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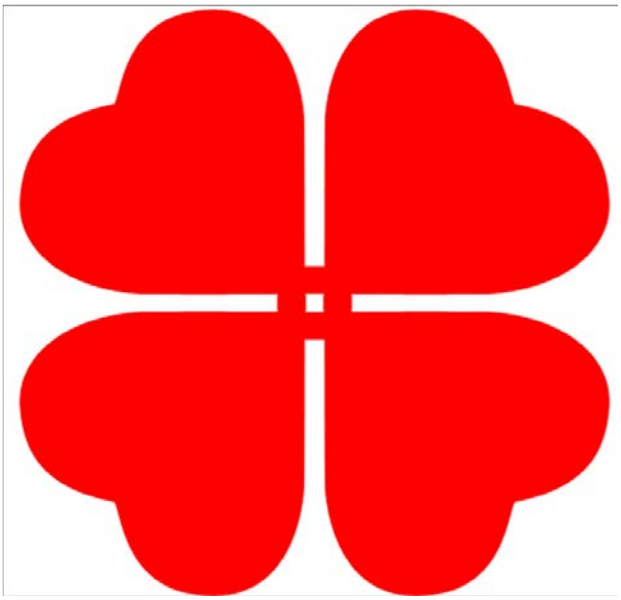

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Editorial

Gilbert C. Viela, MD

Many moons ago, the entire country played perpetual victim to its climate. Victims of the dry and wet spells, the Filipino nation accepted its fate that it is the mercy of the rain and of the sun. During the dry season, rice fields dry up, cities cue up for water rationing, and food prices soar up. During the wet season, the rain soaks the land incessantly, fills up the rivers to the brim, sea shores extended in wards the land as storm surges, lives are lost. Many moons ago, we cannot prepare for such eventualities.

Many moons ago, we cannot respond well to the calamities. But not since the science of weather prediction has improved. Science predicted the climate changes, science predicted the intensity of the dry spells, and during the rainy seasons it predicted the amount of rainfall. Science created models of pathways of storms. Science predicted dimensions, width, and strength of typhoons. Science enabled the nation not just to react to its climate but to handle the weather disturbances efficiently. Without systematized studies, man would always be victim of his environment, of his circumstances, and of his diseases. Science enabled. Science improved. Science saved.

Now as we read through the amazing works of people included with this new edition of the Philippine Heart Center New we are opened to change and to encouragement. The science written here questioned old truths and suggested new realities that paves way to growth and development. There are always better ways of doing things. Finding the better way could be done repeatedly, making it a habit, and making it a guideline for future reference. Then these habits, as time turns, will be revisited and reviewed. It will again pave way to newness and a brighter future.

I say, “Hail to this researchers and to their researches”. They open the gates to tomorrow.

Have fun reading.

Consultant's Corner

Transcatheter Intervention of Congenital Heart Diseases: 40-Years Philippine Heart Center experience

Juan G. Reganion, MD, FPCC, FPSCCI
Chief, Section of Pediatric Invasive Cardiology

Congenital Heart Diseases (CHD) still rank as one of the top ten leading causes of pediatric morbidity and mortality in the Philippines. Its incidence of 5-10/1,000 live births is high among children with congenital anomalies. It is divided into two big groups; the cyanotic and acyanotic types of CHD. Ventricular Septal Defect (VSD), Atrial Septal Defect (ASD), and Patent Ductus Arteriosus (PDA) represent the more common acyanotic type. They are also known as the shunt lesions because of their characteristic left-to-right shunting hemodynamics. Tetralogy of Fallot (TOF), the most common cyanotic CHD along with Truncus Arteriosus (TA), Pulmonary Valve Atresia (PVA), d-Transposition of the Great Arteries (TGA) and Double-Outlet Right Ventricle (DORV) represent the other group.

Historical Background: Since 1975 when the Philippine Heart Center (PHC) was established as a premier cardiovascular institution catering to heart diseases in both pediatric and adult patients, surgery is the only corrective option in treating CHDs for several years. Cardiac catheterization procedures in the section of invasive pediatric cardiology were almost all diagnostic studies in the first 20 years of PHC existence. But beginning in 1994 up to 2014, the latter 20 years, there is a continuous downward trend of purely diagnostic hemodynamic studies (HS), from a high of 308 HS procedures in 1994 down to a low 88 HS cases in 2014 (*Fig. 1*). In contrast, there is a progressive and consistent upward tick of therapeutic interventional procedures in the same period with a very steep rise in the second half of the first decade of the new millennium. (*Fig. 2*) The highest census in this period is in 2014 with a total of 241 cases of transcatheter CHD intervention. Interposing these two contrasting statistics, the census lines intersect at the time or years between 2009 and 2010. (*Fig. 3*). This is the golden era of interventional pediatric cardiology where the confluence of new devices, state-of-the-art hardwares, innovative techniques, and administrative support combined to fulfill the vision of the section- that is to be the best world-class center and section for transcatheter intervention of congenital heart diseases – in training, service, innovation, research, and reach provincial and international missions. The PHC section of Pediatric Invasive Cardiology is still the leader and spearhead of this highly-specialized field in cardiology. It is the best in the country and at par with the global standard.

The Present Status and Role in Interventional Cardiology: Today, the PHC section of invasive pediatric cardiology has already achieved unequalled accomplishments not just in terms of numbers and cases but also in innovations and forward-looking visions. In collaboration with the congenital section of the Thoracic and Cardiovascular Surgery (TCVS) Department, hybrid procedures are being started with a plan of putting up a HLHS (hypoplastic left-heart syndrome) team. Surgical cases for CHDs are also reduced by the transcatheter device closure shunt lesions and the innovative use of PDA stenting in combination with either or both BAS (balloon atrial septostomy) and PPBV (percutaneous pulmonary balloon valvuloplasty) procedures

in cyanotic neonates and young infants. This in effect unloads some of the BTS (Blalock-Taussig Shunting) and open-heart surgical procedures from the surgeon's shoulders and eventually improving the outcome of these cases. For the past 10 years, the total number of transcatheter interventions done on CHDs is 930 cases. It is broken down to 585 device closure for shunt lesions – 485 PDA, 39 ASD, 61 VSD; and 345 cases for other CHD interventions as follows: 163 BAS, 126 PPBV, 17 PTMC, 10 PDA stenting and 29 multi-interventional procedures (PDA stent + BAS + PPBV). There is a total of 31 cases of PDA stenting but 21 of these are multi-interventions in combination with either/or both BAS and PPBV. Only 10 cases of PDA stenting are single-procedure intervention. (*Fig. 4*)

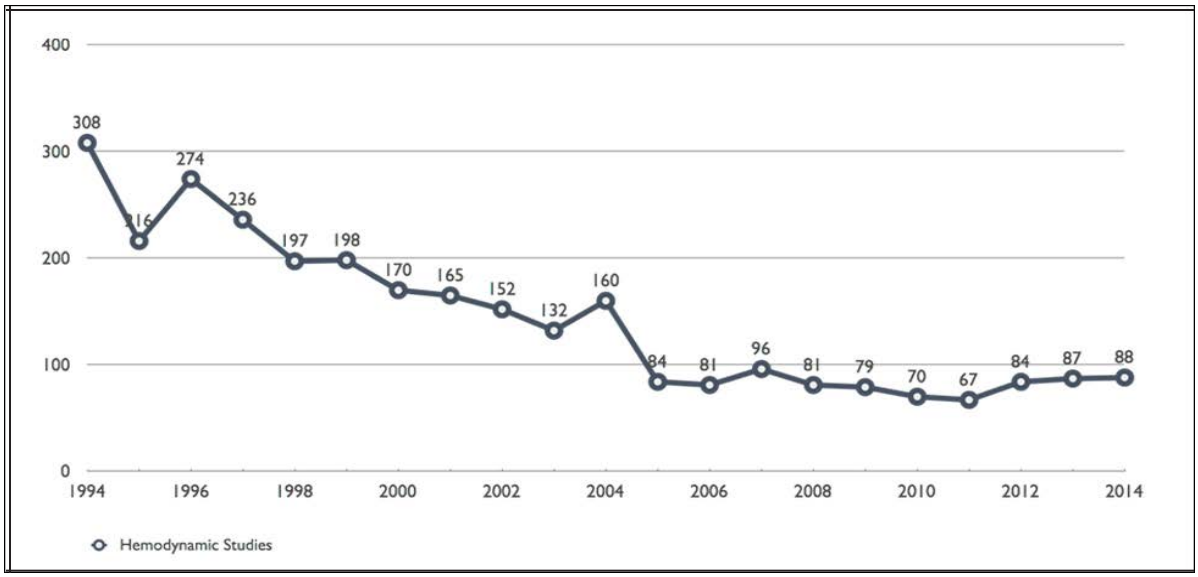


Figure 1. Frequency of Hemodynamic Studies from 1994 to 2014 at the Philippine Heart Center. Note that there is a downward trend in the number of diagnostic hemodynamic studies from 1994 to 2014.

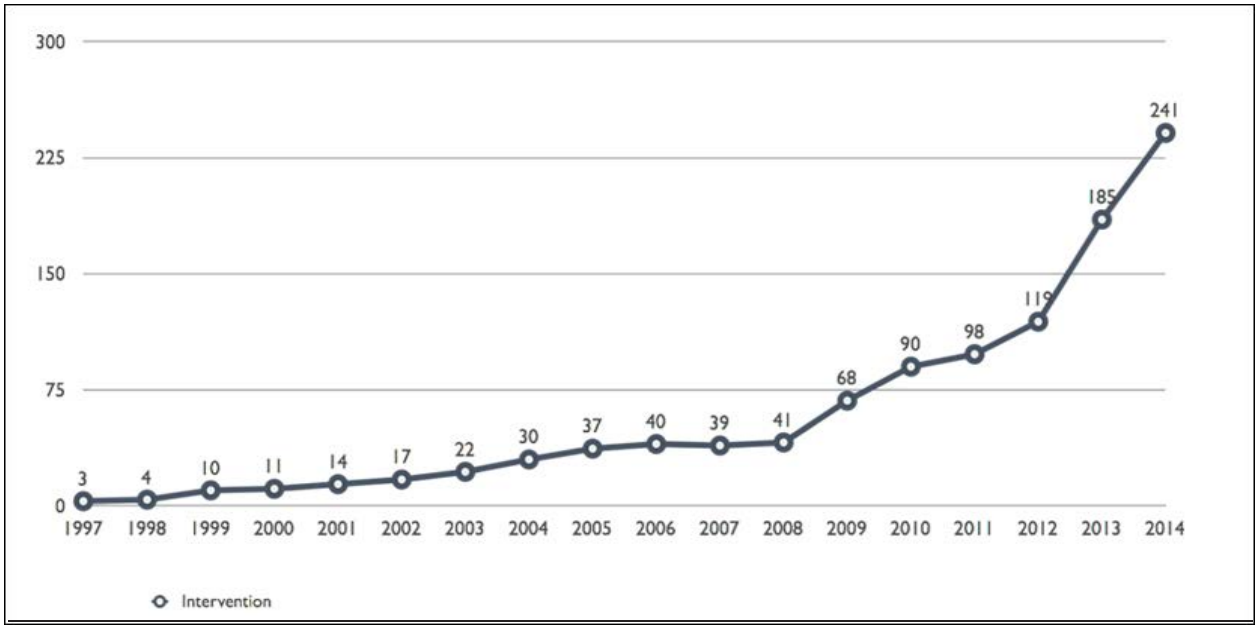


Figure 2. Frequency of Therapeutic Interventional Studies from 1997 to 2014 at the Philippine Heart Center. Note that there is an upward trend in the number of therapeutic interventional procedures with the highest number at 2014.

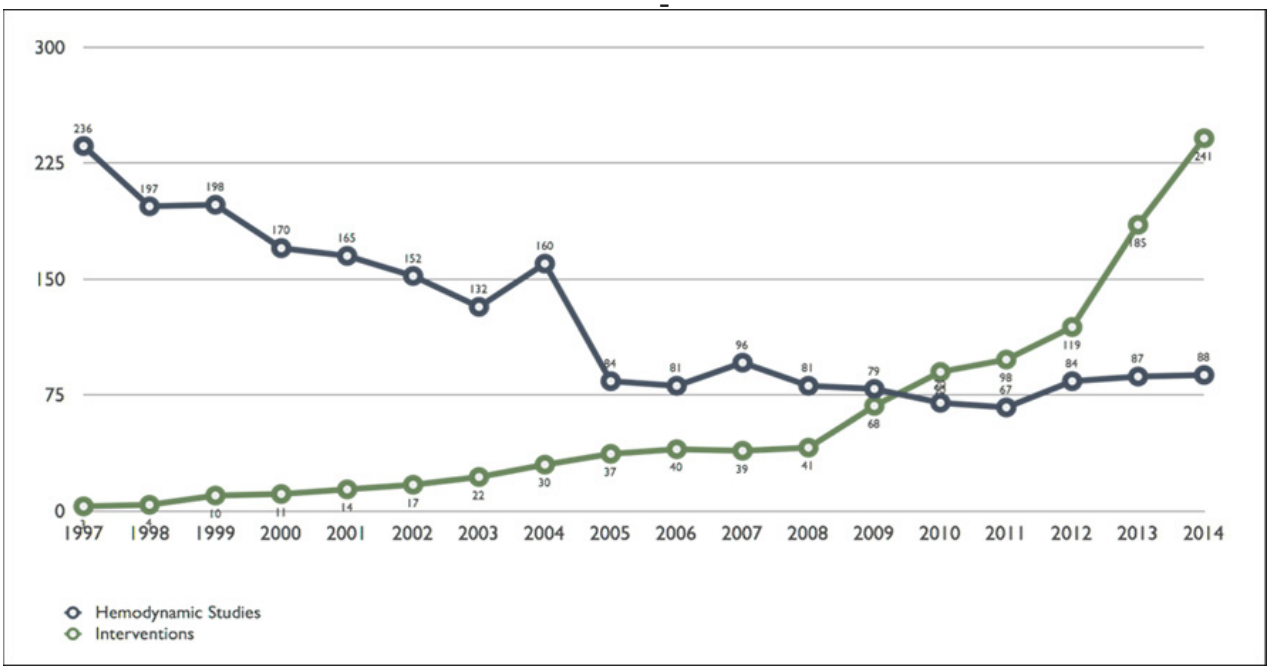


Figure 3. Line graph depicting the volume of diagnostic (hemodynamic studies) and therapeutic interventions from 1997 to 2014 at the Philippine Heart Center. The intersection is at 2009-2010, which is the golden period of interventional pediatric cardiology.

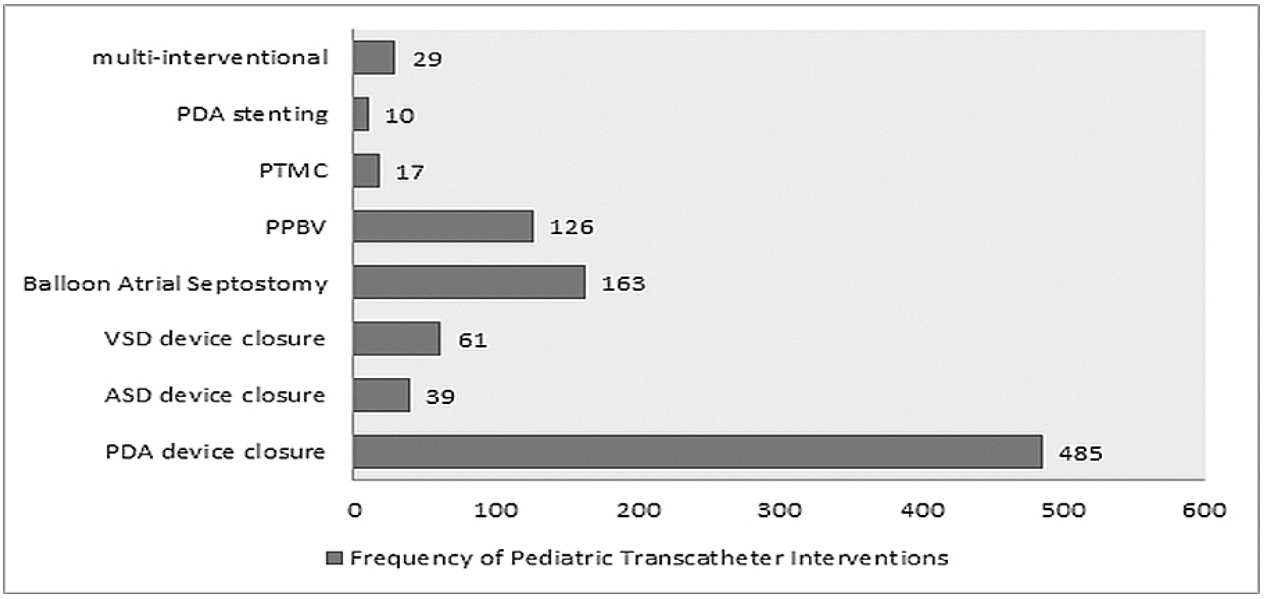
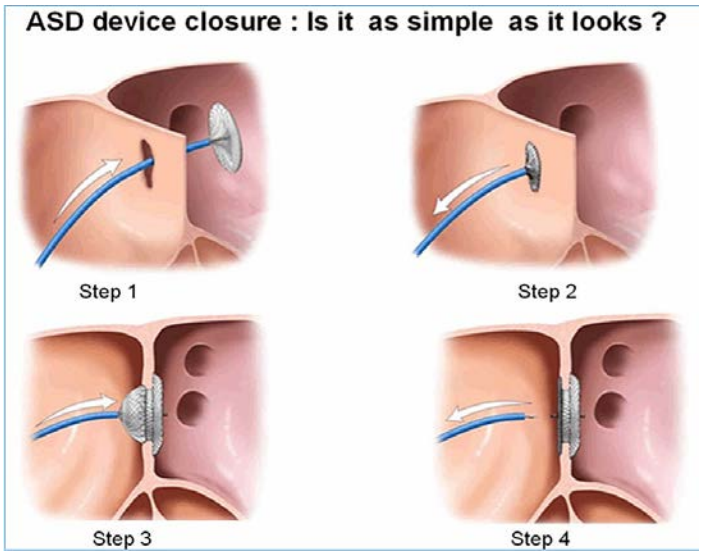


Figure 4. Frequency of Pediatric Transcatheter Interventions from 2004 to 2014 at the Philippine Heart Center
PTMC - percutaneous transvenous mitral commissurotomy PPBV - percutaneous pulmonary balloon valvuloplasty

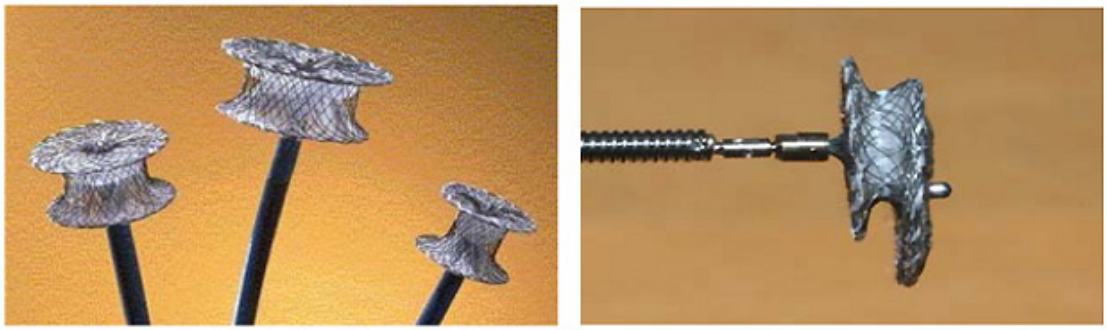
1. Atrial Septal Defect : ASD transcatheter device occlusion procedure has a strict inclusion criteria reflecting the small number of cases done in the cardiac catheterization laboratory (CV Lab). All the four septal rims surrounding the defect – anterior, posterior, superior, and inferior – must be adequate enough and stable for the device to latch on before it is considered for transcatheter closure. In addition, the procedure is dependent on transesophageal echocardiogram (TEE) for the accurate sizing of the ASD and determination of adequate septal rim tissues. (*Pictures 1 and 2*)



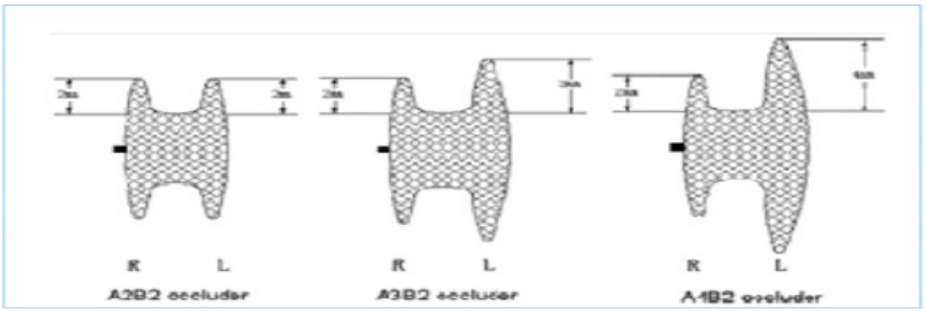
Picture 1. Cartoon depicting the steps in ASD Device Closure

Picture 2. Transesophageal echocardiogram (TEE) of ASD Device Closure

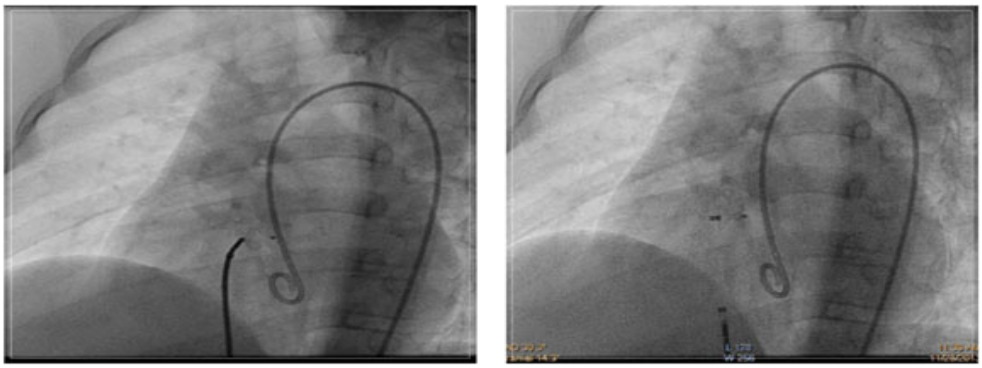
2. Ventricular Septal Defect : In contrast to ASD, the number of VSD cases is increasing due to in large part to the suitability of the anatomical lesion and the stretching of the indications by the influx of new innovations in device technology. Originally indicated only for muscular types of VSD, transcatheter device occlusion can now be done in perimembranous (the most common) and even subpulmonic types. Only an adequate septal defect-to-aortic valve cusp distance of >0.3cm is needed to close a perimembranous VSD. Even VSDs with ventricular septal aneurysmal (VSA) tissue can be closed by using either an asymmetric or an eccentric model of VSD occluders. For subpulmonic types, a coil occluder (PFM Nit-Occlud) can be used to close it. (*see Pictures 3 to 5*) In further overstretching the indication, VSDs with severe pulmonary artery hypertension (PAH) can still be occluded depending on the response during the trial device occlusion test. The trial occlusion of the defect simulates surgical closure and tests the reversibility of the PAH process by real-time monitoring of the pulmonary, systemic, right and left ventricular pressures in situ. If the pulmonary arterial pressure (PAP) decreases with stable systemic pressure on occlusion, then the device is permanently deployed and released. If the opposite happens, the device is then recaptured and retrieved; after which, the patient is referred to the PAH clinic for 6-month pulmonary vasodilator regimen and a repeat the trial occlusion test is done for the last time. At present, a working protocol for this subset of patients is operational.



Picture 3. Examples of VSD Occluders



Picture 4. Graphic representation of VSD Occluders



Picture 5. VSD device closure under fluoroscopy

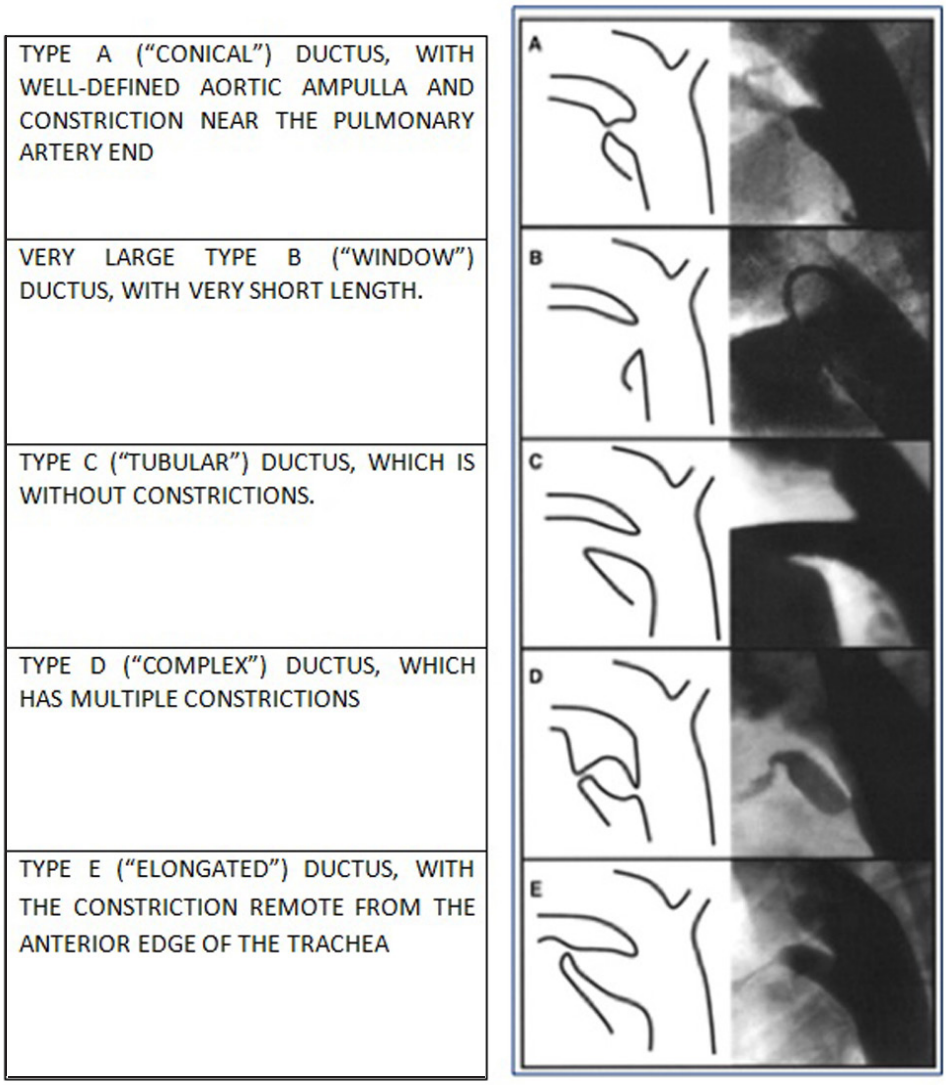
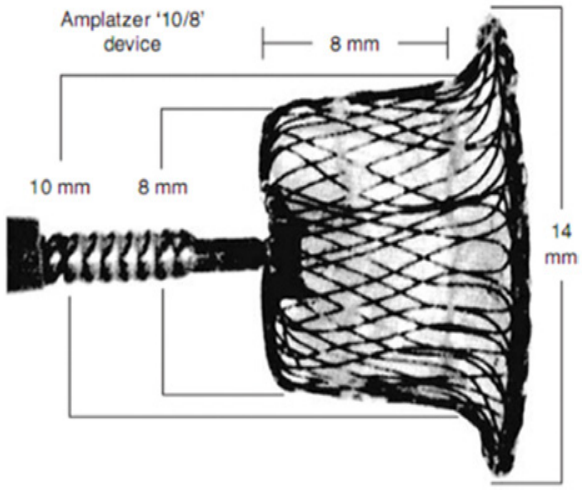


Figure 5. Illustration of the different types of Patent Ductus Arteriosus
http://circ.ahajournals.org/content/114/17/1873/F2.large.jpg

3. Patent Ductus Arteriosus : Globally patent ductus arteriosus are being closed in the CV Laboratory by transcatheter occlusion. There is almost no more role for surgery in closing PDAs in children and rare surgical options are reserved for very special exemption cases and for training purposes. In the PHC section of pediatric invasive cardiology last year, there is a total of 171 cases of PDA closed in the CV Laboratory and only 31 done in the operating room. Almost all PDA types from the common conical to large tubular, kissing, and elongated variations are closed via transcatheter occlusion. Only 31 cases are given to the TCVS section for training purposes and for very large ducts with no available occluder size. Two cases of device embolization were also referred for surgical intervention. Over-all morbidity rate is 1.2% which is comparable to the global rate of 1-5%. The morbidities are due to device embolization, bleeding, hypertensive crisis, mild adverse reaction, and device malfunction. (*see Fig. 5 and Pictures 6 & 7*)



Picture 6. Amplatzer device used in PDA device closure
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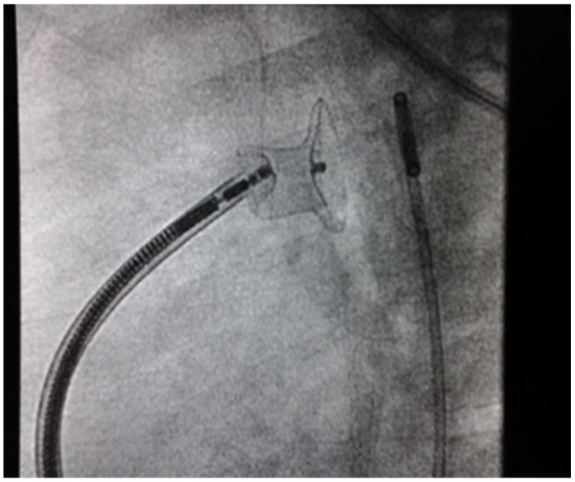


Picture 7. PDA device closure under fluoroscopy

Other CHD Interventions: 1st-or 2nd-Stage Palliation and Emergency Life-Saving Procedures :

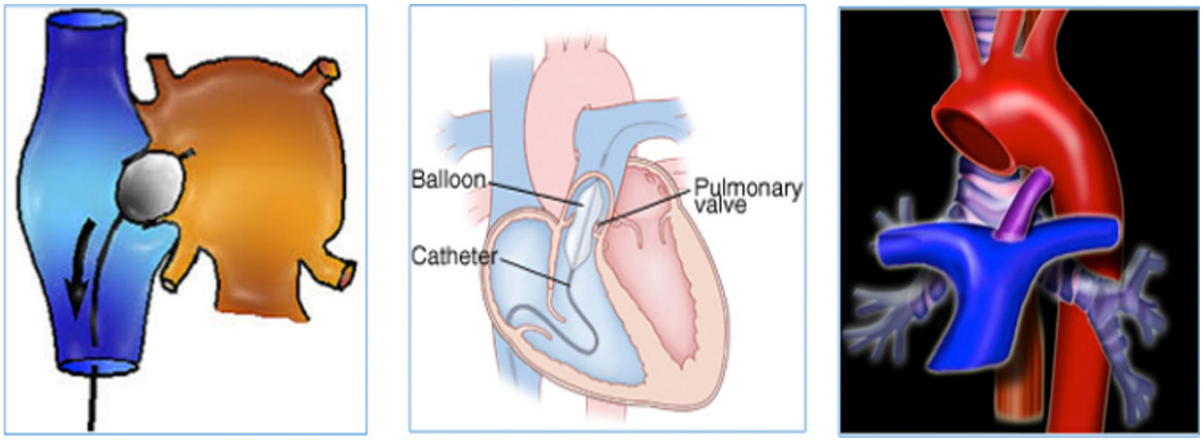
1. Balloon Atrial Septostomy (BAS) : Majority of the 163 BAS cases done for the past 10 years are on cyanotic neonates and very young infants as life-saving emergency palliative procedure. The cardiac lesions ranged from right-sided obstructions (PVA, Critical PS, TS, TVA) to d-TGA and few cases of TAPVR. Innovative techniques and approaches were tried and tested successfully. Femoral and umbilical venous approach for neonates to bedside PICU- vs.- CV Laboratory settings were used depending on the clinical status and urgency of the need for intervention. Wide choices of balloon catheters e.g. Rashkind and Z-5 and smaller tissue-friendly sheaths made the procedure shorter and easier, very critical for successful outcome in critically-ill cyanotic neonates. Sometimes BAS is combined with other procedures in a 2-in-1 or 3-in-1 multi-intervention with PPBV and PDA stenting depending on the cardiac anatomy, hemodynamics and angiograms, clinical status and definitive surgical plan in the future.

2. Percutaneous Pulmonary Balloon Valvuloplasty (PPBV) : PPBV is ideally intended for corrective and definitive purpose. But in some cases where the pulmonic valve is so fibrosed and thick or outright dysplastic it becomes palliative and repeat valvuloplasties or open-heart pulmonic valvotomy is needed as 2nd-stage corrective procedure. Of the 126 PPBV cases done, 5 were dysplastic valves needing open-heart pulmonic valvotomy surgery and 6 patients needed repeat transcatheter valvuloplasties. The high success rate of PPBV in the past decade is due to the availability of the highly effective Tayshak balloon which replaced the old Mansfield device.

3. Percutaneous Transmitral Commissurotomy (PTMC) : Although PTMC procedure is in the realm of adult interventionalists, the section of pediatric invasive cardiology was still able to perform it in 17 adolescent patients in the past 10 years. The age ranges from 14 to 19 years old and all were Rheumatic Heart Disease cases – either as missed diagnoses or neglected cases with poor IE-prophylaxis compliance.

4. PDA Stenting and Multi-interventional Procedures : The first PDA stenting procedure done on a cyanotic neonate with duct-dependent lesion was performed at PHC in 2004. Since then, the procedure evolved into something different and very useful for complex cyanotic heart lesions. Originally intended as life-saving intervention in cyanotic infants and

neonates in conjunction with prostaglandin infusion to keep the duct patent and increase pulmonary blood flow thereby increasing oxygen saturation, it is now combined with either/or both BAS and PPBV. It still serves as emergency life-saving procedure for duct-dependent lesions, but as part of a multi-procedural intervention it now offers more uses and wider options and plans for both the TCVS and Pediatric Cardiology teams. It can serve as a palliative preparatory stage for either a one-and-a-half or single ventricular repair or as a first stage corrective procedure towards the more ideal anatomic and physiologic biventricular surgery. The clinical status, O2 saturation, intracardiac anatomy, purpose of palliation, and future definitive plan dictate the interventional procedures to be combined with or without PDA stenting. The main determinants of plan eventually are the RV morphology and the status of the RVOT and pulmonic valve. If the RV is of good anatomy with tripartite morphology and the pulmonic valve is not totally atretic and amenable to valvuloplasty, then gradual staged PPBV is done starting with coronary balloons and increasing sizes of Tayshak catheters up to the target pulmonic valve annulus size. If still desaturated despite the PPBV and the PDA is stent-friendly, PDA stenting is then done. This pathway favors the ideal biventricular surgical repair in the future. If this condition is not met and the RV morphology is primitive (unipartite or bipartite) and the pulmonic valve is really atretic then BAS + PDA stenting is the next best option and the future plan is towards a 1 and ½ to single ventricular repair or the Glenn-Fontan surgical pathway. There are 10 PDA stenting cases done as a single procedure since 2004 but a total of 31 such cases if the 21 PDA stentings in combination with either/or both PPBV and BAS are included. Multiple interventions in any combination of PDA stenting+BAS+PPBV as 2-in-1 or even 3-in-1 procedures totaled 29 cases for the past 10 years. Five of these are a 3-in-1 multi-interventional procedure of BAS + PDA Stenting + PPBV. Regional and global trend for this innovation is further modification of this protocol towards a minimalist but idealist approach. Foremost is the determination if the RV is suitable and the pulmonic valve is PPBV-friendly. If so, only PPBV is done and the response is observed real-time at the CV Lab. If there is a very good response, then PPBV is enough preparatory palliative stage for biventricular repair. If there is no good response, only then is PDA stenting done. BAS is last reserved for very primitive RV anatomy. This modified protocol is also being done in the PHC section of Invasive Pediatric Cardiology. Our short-term experience of just one patient so far showed a promising result of this modification of an already innovative protocol. A 17-day old critically-ill neonate with PVA and intact ventricular septum stabilized first by prostaglandin drip then PPBV alone done November 2013 and sustained O2 saturation of mid-80% up to the time of biventricular repair last October 2014. Last follow-up at February 2015 showed 100% O2 saturation and good 2D echocardiogram result with just mild tricuspid regurgitation and residual PS gradient of 20 mmHg as insignificant findings. (*see Picture 8*)



Picture 8. Illustration of PDA stenting and multi-interventional procedure

The Impact on the TCVS Procedures: Cardiovascular surgeons are always considered equal colleagues of the interventionalists. They are seen from the eyes of interventional cardiologists as collaborators and innovators in their own field – and not as competitors. In the congenital section of Pediatric Cardiology at PHC we as Interventional Congenitalists have a very good relationship with our surgeons. It is a case of a symbiotic relationship with each member trying to help and unload some of the burden and stress from his counterpart. The interventionalists might have encroached on the simple shunt lesions of PDA, ASD and VSD but in the end this is very beneficial to all involved specially the children patients. TCVS congenitalists can now rechannel their energy and expertise towards challenging and more complex lesions. It means perfecting arterial switch (Jatene) operations for d-TGA and zero-casualty outcome for TOF and difficult VSDs. Switching roles and burden, the interventionalists, on the other hand, unload the surgical burden of BTS palliation and open-pulmonary valvotomy of critically-ill infants from the surgeons and preparing these patients for a better outcome in future definitive surgery. The impact of transcatheter interventions in CHDs are not just felt in the CV Laboratory but also in the operating rooms and statistics board with improved outcomes and over-all success rates.

Conclusion: In summary, transcatheter interventions occupy a major role in the present and future to come in the management of congenital heart diseases. The innovations and technological advancements in this field of medicine usher a new age of unlimited potentials. Consider the specifics, almost all PDAs can be closed by device occlusion, increasing indications and numbers of VSDs done in the CV Laboratory with stretched indication guidelines, and PDA stenting/multi-interventional procedures saving critically-ill cyanotic neonates. Lastly, the surgeons will always be the collaborators and co-innovators of the interventionalists with the common vision of improving the lives of children with congenital heart disease.

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Survival Analysis of Post Arrest Cardiac Patients at the Philippine Heart Center

Anthony N. Lontoc, MD; Gerard S. Razon, MD

Background **---** There are many factors affecting successful cardiopulmonary resuscitation. One is the patient's characteristic which includes age, sex, and co-morbidities. Likewise, the quality of the resuscitation which is dependent to the latest guideline set by international medical specialist organization like American Heart Association and the very people conducting the resuscitation have large impact in the outcome. The objective of this study is to determine the factors affecting the outcome of cardiopulmonary resuscitation in cardiopulmonary arrest patients in our own local setting.

Method **---** Patients admitted in Philippine Heart Center (PHC) who were more than 18 years old and had cardiopulmonary arrest (CPA) and was administered with ACLS by the Philippine Heart Center Medical Emergency Event (PHC MET) team was included in the study. Patients with "Do Not Resuscitate" (DNR) status, before and during first arrest and CPA at the emergency room or operating room were excluded. All data from eligible patients who received ACLS from July 2010 to June 2011 were retrieved and reviewed. Patients who were successfully resuscitated were categorized to Group I and were followed up during the hospital stay to determine outcome on discharge. Patients who were unsuccessfully resuscitated or who had death were categorized to Group 2. Pre-arrest and arrest variables were recorded and analyzed between two groups.

Results **---** One hundred seventy-five (175) patients from January to December 2010 were enrolled in the study; 102 patients who were successfully resuscitated were categorized under revived group (Group 1); and 73 patients who expired despite CPR were categorized under the mortality group (Group 2). Baseline characteristics between two groups were similar except for the presence of diabetes which was noted to be statistically significant in the mortality group. There were 92 patients under the cardiac group and 83 patients under the non-cardiac group. More patients arrested in the ward for Group I (60%) and critical care unit in Group II (61%). There is no predilection between duty and off-duty hours in both groups (46% vs. 54% and 47% vs. 57% respectively. Arrhythmia was shown to be significantly associated with unsuccessful resuscitation ($p<0.001$) in the cardiac group. Asystole/PEA was noted to be the most common initial ECG on arrest for the two groups. (69% and 77%). More than 90% of cases, the MET team arrived within one minute time. CPR duration of more than 30 minutes significantly was associated with mortality both groups. ($p<0.001$). Only 27 patients were discharged after CPR. 32 (43%) patients expired, 42 (56%) signed for a DNR status and one (1%) decided for discharged against medical advice. Among these patients who eventually expired, the non-cardiac cases were significantly associated with mortality compared with the cardiac group ($p=0.001$).

Conclusion **---** The presence of diabetes is significantly associated with unsuccessful resuscitation in cardiopulmonary arrest patients. However, we cannot ignore that other factors such as age, smoking and alcohol history, and other co-morbidities plays a major influence in the outcome of CPR which was not shown in this study. The site and timing of the arrests and the category of the patient does not affect the outcome. The PHC MET team arrived on time. Prolonging of CPR for more than 20 minutes was significantly associated with mortality, and thus, we can consider terminating resuscitative effort to ease the burden of both the family and medical team especially if the prognosis is poor. ***Phil Heart Center J 2015;20(1):10-19.***

Key Words: Cardiopulmonary resuscitation ■ cardiopulmonary arrest ■ In-hospital survival ■ PHC Medical Emergency Event Team

The Philippine Heart Center (PHC) is an institution that specializes in diverse cardiac diseases. It is equipped with competent and skilled practititioners who are up to date

Correspondence to ***Dr. Anthony N. Lontoc, MD,*** Department of Adult Cardiology. Philippine Heart Center, East Avenue, Quezon City, Philippines 1100 Available at **http://www.phc.gov.ph/journal/publication** 2015 ISSN 0018-9034

with the latest sciences and knowledge in the field of cardiology. However, with all the advancement and breakthroughs, one will face an unavoidable death in their practice when everything fails. This is the very reason why international specialty medical organizations such as the American Heart Association (AHA) is constantly revising and updating its guidelines in cardiopulmonary resuscitation (CPR) based on the latest evidence gathered across the globe.

The recent release of the AHA Guidelines in Cardiopulmonary Resuscitation last 2005[1] had remarkably helped doctors and other healthcare personnel to perform a more effective and reliable CPR in patients who experienced cardiopulmonary arrest. Doctors and medical staffs especially in PHC were trained to be competent in performing CPR using the AHA 2005 guideline. However, one must be knowledgeable of the different factors or variables that would influence outcome of CPR. This will include the unresolved conflict involving the of the duration limit of CPR. Recognizing these factors will undoubtedly provide insight and appropriate judgment that would aid in the decision making separating judicial aggressiveness to futile attempts. A number of studies involving patients who experienced cardiopulmonary arrest were done. Most of them illustrated a number of factors that may affect both short and long term survival of post arrest patients. Hypertension, diabetes mellitus, renal failure and other organ involvement prior arrest tends to increase mortality in post arrest patient. Age and sex have also been studied as predictor. However, age have conflicting evidence that it did not show any influence for short term mortality.[2] One recent study, ventricular fibrillation (VF) and tachycardia (VT) is more favorable than pulseless electrical activity (PEA).[3] In the same study, PEA and asystole were the initial electrocardiographic examination noted in cardiac arrest and that delaying the defibrillation among patients with VT/VF is associated with poor survival after cardiac arrest.[2]

Derangements in blood glucose had been studied to have a major impact in a successful CPR. Hyperglycemia is common in diabetics and non-diabetics following in-hospital cardiac arrest. It was noted that survival was decreased with severe (>240 mg/dL, >13.3 mmol/dL) hyperglycemia especially in diabetics and in non-diabetics, survival odds were sensitive to hypoglycemia (<70 mg/dL, <3.9 mmol/L).[4] In addition, timing of arrest can also contribute to the success of CPR. In one recent study, survival rates from in-hospital cardiac arrest are lower during nights and weekends.[5] However, there is no solid evidence or recommendation pertaining to the duration of the CPR in a patient who persistently has no hemodynamic response. One study had shown that CPR of more than 10 minutes is associated with poor prognosis and high likelihood of death.[6] This dilemma often leads to unnecessary burden and anxiety in both the medical team and the family.

This study was done to determine the factors affecting the outcome of cardiopulmonary resuscitation in cardiopulmonary arrest patients and to determine the predictors of survival to discharge in patients who endured cardiopulmonary arrest after CPR.

METHODS

This is a prospective cohort study involving adult cardiac patients admitted at PHC, experienced cardiopulmonary arrest and was administered with Advanced Cardiac Life Support (ACLS) by the PHC MET (Medical Emergency Team) team. The following were excluded in the study: DNR status, before and during first arrest and cardiopulmonary arrest at the emergency room or operating room.

All data from eligible patients who received ACLS from July 2010 to June 2011 were recorded using the MET form. The recording of data were accomplished by the assigned nurse and verified by the adult cardiology fellow of the PHC MET team. All personnel were oriented by the investigator. The following factors were extracted from the MET form and medical chart: pre-arrest variables (demographic data, co-morbidities, arrest setting and time of event); and arrest variables (presenting cardiac rhythm, immediate cause of arrest,

event time intervals and duration of CPR). Patients who were successfully resuscitated were followed-up during the hospital stay to determine outcome. This study and a waiver of informed consent was approved by the Institutional Ethics Review Board. Eligibility for waiver of informed consent was requested from Institutional Review Board for this study because of the following reasons: the risk to the subjects' privacy is minimal; the investigators of this study will only obtain information from the MET form and medical records and no sensitive information will be collected; and this research cannot be practicably conducted without the waiver. The study will involve patients who went into cardiopulmonary arrest, whereas some of them may not be successfully resuscitated. Obtaining informed consent from these patients and/or relatives cannot be practicably done (since investigator cannot be present in all CPR) and sometimes be misconstrued to be insensitive. The investigator did not disclosed protected health information beyond the scope of the research.

Sample Size: Assume 18.1% survival to discharge with 95% level of confidence (α= 0.05 and relative error of 10%, the sample size is n >228. The assumed survival was based on the paper of Pebedy et al.[10]

Statistical Analysis: Continuous data were presented as mean + SD, while categorical variable were presented in frequency and percent distribution. Association of the different variables with the outcome was carried out using independent t-test, Mann-Whitney u-test or Chi-square test whichever is applicable. A p <0.050 were considered significant.

RESULTS

One hundred seventy-five (175) patients from July 2010 to June 2011 were enrolled in the study. One hundred two (102) patients who were successfully resuscitated were categorized under revived group (Group II) and 73 patients who expired despite CPR were categorized under the mortality group (Group II). Baseline characteristics between two groups were similar except for the presence of diabetes which was noted to be significant in the mortality group (*Table 1*). Mean age was 63 $\pm$ 15. No drug user was noted. Compared to Group I, patients in Group II have more cases of HPN (63% vs. 68%), coronary artery disease (50% vs. 62%), CAP and/or HAP (39% vs. 45%), CKD/ESRD (37% vs. 47%), and shock requiring triple vasopressor therapy (18% vs. 30%) who resuscitated unsuccessfully but were all statistically insignificant. The presence of malignancy only showed trend towards mortality. The two groups were further divided to cardiac and non-cardiac for analysis of the association of the arrest variables with the outcome of resuscitation.

There are 92 patients under the cardiac group (*Table 2*); 35 patients (40%) arrested in the regular ward while 57 (60%) patients arrested in the critical care units. There are more patients admitted under private category (75%) than under service category. There is no predilection between duty and off-duty hours (46% vs. 54%). Hypotension was the most common immediate cause of arrest (42%) in this group. However, arrhythmia was shown to be significantly associated with unsuccessful resuscitation (p<0.001). In terms of the initial ECG reading upon arrest, 69% were noted to be asystole or pulseless electrical activity. Thirty percent (30%) were in ventricular tachycardia or ventricular fibrillation. 93% of cases, the MET team arrived within one minute time. Late arrival is the primary cause of delay in the giving of necessary medications and providing effective airway. Nonetheless, none of these appear to be significantly associated to mortality. CPR duration of more than 30 minutes significantly was associated with mortality (79%).

There were 83 patients under the non-cardiac group (*Table 3*); 61% of the patients had CPR at the critical care wards that statistically only showed trend compared to the regular ward. Sixty-nine (69) patients (75%) were admitted under private category. Cardiopulmonary arrest was likewise to be evenly distributed within the duty and off duty hours. Sepsis was the most common immediate cause of arrest (41%) followed accordingly by cerebrovascular disease, arrhythmia, renal failure and hypoten-

disease, arrhythmia, renal failure and hypotension. Most of the presenting ECG on arrest showed asystole or pulseless electrical activity of 77% but were statistically insignificant. More than 90% of events, the MET team were able to arrive within one minute time. There was only one incident that the team arrived after one minute. And one incident was noted wherein an effective airway was established after two minutes but subsequently expired. The longest resuscitation effort was recorded to be more than 40 minutes. CPR duration of more than 20 minutes was statistically associated with mortality.

Upon follow-up of the 102 patients who were successfully resuscitated after the first event, only 27 of them were subsequently discharged (*Figure 1*); 32 patients expired, 42 signed for a DNR status and one decided for discharged against medical advice. Among these patients who eventually expired, the non-cardiac cases were significantly associated with high mortality compared with the cardiac group (*Table 4).*

Table 1. Baseline Demographic Data Showing Association of the Pre-arrest Variables with the Outcome of Resuscitation (PHC, 2012)

Characteristics	**Revived** (n=102) Mean ± SD / No. (%)	**Mortality** (n=73) Mean ± SD / No. (%)	p-value
Age	63.70 ± 14.54	63.16 ± 15.52	0.817
Male Gender	54 (53)	47 (64)	0.163
Smoker	41 (40)	27 (37)	0.876
Alcoholic	30 (29)	14 (19)	0.221
Drug User	0	0	n/a
Comorbidities			
HPN	64 (63)	50 (68)	0.520
DM	38 (37)	43 (59)	0.006
CAD	51 (50)	45 (62)	0.165
RHD/VHD	11 (11)	8 (11)	1.000
CAP/HAP	40 (39)	33 (45)	0.441
COPD	15 (15)	12 (16)	0.833
CKD/ESRD	38 (37)	33 (45)	0.349
CVD	17 (17)	13 (18)	0.842
Malignancy	5 (5)	10 (14)	0.055
Sepsis	39 (38)	22 (30)	0.335
Shock (triple vasopressors)	18 (18)	22 (30)	0.079

Table 2. Association of the Arrest Variables with the Outcome of Resuscitation in Cardiac Cases (PHC, 2012)

Characteristics	**Revived** n = 65 n (%)	**Mortality** n = 27 n (%)	p-value
Arrest Setting			
Ward	30	5	0.053
CCU/CV Lab/ICU	35	22	
Admitting Category			
Service	14	9	0.355
Private	51	18	
Time of Event			
AM (7am - 7pm)	26	16	0.111
PM (7pm - 7am)	39	11	
Immediate Cause			
Ischemia	15	5	0.970
Hypotension	30	9	0.603
Arrhythmia	12	21	<0.001
Presenting Cardiac Rhythm			
Asystole/PEA	47	16	0.755
VF/VT	17	11	0.141
Bradycardia	1	0	1.000
Tachyarrhythmia other than VT/VF	0	0	n/a
Onset to Arrival of MET			
<1 minute	59	27	0.175
≥1 minute	6	0	
Onset of ACLS			
<1 minute	59	27	0.175
≥1 minute	6	0	
Onset to Institute Medications			
<1 minute	59	27	0.175
≥1 minute	6	0	
Onset to Defibrillate			
<1 minute	22	11	n/a
≥1 minute	0	0	
Onset to Start and Effective Airway			
<1 minute	36	14	0.269
1-2 minutes	4	0	
>2 minutes	0	0	
CPR duration (min)			
<10 minutes	33	0	<0.001
10-20 minutes	14	0	
21-30 minutes	12	4	
>30 minutes	6	23	

Table 3. Association of the Arrest Variables with the Outcome of Resuscitation in Non – Cardiac Cases (PHC, 2012)

Characteristics	**Revived** n = 65 n (%)	**Mortality** n = 27 n (%)	p-value
Arrest Setting			
Ward 32 (29)	12	20	0.423
CCU/CV Lab/ICU 51 (61)	25	26	
Admitting Category			
Service 9 (11)	4	5	1.000
Private 74 (89)	33	41	
Time of Event			
AM (7am - 7pm) 47 (57)	22	25	0.663
PM (7pm - 7am) 36 (43)	15	21	
Immediate Cause			
Hypotension 6 (4)	0	6	0.031
Arrhthmia 15 (18)	5	10	0.496
Renal Failure 7 (18)	2	6	0.289
Cerebrovascular Disease 20 (24)	10	10	0.763
Sepsis 34 (41)	19	15	0.133
Presenting Cardiac Rhythm			
Asystole/PEA 64 (77)	27	37	0.588
VF/VT 11 (30)	5	6	1.000
Bradycardia 6 (1)	4	2	0.400
Tachyarrhythmia other than VT/VF 2 (2)	1	1	1.000
Onset to Arrival of MET			
<1 minute 82 (99)	37	45	1.000
≥1 minute 1 (1)	0	1	
Onset of ACLS			
<1 minute 82 (99)	37	45	
≥1 minute 1 (1)	0	1	
Onset to Institute Medications			
<1 minute 82 (99)	37	45	1.000
≥1 minute 1 (1)	0	1	
Onset to Defibrillate			
<1 minute 15 (100)	5	10	n/a
≥1 minute			
Onset to Start an Effective Airway			
<1 minute 39 (85)	17	22	0.107
1-2 minutes 6 (14)	6	0	
>2 minutes 1 (1)	0	1	
CPR duration (min)			
<10 minutes 18 (22)	18	0	<0.001
10-20 minutes 21 (25)	16	5	
21-30 minutes 15 (18)	3	12	
>30 minutes 29 (35)	0	29	

Table 4. Association of Diagnosis in the Mortality Patients After a Successful Resuscitation (PHC, 2012)

Diagnosis	**Mortality**	p-value
Cardiac	41 (63)	0.001
Non-Cardiac	34 (91)	

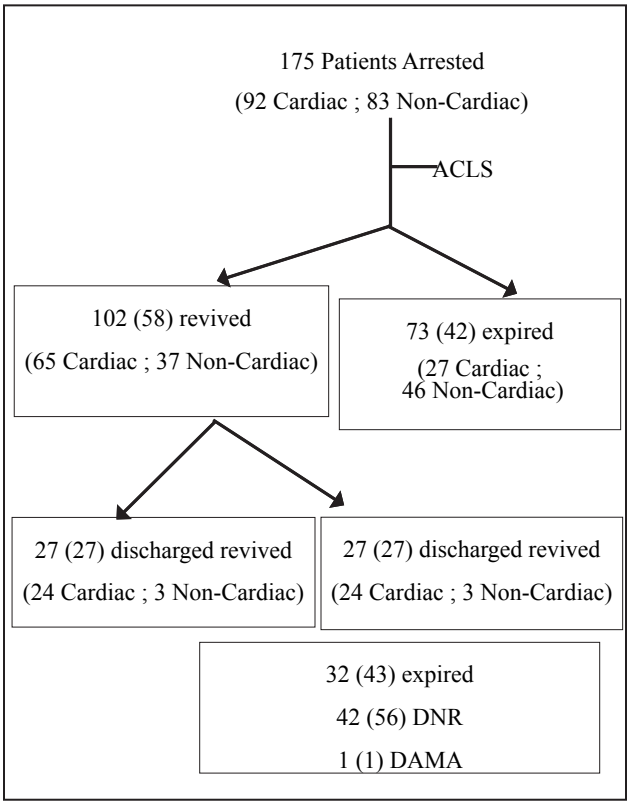

Figure 1. Distribution of patient who underwent ACLS. (PHC, 2012)

DISCUSSION

A total of 175 patients were included in the study from January to December 2010. However, the guidelines that were adapted during the study was an old version (2005) since a new version was published on 2010.[8] We believe that even if there is a new guideline, it will not affect the outcome the study since there were no major modifications particularly in the ACLS part. Baseline demographic data comparing the two groups showed that there were more patients with diabetes and malignancy in the mortality group. One study done in Sweden showed that patients with diabetes had lesser survival to discharge outcome compared to the non-diabetics and that was more associated with the presence of other chronic diseases like renal impairment and heart failure.[9] In a national registry done in Yale University in 2010, the presence of an existing malignancy was associated with in-hospital mortality after arrest.[10] However, according to the same study, other factors such advance age, stroke, sepsis or pre-arrest vasopressor use was associated with poor survival which were not statistically evident in this study. In a meta-analysis by Cohn and et al., factors that strongly predict decreased survival from arrest was age more than 60 years old, renal failure and cancer.[11]

The small population included in this study may account for the deviation of the co-morbidities. One probable reason was the population which was small to account any significance. There was no significant difference among both genders. But in one study by Herlitz et al., women were associated with slightly increased survival to discharge from arrest.[12] Although, women included in that study have lower incidence of co-morbidities compared to men and were less to have ventricular fibrillation or ventricular tachycardia arrhythmias.

The admitting category, arrest time and setting showed no significant association to resuscitation outcome in both cardiac and non-cardiac group.

Survival of patients who were in a critical care ward compared to the ones in a regular ward did not differ statistically. This is in contrast with the study of in Swedish University Hospital were survival was noted more in facilities with monitors.[13] Access to bedside ECG moni-

tors, crash carts and rapid recognition may account for the non-significance of survivability between two in-hospital settings.

Most of these patients were managed by private physicians because only a small proportion of admissions were under service care. More patients arrested in the critical care units since most of the patients admitted here were complicated cases with usually with multiple medical problems and hemodynamically unstable. These events happened throughout the day, during duty and off-duty hours. Because of these data, the MET team of the institution can be recognized to be both efficient and flexible in every CPR event.

Hypotension as the immediate cause was noted to be most common in the cardiac group but arrhythmia was significantly associated with mortality. Thus, it is essential to have a cardiac monitor or bedside ECG immediately available to properly manage such cases. Defibrillators and anti-arrhythmic medications should always be available and routinely checked. In the non-cardiac group, sepsis was the most common and hypotension was significantly associated with mortality. Sepsis is common since most of these patients are relatively immunocompromised and have multiple route or sources for infection like endotracheal tube, catheters, IV lines and nasogastric tubes. Unlike in the cardiac group, the presence of hypotension usually dictates multiple organ involvement that highly suggest poor prognosis.

The MET team of the institution consistently arrived 85-90% of times at the event within one minute. This is important since ACLS is effectively instituted, including giving emergency medications and providing airway, upon their arrival. Arrival after one minute is usually observed during off-duty hours, such as early morning hours. Difficult intubation is still the usual cause of delay in starting effective airway. However, there are measures being followed to address the problem like calling for the aid of the pulmonologist and anesthesiologist. Defibrillation was given appropriately 100% within a minute.

It was noted that the longer the duration of CPR the higher the association in mortality. In both groups, giving CPR for more than 20 minutes increases the rate of mortality. In PHC, it has been a tradition to set CPR to a maximum of 30 minutes before pronouncing the patient. But at 20 minute time, one may consider stopping resuscitative effort especially if the decision will be coupled by other factors related to mortality.

According to the National Registry of Cardiopulmonary Resuscitation, after CPR of 20 minutes, the survival rate is down to 44% and 17% from them were discharged alive.[7] This findings did not deviate so much from this study with 102 (58%) patients who were revived, only 27 (27%) were discharged alive. The rest of the population subsequently expired. It was noted that among the patient who expired, more than half decided for a DNR status.

The study did not include patients who arrested outside the hospital and patients who arrested in the emergency room. Likewise, patients who arrested in the recovery room and surgical suites were not included. The condition of the patient who survived CPR such as the neurologic, renal and functional status was not documented. Comparison of the results from this study to other local studies was not done due to the inaccessibility of the research paper through internet or the main authors.

The presence of diabetes is significantly associated with unsuccessful resuscitation in cardiopulmonary arrest patients. However, we cannot ignore that other factors such as age, smoking and alcohol history, and other co-morbidities plays a major influence in the outcome of CPR which was not shown in this study. The site and timing of the arrest, and the category of the patient does not affect the outcome. The PHC MET team arrived on time. Rarely there was difficulty in giving adequate airway, however, was shown not to affect the outcome. Prolong CPR of more than 20 minutes was significantly associated with mortality, and thus, we can consider terminating resuscitative effort to ease the burden of both the family and medical team especially if the prognosis is poor.

Survival analysis of patients who underwent CPR in PHC should be conducted regularly to evaluate the medical staffs in conducting CPR to maintain their efficiency. However, record keeping remains an immense challenge in this institution and should sought means to drastically improve documentation of all MET event for future study and reference.

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Microalbuminuria and Coronary Artery Disease Among Non-Diabetic Patients Undergoing Coronary Angiogram at Philippine Heart Center

Josephine Matza-Recierdo, MD; Eduardo Tin-Hay, MD

Background --- Microalbuminuria has been associated with microvascular disease. It has been associated with progressive kidney disease and is now correlated with risk of stroke, left ventircular hypertrophy, adverse cardiovascular event and even death. The study aim to determine the relationship between the presence of microalbuminuria and coronary angiographic lesions among non diabetic patients.
Method --- This is a cross-sectional study which involved admitted non diabetic patients with indications for coronary angiography at Philippine Heart Center. Demographic characteristics were obtained. Urinalysis was done to exclude patients with overt proteinuria. Dip stick micral test was done using first void urine prior to coronary angiogram. Presence or absence of microalbuminuria was correlated with coronary artery disease.
Results --- One hundred ten (110) subjects were included in the study. The prevalence of microalbuminuria among patients with coronary artery disease was 32.8%. Twenty-eight percent of the total population had microalbuminuria. Seven percent of the subjects had abnormal waist to hip ratio which was statistically significant (p = 0.032). Among 110 subjects, 23% had normal coronaries and 77% had insignificant and significant CAD. Furthermore, out of 85 subjects with abnormal coronaries, 21 patients comprising 32.8% had microalbuminuria. The correlation between microalbuminuria and coronary artery disease was not statistically significant (p = 0.261).
Conclusion --- Microalbuminuria did not have a significant association with coronary artery disease. The aid of microalbuminuria as an indicator of coronary artery disease among non-diabetic patients was not etablished
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Key Words: Supraventricular Tachycardia ■ Coronary Artery Disease

Microalbuminuria refers to a long-standing increase in the albumin excretion rate to values between 20 and 200ug/min (30 and 300mg/day). It has been persistently recognized as a marker of kidney disease. It is also an early characteristic of generalized microvascular disease and strongly ominous of progressive kidney disease.[1]

Among diabetics, preliminary studies established that microalbuminuria transcribed the earliest clinical manifestation of diabetic nephropathy, and its determination is now recommended for the initial assessment and follow-up of patients. Presently, it is now an adrift predictor of cardiovascular and all-cause mortality among patients with diabetes.[2]

Microalbuminuria is also constantly prevalent among hypertensive. In conjunction with the analysis of the LIFE study on hypertensive patients with electrocardiographic evidence of left ventricular hypertrophy it demonstrated that for every increase of 10 times in the albumin/creatinine ratio, the risk of infarction or stroke increased by 57%, and the risk of cardiovascular death by 98% for non-diabetic patients.[3]

Furthermore, the HOPE study has also exhibited that the presence of microalbuminuria was implicated with an increased relative risk of primary endpoints such as myocardial infarction, stroke or cardiovascular death not only among hypertensive and diabetics but the general population as well. With the increase in the

Correspondence to ***Dr. Josephine Matza-Recierdo***, Department of Adult Cardiology. Philippine Heart Center, East Avenue, Quezon City, Philippines 1100 Available at **http://www.phc.gov.ph/journal/publication** ISSN 0018-9034

levels of microalbuminuria, the risk of an adverse cardiovascular event conjointly increased progressively.[4]

The PREVEND study cited that an increase in the relative risk of cardiovascular mortality of 1.35 for every two-fold increase in the value of albuminuria.[5] Moreover, even very low levels of microalbuminuria may be correlative with increased cardiovascular risk, as confirmed in the "Copenhagen City Heart Study". The study derived that patients with albuminuria more than 6.9 mg/day had a relative risk of death of 1.9, and risk of coronary artery disease of 2.0.[6]

The mechanisms supporting the association between microalbuminuria and cardiovascular disease are unclear but are thought to simulate considerable endothelial dysfunction and microvascular damage[7] and likely inflammation.[8] Although, the analogy between microalbuminuria and cardiovascular disease is already extremely recognized,[9] and has emanated as an important risk factor of considerable importance for cardiovascular events, only few studies have invoked its correlation with the severity of coronary artery disease.

This study aims to determine if microalbuminuria is associated with Coronary Artery Disease among non-diabetic patients. We want to determine the prevalence of microalbuminuria among patients with coronary artery disease and to determine the relationship between microalbuminuria and other coronary artery disease risk factors such as smoking, dyslipidemia and obesity among non-diabetic patients.

METHODS

This is a cross-sectional study which involved admitted non-diabetic patients with indications for coronary angiography at Philippine Heart Center from September 1, 2010 to October 31, 2011. The following patients were excluded: those individuals with a history of myocardial infarction, percutaneous coronary angioplasty or CABG, those individuals with overt proteinuria on urinalysis, those with renal, infectious disease and malignant disease, those with urinary tract infection and those who underwent strenous exercise or activity.

Patients included in the study were asked to sign an informed consent. The demographic characteristic of the participant were obtained. Height and weight were measured to determine Body Mass Index as well as waist-hip ratio. History of smoking and dyslipidemia were obtained. Urinalysis was done to exclude overt proteinuria. Microalbuminuria was measured using micral test urine dipstick method of the first morning void. An albumin higher than or equal to 20mg/dL in a spot morning urine sample was considered microalbuminuria. *Significant coronary artery disease* was defined as coronary artery stenosis ≥70% in one or more coronary artery or ≥50% stenosis in left main coronary artery. *Insignificant coronary artery disease* was defined as coronary artery stenosis <70 % in one or more coronary artery or <50% stenosis for left main coronary artery. Those patients with significant stenosis was classified as CAD positive and those with insignificant lesion as insignificant CAD and those with angiographically normal coronary as CAD negative.

Sample size: The sample size computed was n ≥110 based on 95% confidence level, relative error of 5% and assumed prevalence of microalbuminuria of 7.75% based on the paper of AD Liese et al, microalbuminuria, central adiposity and hypertension in the non-diabetic urban population of the MONICA Augsburg survey.

Data Analysis: Chi square test was used to determine the difference between non diabetic patients with presence or absence of microalbuminuria with the coronary angiography lesions.

RESULTS

Table I shows the demographic characteristics of the subjects. Of the 110 patients included in the study, 80% of which are male with a mean age of 58 and 57 year old for micral test positive and micral test negative respectively. Thirty-one (31) subjects comprising of 28.18% of the total population had microalbuminuria. Those with abnormal BMI, hypertension, smoker and dyslipidemia showed no significant difference in relation to the presence or absence of microalbu-

minuria. Seven percent of the subjects had abnormal waist to hip ratio, which was statistically significant. The medications did not also show significant correlation among subjects with or without microalbuminuria.

Among 110 subjects, 23% had normal coronaries and 77% had insignificant and significant CAD. The prevalence of microalbuminuria among the total population was 28%. Furthermore, out of 85 subjects with abnormal coronaries, 21 patients comprising 32.8% had microalbuminuria but was not statistically significant. Table 2 showed the prevalence of micralbuminuria among subjects with Coronary Artery Disease.

Although waist to hip ratio showed correlation with microalbuminuria, No significant association was noted between microalbuminuria and CAD among subjects with abnormal waist to hip ratio even after adjusting its effect which was considered as a confounder. Table 3 demonstrated the insignificant association of CAD and microalbuminuria among patients with abnormal waist to hip ratio.

Table 1. Demographic Characteristics and Prevalence of Microalbuminuria Among Patients Undergoing Coronary Angiography (PHC, 2012)

Variables	Absence of microalbuminuria (n=79)	Presence of microalbuminuria (n=31)	p-value
Male	25	63	1.000
BMI ≥25	14	46	0.305
Abnormal waist hip ratio	8	39	**0.032**
Hypertension	25	56	0.345
Smoker	16	50	0.286
Dyslipidemia	20	58	0.361
Medications:			
ACE inhibitors	1	2	1.000
ARBs	3	2	0.135
Beta-blocker	4	8	0.737
Calcium channel	1	6	0.671
Diuretics	1	1	0.486
Combination	19	51	0.920

Table 2. Prevalence and Association of Coronary Artery Disease Among Patient with Microalbuminuria. (PHC, 2012)

Results of Coronary Angiography	Absence of microalbuminuria (n=79)	Presence of microalbuminuria (n=31)	p-value
CAD negative	15	10	0.261
Insignificant CAD	8	4	
Significant CAD	56	17	

Table 3. Association of Coronary Artery Disease and Microalbuminuria Among Patients with Abnormal Waist to Hip Ratio. (PHC, 2012)

CAD	Odds Ratio	p>(z)	(95% conf. Interval)
Waist to hip ratio	2.53	0.038	1.054
Microalbuminuria	0.6	0.261	0.247

DISCUSSION

The prevalence of microalbuminuria among patients with abnormal coronaries which include significant and insignificant coronary artery disease was 32.8%. The findings in this study was much lower compared with a similar study by Heseini et al, which showed 62.9% prevalence of microalbuminuria among patients with coronary artery disease.[11] However, the prevalence of microalbuminuria in the study population was higher compared with the MONICA Augsburg survey which showed a prevalence of 7.75%.[10]

In this study, waist to hip ratio showed a significant relationship with microalbuminuria. However, this result was not associated with coronary artery disease. In a study by Yesim et al, waist to hip ratio did not have a correlation with 24 hour urine albumin excretion among non diabetic, normotensive obese women.[12]

Furthermore, the relationship between microalbuminuria and coronary artery disease was not statistically significant in this study. A study by Buggy et al. concluded that albumin excretion rate showed no significant relationship between coronary artery disease severity determined by coronary angiography and microalbuminuria is not a sensitive indicator of coronary artery disease among non-diabetic patients.[13]

The result in this study is still inconclusive because of the limited population. Follow-up is recommended to determine the major adverse cardiac events among those patients with coronary artery disease and microalbuminuria.

CONCLUSION

This study concluded that microalbuminuria did not have a significant association with coronary artery disease. The prevalence of microalbuminuria among coronary artery disease patients was higher compared with the non-diabetic patients in general population.

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The Accuracy of Diagnosing AVNRT through the Use of aVL Notch Compared With Pseudo-S and Pseudo-R' in the 12 Lead ECG

Marie Sylvie Easter T. Gunigundo, MD; Ma. Belen O. Carisma, MD;
Eden A. Gabriel, MD; Erdie C. Fadreguilan, MD

Background **---** Supraventricular tachycardia (SVT) is most commonly caused by atrioventricular nodal re-entrant tachycardia (AVNRT) and atrioventricular tachycardia (AVRT). Electrocardiograms (ECG) have been helpful in identifying SVT but there have been limited studies and algorithms that have been able to accurately predict AVNRT from AVRT. This study aims to compare the accuracy of the presence of the aVL notch versus the presence of pseudo-R' and pseudo-S in diagnosing AVNRT.

Method **---** This is a cross-sectional study utilizing consecutive patients who underwent electrophysiologic studies (EPS) or radiofrequency ablation (RFA) for supraventricular tachycardia (SVT) from the Philippine Heart Center from January 2006 to December 2011. ECG tracings of 78 patients were analyzed by two electrophysiologists who were blinded to the result of the EPS/ RFA.

Results **---** Results show that the presence of the aVL notch showed statistically significant sensitivity and specificity of 44.0 and 92.1%, respectively. If the aVL notch is used in combination with the presence of pseudo-R', there is also statistically significant sensitivity and specificity of 60.0 and 71.1%, respectively. However if all three ECG criteria are present (aVL notch, pseudo-S and pseudo-R') the sensitivity and specificity were 28.0% and 100.0%.

Conclusion **---** The presence of the aVL notch can be utilized as a diagnostic criterion to differentiate between AVNRT and AVRT. The sensitivity to diagnose AVNRT can be increased if the aVL notch and pseudo-R' are both present. It is recommended that the findings in this study be validated using a larger population. ***Phil Heart Center J 2015;20(1):24-28.***

Key Words: Supraventricular Tachycardia ■ Atrioventricular Nodal Re-entrant Tachycardia (AVNRT) ■ Atrioventricular Tachycardia (AVRT)

A common cause of tachyarrhythmia is supraventricular tachycardia (SVT), wherein the arrhythmia is produced from atrial and/ or atrioventricular nodal tissue. Two of the more common causes of paroxysmal SVT are atrioventricular nodal re-entrant tachycardia (AVNRT) and atrioventricular tachycardia (AVRT).

AVNRT is seen in 50-60% of patients presenting with a regular, narrow QRS tachyarrhythmia.[1] Normally, most people would have a single conducting pathway in the AV node which conducts impulses in an anterograde manner to the bundle of His.[2]

However, in some individuals a dual pathway exists with different electrophysiologic properties. The alpha or slow pathway is relatively slow in conduction with a short refractory period. On the other hand, the beat or fast pathway is a rapid conducting system with a long refractory period. Conduction anterogradely goes down one pathway and retrogradely in the other. Hence, one can have a slow-fast, fast-slow, or slow-slow pathways.

The second most common cause of paroxysmal SVT is AVRT.[2] As compared to AVNRT, patients with AVRT have accessory pathways, or bypass tracts present. These accessory pathways

Correspondence to ***Dr. Marie Sylvie Easter T. Gunigundo,*** Department of Adult Cardiology. Philippine Heart Center, East Avenue, Quezon City, Philippines 1100 Available at **http://www.phc.gov.ph/journal/publication** ISSN 0018-9034

are errant fibers that connect the AV node or the atrium to the ventricle.[2] Orthodromic AVRT occurs when conduction goes anterogradely through the normal pathway and retrogradely through the accessory pathway. Antidromic AVRT occurs when conduction anterogradely through the accessory pathway and retrogradely up the normal pathway producing a wide QRS.

Although 12-L electrocardiograms (ECG) have correctly identified SVT, there have been limited studies and algorithms[3-6] that have been able to accurately predict AVNRT from AVRT. The presence of pseudo-R' wave in lead V1 and pseudo-S wave in the inferior leads have been often used.[3] The value of the aVL lead has been underutilized. Hence, this study has been undertaken to see if the aVL lead can be used to differentiate between AVNRT and AVRT.

The general objective of this study is to compare the accuracy of presence of aVL notch versus presence of pseudo-R' and pseudo-S in diagnosing AVNRT.

METHODS

This research is a cross-sectional study done at the Philippine Heart Center. Patients included in this research are those who underwent electrophysiologic studies (EPS) or radiofrequency ablation (RFA) for supraventricular tachycardia from January 2005 to January 2012. Patients excluded from the study are those who have atrial fibrillation and atrial tachycardia.

Sample size was computed at n > 96 patients based on 95% confidence level (α=0.05) with a relative error of 20% and assumed sensitivity of the presence of aVL notch in predicting AVNRT at 48.6% as presented in the study of DiToro.[4]

The records of all patients who underwent EPS or RFA for supraventricular tachycardia were reviewed. ECG tracings of patients during tachycardia and during sinus rhythm were retrieved. Patient details and results of EPS were withheld from the ECG readers.

ECG readers determined the presence of the following ECG criteria which are as follows:

Pseudo-R' in V1. Defined as the presence of a positive deflection at the end of the QRS in lead V1 during the tachycardia and absence during sinus rhythm.[7] Its appearance is shown in Figure 1:

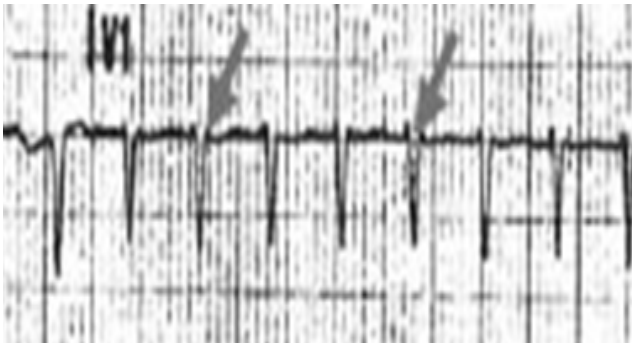

Figure 1. Pseudo-R' seen in V1 during tachycardia. Adapted from Kalbfleisch SJ, El-Atassi R, Calkins H, Lanberg JJ, Morady F. Differentiation of paroxysmal narrow QRS complex tachycardias using the 12-lead electrocardiogram. J Am Coll Cardiol.[7]

Pseudo-S wave in leads II, III, aVF. Defined as the presence of a negative deflection at the end of the QRS in the inferior leads during tachycardia and absence during sinus rhythm.[7] Its appearance is shown in Figure 2.

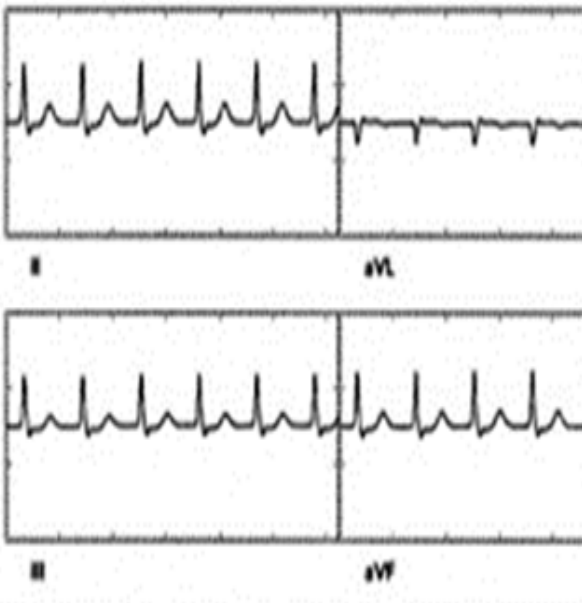

Figure 2. Pseudo-S seen in II, III, aVF during tachycardia. Adapted from Kalbfleisch SJ, El-Atassi R, Calkins H, Lanberg JJ, Morady F. Differentiation of parozysmal narrow QRS complex tachycardias using the 12-lead electrocardiogram. J Am Coll Cardiol.[7]

AVL notch. Defined as the presence of any positive deflection at the end of the QRS during tachycardia but absent during sinus rhythm.[4] Its appearance is shown in Figure 3.

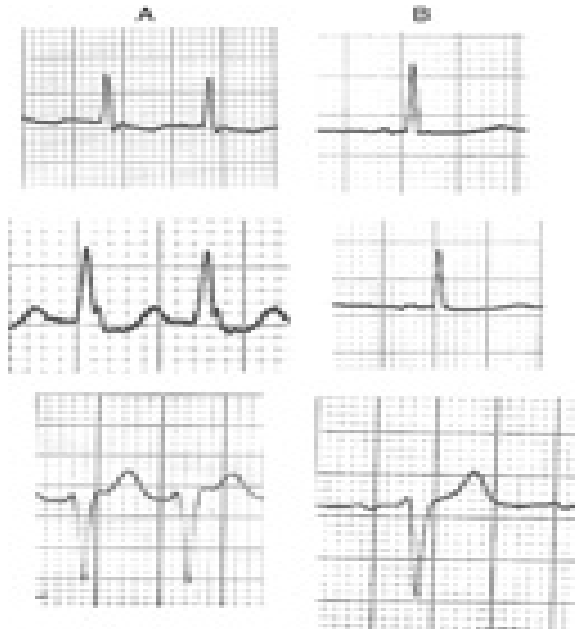

Figure 3. The aVL notch seen during tachycardia in A but absent during sinus rhythm in B. Adapted from Di Toro D, Hadid C, Lopez C, Fuselli J, Luis V and Labadet C. Utility of the aVL lead in the electrocardiographic diagnosis of AVNRT. Europace.[4]

Table 1. Demographic Profile of Patients with Supraventricular Tachycardia Included in the Study (PHC, 2012)

	No. of Patients (Total = 78)
Sex: Male (%)	20 (31.7%)
Female (%)	43 (62.8%)
Age (Years)	
Range	12 - 69
Average (std. dev.)	35.25 (14.901)
Presenting Manifestation (%)	
Palpitation	60 (95.2%)
Syncope	10 (15.9%)
Dizziness	2 (3.2%)
Difficulty of Breathing	5 (7.9%)
Chest pain	3 (4.8%)
Asymptomatic	1 (1.6%)
Medications (%)	
Beta-Blocker (Metoprolol, Propanolol)	20 (31.7%)
Calcium-Channel Blocker (Verapamil)	21 (33.3%)
Amiodarone	8 (12.7%)
Flecainide	6 (9.5%)
Digoxin	1 (1.6%)
None	20 (31.7%)
ECG Criteria	
Pseudo-S	8 (12.7%)
Pseudo-R'	19 (30.2%)
AVL Notch	14 (22.2%)
Result of EPS/RFA	
AVNRT	25 (39.7%)
AVRT	38 (60.3%)

The diagnosis was confirmed by EPS or RFA during localization of the pathway. Similarly, for patients who would undergo EPS or RFA, initial ECGs would be analyzed with the diagnostic criterion mentioned above.

The 12-Lead ECG tracings were also analyzed as to the presence of aVL notch, pseudo-S, and pseudo-R' by 2 investigators who were blinded to the result of the EPS or RFA of the patient. If disagreement would occur, a third investigator was called.

The data collected with regards to the presence of the ECG characteristics were analyzed using SPSS v. 11.0 for the descriptive statistics. The sensitivity, specificity, negative and positive predictive values and Kappa test for each ECG criteria alone or in combination was also analyzed.

RESULTS

There had been 63 patients included in the study as seen in Table I. The age range from 12 to 69 years old with average age of 35.25. There were 20 (31.7%) males and 43 (68.3%) females. The clinical manifestations noted were palpitation (95.2%), followed by syncope (15.9%), difficulty of breathing (7.9%), dizziness (3.2%), and (4.8%). The medications being taken by the patients were beta-blockers (31.7%), calcium-channel blockers particularly verapamil (33.3%), amiodarone (12.7%), digoxin (1.6%) and flecainide (9.5%).

About one-third had no medications (31.7%). Upon EPS testing, there were 25 patients (39.7%) who were diagnosed with AVNRT while there were 38 patients (60.3%) with AVRT.

The results can be seen in Table 2 and Figure 4. If the ECG criteria would be considered individually, the sensitivity would be 28.0%, 44.0%, 44.0% for Pseudo-S, Pseudo-R'and AVL notch respectively. The specificity for pseudo-S, pseudo-R' and aVL notch are 97.4%, 78.9% and 92.1% respectively. When used in combination, if pseudo S and pseudo-R' are both present sensitivity is 44.0% and specificity is 73.7%. If aVL notch and Pseudo-S are both present, the sensitivity is 44.0% and specificity is 92.1%. If aVL notch and Pseudo-R'

are both present, the sensitivity is 60.0% and specificity is 73.7%. If any one of be seen in Table 2 and Figure 4. If the ECG criteria would be considered individually, the sensitivity would be 28.0%, 44.0%, 44.0% for Pseudo-S, Pseudo-R'and AVL notch respectively. The specificity for pseudo-S, pseudo-R' and aVL notch are 97.4%, 78.9% and 92.1% respectively. When used in combination, if pseudo S and pseudo-R' are both present sensitivity is 44.0% and specificity is 73.7%. If aVL notch and Pseudo-S are both present, the sensitivity is 44.0% and specificity is 92.1%. If aVL notch and Pseudo-R' are both present, the sensitivity is 60.0% and specificity is 73.7%. If any one of the three ECG criteria are present the sensitivity is 28.0% and specificity is 100%.

The highest positive predictive value for the diagnosis of AVNRT among the different ECG criteria when considered individually is seen if pseudo-S alone is present (87.5%). When two ECG criteria are used, the highest positive predictive value is seen when both aVL notch and pseudo-S is present (78.6%).

Figure 4. The Predicted Probabilities for the Diagnosis of AVNRT (PHC, 2012)

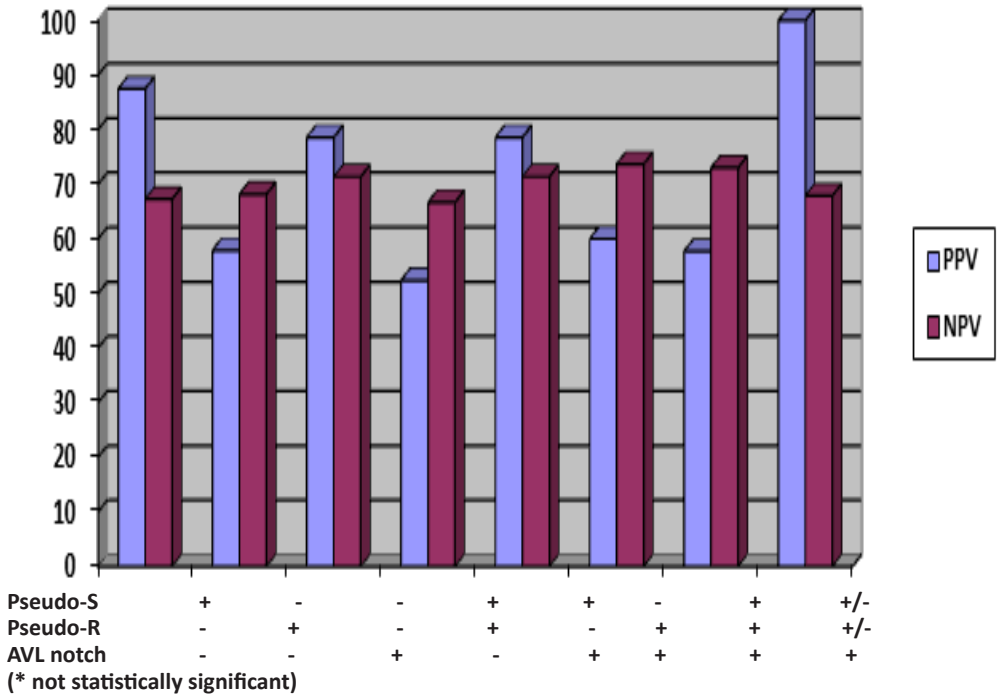

Table 2. Sensitivity and Specificity of ECG Criteria in the Diagnosis of AVNRT (PHC, 2012)

Criteria	Sensitivity	Specificity	PPB	NPV	Kappa Test	P value
Pseudo-S only	28.0	97.4	87.5	67.3	0.287 ± 0.097	0.030
Pseudo-R' only	44.0	78.9	57.9	68.2	0.239 ± 0.123	0.052
AVL notch only	44.0	92.1	78.6	71.4	0.390 ± 0.116	0.000
Psuedo-S + Pseudo-R'	44.0	73.7	52.4	66.7	0.182 ± 0.125	0.145
AVL Notch + Pseudo S	44.0	92.1	78.6	71.4	0.390 ± 0.116	0.000
AVL Notch + Pseudo-R'	60.0	73.7	60.0	73.7	0.337 ± 0.126	0.004
AVL Notch + Pseudo-R' + Pseudo-S	28.0	100.0	100.0	67.9	0.319 ± 0.092	0.000
AVL Notch ± Pseudo-R' ± Pseudo-S	60.0	71.1	57.7	73.0	0.308 ± 0.126	0.014

DISCUSSION

The study was only able to achieve 66% of its target population size. A limiting factor is that EPS/RFA procedures were limited in the latter half of 2011 due to unavailability of the machine.

The results of the study showed that if the ECG criteria for the diagnosis of AVNRT were considered individually, the sensitivity was low but with a high specificity which was very similar to the study done by Di Toro.[4] The presence of pseudo-R' in V1 provided the highest sensitivity and lowest specificity (44.0 and 78.6%, respectively) but the result was not statistically significant. In the study done by Di Toro,[4] the sensitivity for the aVL notch was 48.6%. The study was able to achieve a similar sensitivity at 40%.

If two of the ECG criteria were combined to diagnose the presence of AVNRT, the sensitivity increased but the specificity of the combination decreased. The presence of both the aVL notch and pseudo-R' provided the highest sensitivity (60.0%) with a specificity of 73.7%.

The sensitivity to diagnose AVNRT further decreased (28%) and the specificity increased (100%) when all three ECG criteria are present. If any three of the ECG criteria are present, the sensitivity increased to 60.0% and the specificity decreased to 71.1%.

A limiting factor to the result of the study is the number of patients included and the unavailability of the ablation machine used to confirm the mechanism of the SVT. Another limitation is the subjective interpretation of surface ECG tracings. Lastly, it cannot be ascertained if filter settings of the ECG could possibly influence the recognition of the different ECG criteria for the diagnosis of AVNRT.

CONCLUSIONS/RECOMMENDATIONS

The study shows that compared to the widely used ECG criteria of pseudo-S and pseudo-R' for the diagnosis of AVNRT, the presence of the aVL notch has a similar sensitivity and specificity. And the presence of both aVL notch and pseudo-S can also be used in the diagnosis of AVNRT.

It can be recommended that a study with a larger population be used in the future. ECG tracings should be standardized as to the person who would install the leads and the settings that would be used. A greater consensus of ECG readers should also be utilized.

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Optimal Medical Therapy With or Without Coronary Artery Bypass Graft for Stable Triple Vessel Coronary Artery Disease

Ray P. Aswat, MD; Gilbert Vilela, MD

Background --- Coronary Artery Bypass Graft (CABG) is recommended for patients with left main coronary artery disease and the preferred revascularization strategy for patients with multi-vessel coronary disease, with Left Ventricular Ejection Fraction (LVEF) < 50%, and diabetes mellitus. However, recent trials are suggesting that medical therapy may prove to be as effective as interventional techniques in patients with stable coronary artery disease. This study aims to compare the outcomes of patients with stable triple vessel coronary artery disease on optimum medical therapy with or without CABG.

Method --- This is a prospective cohort study wherein a total of 70 patients diagnosed with triple vessel coronary artery disease with a recommendation of CABG were enrolled in this study. Those who underwent CABG with optimal medical therapy were analyzed among the "CABG" group and those who did not undergo CABG were analyzed under the "optimal medical therapy (OMT)" group. Outcomes included assessment of the Canadian Classification Society of angina pectoris grade, occurrence of acute coronary syndrome, cerebrovascular events, congestive heart failure and all cause mortality.

Results --- There were 70 patients enrolled in the study with similar baseline variables but with male preponderance. Likewise, there were similar modifiable risk factors including blood pressure, lipid profile, and HbA1c between the two groups at baseline and at the end of study as well as similar medications except for the added use of calcium channel blockers in the OMT group. Outcomes including CCS grade for angina pectoris, occurrence of ACS, CHF, stroke and all cause mortality was similar in both group.

Conclusion --- Among patients with triple vessel coronary artery disease, those who underwent CABG with OMT and those who had OMT alone did not show any difference in the occurrence of ACS, CHF, stroke, all cause mortality and CCS classification of angina pectoris.

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Key Words: Coronary Artery Bypass Graft ■ Optimal Medical Therapy

Coronary artery bypass graft (CABG) surgery, is a revascularization technique that uses the patient's own veins or arteries to bypass narrowed areas and restore blood flow to heart muscle.[1]

It is recommended for patients with left main disease and the preferred revascularization strategy for patients with multi-vessel coronary disease, with depressed systolic function (Left Ventricular Ejection Fraction or LVEF less than 50%), and diabetes.[2] A meta-analysis of trials comparing medical and surgical therapy in patients with stable coronary disease had included in its results, that among patients with three vessel or left main disease, there was a survival benefit after CABG in those with or without proximal left anterior descending (LAD) artery disease.[3]

The ACC/AHA guidelines update for coronary artery bypass graft surgery mentioned that CABG is a Class I indication for three-vessel disease where the LVEF is less than 50 %.[4]

"Medical therapy (MT) for multivessel CAD

Correspondence to ***Dr. Ray P. Aswat,*** Department of Adult Cardiology. Philippine Heart Center, East Avenue, Quezon City, Philippines 1100 Available at **http://www.phc.gov.ph/journal/publication** 2015 ISSN 0018-9034

showed a lower incidence of short-term events and a reduced need for additional revascularization, compared with PCI"[5] according to the MASS II trial. Also, MT was less superior to CABG in eliminating anginal symptoms. [5]

The COURAGE trial compared optimal medical therapy alone or in combination with PCI as an initial management strategy in patients with stable coronary artery disease. The addition of PCI to optimal medical therapy reduced angina but did not reduce long-term rates of death, nonfatal myocardial infarction, and hospitalization for acute coronary syndromes.[6]

In addition to post operative complications, old age and chance of recovery, financial difficulties, and recent studies tend to support a more conservative method of managing stable coronary artery disease. Thus, the concept of OMT is introduced.

"Optimal Medical Therapy" includes medications which are strongly recommended for patients with coronary artery disease to improve prognosis, thereby reducing death and risk for myocardial infarction.[7]

In this study, it included medications such as antiplatelets: (Aspirin 80 to 100 mg and/ or Clopidogrel 75 mg); anti-ischemic therapy (long acting metoprolol, carvedilol; amlodipine, diltiazem; isosorbide mononitrate, trimetazidine; alone or in combination); LDL-cholesterol lowering therapy (simvastatin, rosuvastatin or atorvastatin); ACE-inhibitors or Angiotensin II Receptor Blockers (ARB) for hypertension.

The following were the desired targets:

a. Blood pressure less than 140/90 among non-diabetics or less than 130/80 among diabetics or patients with Chronic Kidney Disease.
b. LDL less than 100 mg/dL
c. Hemoglobin A1c less than 7%
d. Smoking cessation

Desired BMI was within 18.5 to 22.9

Medications were adjusted accordingly by their attending physician until the desired parameters are met, taking into account the maximum allowable doses, side effects and tolerability of the medications.

The purpose of the study was to determine the outcomes of patients who have triple vessel coronary artery disease who were managed by optimal medical therapy with or without CABG as to:

a. CCS Grading of Angina Pectoris
b. Occurrence or recurrence of acute coronary syndrome
c. Occurrence of congestive heart failure
d. Occurrence of stroke
e. All cause mortality

METHODS

This is a prospective cohort study done at Philippine Heart Center, involving 70 patients with triple vessel coronary artery disease advised for CABG, 19 years of age and above who consented to participate in the study. Included were adult patients admitted at the Philippine Heart Center who have significant three vessel coronary artery disease and are recommended for CABG and consents to cooperate with the study. Excluded were patients with any of the following: allergies/ contraindications to medications included among the optimum medical therapy medications; unstable angina and symptoms refractory to maximal oral and intravenous medical therapy (persistent CCS class IV); post-MI course complicated by persistent rest angina, shock, and persistent CHF for which the need or likelihood of urgent myocardial revascularization is high; cardiogenic shock; pulmonary edema or heart failure unresponsive to standard medical therapy; previous CABG or PCI; concomitant valvular heart disease likely to require surgery or affect prognosis during follow-up; congenital or primary cardiac muscle disease likely to affect prognosis during follow-up; resuscitated out-of-hospital sudden death or symptomatic sustained or nonsustained ventricular tachycardia; significant systemic hyper-

tension (BP >200/100 mmHg) unresponsive to medical therapy; and severe noncardiovascular comorbidity limiting survival. The inclusion and exclusion criteria are similar with that of the Courage Trial.[6]

Baseline characteristics such as demographics, cardiovascular risk factors, laboratory parameters, Canadian Cardiovascular Society (CCS) Angina Class and co-morbid events were obtained.

The choice of OMT regimen was on the discretion of the attending physician as long as the patient was on anti-platelet, statin, ACE inhibitor or ARB, beta-blocker other anti-ischemic drugs, and anti-diabetic medications among the diabetic patients. Titration of the medications was also according to the attending physician's discretion.

The patients were re-evaluated after 3, 6, 9 and 12 months if modifiable risk factors were achieved including cessation of smoking, attainment of target BMI, target BP, as well as compliance with prescribed medications. Lipid profile and HbA1c among diabetics, were done at the 6th and 12th month of follow-up.

These data were correlated with the patient's CCS Classification of Angina Pectoris, occurrence or recurrence of acute coronary syndrome, congestive heart failure, stroke and all cause mortality.

Those who underwent CABG with optimal medical therapy were analyzed by the investigators under the "CABG" group. Those who did not undergo CABG were analyzed under the "Optimum Medical Therapy (OMT)" group.

The study period started from April 2010 to June 2011. Patient follow up was up to 1 year or until December 2011 whichever came first.

Sample Size: The sample size computed was n > 35 per group or a total of >70 patients based on a 95% confidence level and power of 80% to detect significance at an assumed difference in rates of relief from angina between surgery (CABG) and medical management of 36%. The assumption was based on the paper of "The Coronary Artery Surgery Study (CASS)" performed in the late 1970s and early 1980s, with 66% versus 30% relief from angina with CABG and medical management respectively at one year follow-up.

Data Analysis: The data were described as mean and standard deviation, and as frequency and percent distribution. Association of parameters with the outcomes was done using chi-square test, Fischer-exact test and t-test. P value of less than 0.05 was considered statistically significant.

RESULTS

Out of the 70 patients included in the study, baseline characteristics were similar in both groups as shown in Table 1. The average age among the OMT + CABG group was 58 years while the OMT group was 55 years. Majority are male, hypertensive with left ventricular ejection fraction more than 50% in both groups. Average body mass index (BMI) was overweight but with average blood pressure below 130/80 and average LDL levels below 100 mg/dL in both groups.

There were three subjects who were lost to follow-up cases in the CABG group and five in the OMT group.

There were more patients in the CABG group who use calcium channel blockers compared to the OMT group at baseline and at the end of study. All other medications were similar in both groups as shown in Table 2.

Modifiable risk factors including blood pressure, lipid profile, and HbA1c were similar between the two groups at baseline and at the end of study as shown in Table 3. Majority in both groups had a target BP, overweight, LDL less than 100 mg/dL. Majority of HbA1c levels among the OMT + CABG group was less than 7% at baseline and at the end of study while the OMT group had 31.3% and 43.8% had HbA1c less than 7% at baseline and end of study respectively, yet not statistically significant.

Table 1. Baseline Characteristics of Patients with Stable Triple Vessel Coronary Artery Disease According to therapeutic intervention (PHC, 2012)

	OMT + CABG (N = 35)	OMT (N = 35)	p value
Age (years)	57.89 ± 1.295	55.09 ± 1.535	0.168
Male Sex	33 (94.3)	30 (85.7)	0.428
Left Main Involvement	11 (31.4)	7 (20.0)	0.206
Current Smoker	0	0	-
HPN	23 (65.7)	16 (45.7)	1.00
DM	13 (37.1)	19 (54.2)	0.628
Ejection Fraction >50%	21 (60.0)	36 (39)	0.809
CCS	-	-	0.056
I	24 (68.6)	16 (45.7)	-
II	10 (28.6)	17)48.6)	-
III	1 (2.9)	2 (5.7)	-
BMI	25.92 ± 13.75	25.48 ± 20.06	0.751
SBP (mmHg)	126.07 ± 16.852	128.15 ± 20.055	0.679
DBP (mmHg)	74 ± 9.335	74.63 ± 8.427	0.829
Ejection Fraction (%)	55.81 ± 13.830	51.11 ± 14.598	0.235
Cholesterol (mg/dl)	166.82 ± 40.257	166.85 ± 40.858	0.998
LDL (md/dl)	95.14 ± 35.093	90.93 ± 26.312	0.617
HDL (mg/dl)	38.68 ± 8.014	43.37 ± 23.806	0.328
TG (mg/dl)	168.46 ± 123.698	169.00 ± 81.379	0.985

OMT: optimal medical therapy; CABG: coronary artery bypass graft; LMI: left main coronary artery involvement; HPN: hypertension; DM: diabetes mellitus; CCS: Canadian Cardiovascular Society classification of angina; BMI: body mass index; SBP: systolic blood pressure, DBP: diastolic blood pressure; Chole: cholesterol; LDL: low density lipoprotein; HDL: high density lipoprotein; TG: triglyceride

Table 2. Medications at Baseline and at the End of Study of Patients with Stable Triple Vessel Coronary Artery Disease According to Therapeutic Intervention (PHC, 2011)

	Baseline			End of Study		
Medications	OMT + CABG (N = 35)	OMT (N = 35)	p value	OMT + CABG (N = 35)	OMT (N = 35)	p value
ASA	27 (77.1)	29 (82.9)	0.766	27 (77.1)	26 (74.3)	1.00
Clopidogrel	14 (40.0)	14 (40.0)	1.00	14 (40.0)	17 (48.6)	0.631
Statin	33 (94.3)	35 (100)	0.493	33 (94.3)	34 (97.1)	1.00
Beta Blocker	31 (88.6)	26 (74.3)	0.218	30 (85.7)	26 (74.3)	0.371
CCB	4 (11.4)	12 (34.3)	0.044	3 (8.6)	11 (31.4)	0.034
ACE Inhibitor	13 (37.1)	22 (62.9)	0.055	15 (42.9)	21 (60.0)	0.232
ARB	18 (51.4)	11 (31.4)	0.145	16 (45.7)	11 (31.4)	0.326
Nitrates	10 (28.6)	17 (48.6)	0.140	11 (31.4)	17 (48.6)	0.222
Trimetazidine	5 (14.3)	5 (14.3)	1.00	6 (17.1)	5 (14.3)	1.00

OMT: optimal medical therapy; CABG: coronary artery bypass graft; ASA: acetylsalicylic acid; CCB: calcium channel blocker; ACE: angiotensin converting enzyme; ARB: angiotensin receptor blocker

Table 3. Modifiable Risk Factors at Baseline and at the End Study of Patients with Stable Triple Vessel Coronary Artery Disease According to Therapeutic Intervention (PHC, 2011)

	Baseline			End of Study		
	OMT + CABG (N = 35)	OMT (N = 35)	p value	OMT + CABG (N = 35)	OMT (N = 35)	p value
Target BP	24 (68.6)	19	0.326	25 (71.4)	20	0.318
BMI	-	-	0.751	-	-	0.687
Underweight	1 (2.9)	1 (2.9)	-	1 (2.9)	2 (5.7)	-
Normal	13 (37.1)	16 (45.7)	-	16 (45.7)	14 (40.0)	-
Overweight	17 (48.6) 3 (8.6)	12 (34.3) 5 (14.3)	- -	14 (40.0) 3 (8.6)	12 (34.3) 6 (17.1)	- -
Obese I	1 (2.9)	1 (2.9)	-	1 (2.9)	1 (2.9)	-
Obese II						
Chole <200mg/dl	29 (82.9)	25 (71.4)	0.394	28 (80.0)	31 (88.6)	0.513
LDL <100mg/dl	23 (65.7)	22 (62.9)	1.00	20 (57.1)	24 (68.6)	0.458
HDL <40mg/dl	14 (40.0)	16 (45.7)	0.809	19 (54.3)	15 (42.9)	0.473
TG <150mg/dl	22 (62.9)	19 (54.3)	0.628	20 (57.1)	13 (37.1)	0.051
Hb1c <7%	9/13 (60.2)	5/16 (31.3)	0.066	11 (84.6)	7 (43.8)	0.052

OMT: optimal medical therapy; CABG: coronary artery bypass graft; BP: blood pressure; BMI: body mass index; Chole: cholesterol; LDL: low density lipoprotein; HDL: high density lipoprotein: TG: triglyceride; HBA1c: glucosylated hemoglobin

Table 4. Clinical Outcomes of Patients with Stable Triple Vessel Coronary Artery Diseae According to Therapeutic Intervention (PHC, 2011)

Outcomes	OMT + CABG (N = 35)	OMT (N = 35)	p value
Mean follow-up (months)	10.09 ± 3.221	9.74 ± 2.924	0.643
CCS			0.112
I	27 (77.1)	21 (60.0)	-
II	8 (22.9)	12 (34.3)	-
III	0	2 (5.7)	-
ACS	3 (8.6)	4 (11.4)	1.00
CHF	0	2 (5.7)	0.493
Stroke	0	0	-
All Case Mortality	0	1 (2.9)	1.00

OMT: optimal medical therapy; CABG: coronary artery bypass graft; CCS: Canadian Cardiovascular Society Classification of Angina; ACS: Acute Coronary Syndrome; CHF: Congestive Heart Failure

Outcomes including CCS grade for angina pectoris, occurrence of ACS, CHF, stroke and all cause mortality were similar in both groups as shown in Table 4. 8.6% and 11.4% had ACS in the OMT + CABG group and OMT group respectively. 5.7% had CHF and 1 reported mortality in the OMT group only while there was none in the OMT + CABG group. Also, there were two patients under the OMT group who eventually had CABG.

DISCUSSION

Revascularization techniques as well as medical management have improved thru the years. As a result, if CABG were compared with medical therapy today, the relative benefits for survival and angina relief observed several decades ago might no longer be observed. In BARI 2D (Bypass Angioplasty Revascularization Investigation 2 Diabetes) trial of patients with diabetes mellitus, no significant difference in risk of mortality in the cohort of patients randomized to medical therapy plus CABG or medical therapy alone was observed.[8] This research is unique since it studies a more specific subset of CAD patients, particularly those having three vessel affectation. It has the strength of having similar baseline characteristics including age, blood pressure, lipid profile and HbA1c among diabetics, body mass index, CCS classification, and left ventricular ejection fraction. However, most patients in both groups were male. Follow-up was done assessing a 'real world scenario' on how our local patients comply with doctor's advice and medication and not the ideal setting of full compliance in all patients.

Most of the subjects achieved the desired targets with similar medications at baseline and at the end of study except for an added calcium channel blocker in the OMT group. It seems that this added medication is required for the OMT group to have similar outcomes as to the CABG group.

Most of the patients were males, thus women are underrepresented. This study was done in a single center therefore it cannot claim its conclusions to the general population. A randomized, controlled trial with a larger sample size and longer would surely provide a more robust conclusion and is thus recommended.

In conclusion, there is no difference in the occurrence of ACS, CHF, stroke, all-cause mortality and CCS classification of angina pectoris among patients with triple vessel coronary artery disease who underwent CABG with OMT and those who had OMT alone. However, the OMT group needed and additional calcium channel blocker in their list of medications to have similar CCS grade as to the CABG group.

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Exercise Stress Ankle Brachial Index in the Diagnosis of Peripheral Artery Disease among Patients with Low, Intermediate and High Framingham Risk Profile

Maribel C. Gonzales-Tanque, MD; Norberto Tuaño Jr., MD

Background **---** Peripheral artery disease (PAD) is a common manifestation of atherosclerosis and is characterized by increasing incidence of morbidity and mortality. It is a powerful predictor of cardiovascular and cerebrovascular events associated with increase in mortality thereby making early detection of this disease fundamental. This study aims to determine the use of exercise stress ankle brachial index in the diagnosis of peripheral artery disease among patients with different Framingham risk categories.

Method **---** This is a prospective cross-sectional study conducted at the Philippine Heart Center from September 2011 to December 2011. Subjects included were stratified using Framingham risk score. Claudication was identified using the Edinburgh Questionnaire. The subjects underwent stress ABI determination. The Framingham risk categories were correlated with the result of the stress ABI.

Results **---** A total of 81 patients were enrolled in the study. Forty-eight percent of the population were male with an average age of 61 years. Among the associated co-morbidities, hypertension was present in the majority of the study population (72%) followed by diabetes mellitus (57%). Eighty-six percent of patients with intermittent claudication and 64% of patient who had history of cigarette smoking had positive stress ABI, which are both statistically significant (p-value of 0.00 and 0.017 respectively). All the Framingham risk categories failed to show statistically significant correlation with abnormal stress ABI.

Conclusion **---** This study demonstrated that almost all patients with intermittent claudication had abnormal stress ABI. Regardless of the Framingham risk category, stress ABI should be performed in patients with this symptom. Smoking history also showed a statistically significant correlation with PAD and it is reasonable to perform stress ABI among this group of patients. ***Phil Heart Center J 2015;20(1):35-39.***

Key Words: Peripheral arterial disease ■ Ankle-Brachial Index ■ Framingham Risk Score

Peripheral artery disease (PAD) is one of the overlooked manifestations of atherosclerosis and is morbidity and mortality. Diagnostic methods to facilitate early detection of PAD is of prime importance.[1]

According to the Inter-Society Consensus for the management of peripheral artery disease (TASC II), the over-all prevalence of PAD based on several epidemiological studies are 3-10%, increasing to 15-20% in patients over 70 years of age.[2]

Both symptomatic and asymptomatic PAD subjects have been found to be associated with increased risk of cardiovascular disease (CVD) and adverse risk profile. Results from these cross-sectional studies provided evidence that majority of PAD patients have some manifestation of cerebrovascular and cardiovascular disease. However, due to the silent nature of this disease and the subtle findings on physical examination, PAD has been considered the least effectively managed major atherosclerotic vascular disorder.[3] The recent AHA/ACC guidelines for the management of patients with PAD states that early detection and treatment of PAD, particularly in the populations at risk, may prevent disability and save lives.[4]

Correspondence to ***Dr. Maribel C. Gonzales-Tanque,*** Department of Adult Cardiology. Philippine Heart Center, East Avenue, Quezon City, Philippines 1100 Available at **http://www.phc.gov.ph/journal/publication** ISSN 0018-9034

The Ankle Brachial Index (ABI), which is the ratio of systolic pressure at the ankle to that in the arm, is "quick and easy to measure and has been used for many years in vascular practice to confirm the diagnosis and assess the severity of peripheral artery disease in the legs." However, the ABI is also an indicator of generalized atherosclerosis because lower levels have been associated with higher rates of concomitant coronary and cerebrovascular disease, and with the presence of cardiovascular risk factors."[5]

The ABI is a sensitive and cost-effective screening tool for PAD, and can provide clues to the presence of "generalized atherosclerosis."[3] Previous studies have shown that a low ABI (≤0.90) has a specificity of greater than 98% for the diagnosis of PAD and a specificity of 92% for the prediction of CVD and stroke.[3]

Patients with ABI of <0.90, whether symptomatic or asymptomatic, have significantly higher risk of mortality and vascular events and ABI provides independent risk information compared with the coronary risk functions.[6]

Several studies[7] provide evidence that stress ABI is a helpful method to detect PAD in patients with normal resting ABI.

Some authors provided the reason for a normal resting ABI in patients with PAD.[2] When taken at rest, ABI has a specificity of 99% and a sensitivity of 94-97% in detecting high-grade stenosis as assessed by angiography.[7] In some patients with isolated iliac stenosis wherein there is no pressure decrease across the stenosis at rest, claudication may be present but the resting ABI is normal. With exercise, the inflow velocity will make such lesions hemodynamically significant. Under these conditions, exercise will induce a decrease in the ABI that can be detected in the immediate recovery period and thus establish the diagnosis of PAD.[2]

Furthermore, the addition of ABI on top of the Framingham risk score (FRS) may improve the accuracy of FRS in cardiovascular risk prediction as determined in a meta analysis done by Fowkes et al.[9] An ABI of <0.9 doubled the risk of MACE across all FRS categories.[9]

This study aims to determine the use of exercise stress ankle brachial index in the diagnosis of peripheral artery disease among patients with different Framingham risk categories. Specifically, this study is done to determine the incidence of PAD in patients with low, intermediate, and high Framingham risk profile; to determine the exercise stress ABI results in different Framingham risk categories; and to determine the different risk factors associated with abnormal stress ABI.

METHODS

This is a prospective cross-sectional study. The study was conducted at the Philippine Heart Center from September 2011 to December 2011. Included were patients more than 45 years of age belonging to low, intermediate and high risk on the Framingham heart study, with or without symptoms of claudications and with an ABI of ≥1.0 but less than 1.30. Excluded were those patients who cannot tolerate stress exercise, who underwent limb amputation, or with rest pain. This study was approved by the Institutional Ethics Review Board and informed consent was obtained prior to each subject's participation.

The computed sample size was 89 with a 5% level of error and 95% confidence interval, based on the CAREFUL Study,[3] a national multi-center, cross-sectional observational study where the prevalence of PAD in patients with at least one risk factor for atherothrombosis was 20%.

After obtaining an informed written consent from the subjects, the investigator recorded the baseline characteristics and cardiovascular risk factors of patients. Cardiovascular risk factors include: diabetes mellitus, smoking, dyslipidemia, hypertension, and history of coronary heart disease. Framingham risk calculator was used to assess the cardiovascular risk profile. To identify patients with intermittent claudication, the Edinburgh questionnaire[8] for claudication was utilized.

Baseline ABI at rest was measured and the patient was then asked to walk on a treadmill at 3.2km/h until claudication pain occurs or a maximum of 5 minutes, after which the ABI was measured again. A 15-20% decrease in ABI from the baseline value was diagnostic of PAD.

Statistical Analysis: To compare patient's demographics and risk factors for PAD, chi square test was used for the categorical data and Mann-Whitney U test for the continuous data. A multiple logistic regression was performed to model the simultaneous relationships between patients' demographics and risk factors and the presence of PAD.

RESULTS

A total of 81 patients were enrolled in the study. The baseline characteristics, including the co-morbidities and concomitant medications were shown in Table 1. Forty-eight percent of the populations were male and average age was 61 years. Among the associated co-morbidities, hypertension was present in the majority of the study population (72%) followed by diabetes mellitus (57%).

Framingham risk category of each patient was determined using the downloadable Framingham risk calculator. Table 2 shows the distribution of patients according to FRS risk stratification. Twelve percent (12%) of patients belong to low Framingham risk category, 37% to the intermediate risk and 51% to high risk category.

Eighty-six percent (86%) of patients with intermittent claudication and 64% of patient who had history of cigarette smoking has positive stress ABI which are both statistically significant with a p value of 0.00 and 0.017 respectively (*Table 3*).

Table 4 showed the distribution of stress ABI in different Framingham risk categories. All the Framingham risk categories failed to show statistically significant correlation with abnormal stress ABI.

Table 1. Baseline Characteristics of Patients Included in the Study. (PHC, 2012)

Characteristics	n = 81 (Mean± SD) or n (%)
Demographics	
Age in years (Mean ± SD)	61 (± 8.8)
Male Gender	39 (48)
Medical History	
Diabetes	46 (57)
Hypertension	58 (72)
Current Smoker	21 (26)
Obesity	37 (46)
Dyslipidemia	44 (54)
Intermittent Claudication	39 (48)

Table 2. Framingham Risk Categories of Patients Included in the Study (PHC, 2012)

Framingham Risk	n = 81 n (%)
Low	10 (12)
Intermidiate	30 (37)
High	41 (51)

Table 3. Association of Risk Factors with Abnormal Stress ABI (PHC, 2012)

Risk Factor	Abnormal Stress ABI n (%)	p Value
Diabetes	25 (57)	0.586
Hypertension	34 (77)	0.162
Smoker	28 (64)	0.017
Intermittent Claudication	38 (86)	0.000

Table 4. Distribution of Stress ABI Results in Different Framingham Risk Categories (PHC, 2012)

Risk Factor	Normal Stress ABI	Abnormal Stress ABI	p Value
Low	6	4	0.374
Intermidiate	11	19	0.371
High	20	21	0.959

DISCUSSION

In this study, we observed that intermittent claudication and significant history of smoking were strongly associated with abnormal stress ABI result. In a study done by Kownator and colleagues,[10] the presence of cardiovascular risk factors such as hypertension, diabetes, smoking as well as intermittent claudication are statistically significantly associated with PAD; however, in the present study, hypertension and diabetes failed to show statistically significant correlation with abnormal stress ABI.

Fifty-four percent of patients in this study showed a positive response to stress ABI which is higher compared to the study done by Stein et al.[7] in 2006.

The inability of resting ABI measurement to detect mild arterial stenosis results from preservation of perfusion pressure governing flow across the region of lumen narrowing. During exercise, blood flow cannot increase beyond the area of significant stenosis despite the reduction of resistance due to arteriolar dilatation, resulting to significant drop in pressure distal to the stenosis. A fall in systolic pressure after exercise is the most sensitive test for detection of hemodynamically significant stenosis. Thus, stress ABI is useful for the detection of PAD if the stenosis is not severe enough to compromise blood flow at rest.[7]

CONCLUSION

This study demonstrated that almost all patients with intermittent claudication had abnormal stress ABI. Regardless of the Framingham risk category, stress ABI should be performed in patients with this symptom. Smoking history also showed a statistically significant correlation with PAD and it is reasonable to perform stress ABI among this group of patients.

As mentioned by Chang and colleagues,[1] ABI measurement is now used worldwide as an easy and practical method for the diagnosis of PAD, and can be used clinically to assess the risk for future cardiovascular events.

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APPENDIX A

THE EDINBURGH CLAUDICATION QUESTIONNAIRE'

1) Do you get a pain or discomfort in your leg(s) when you walk?
   Yes
   No
   I am unable to walk

If you answered "Yes" to question (1) - please answer the following questions. Otherwise you need not continue.

2) Does this pain ever begin when you are standing still or sitting?
   Yes
   No

3) Do you get it if you walk uphill or hurry?
   Yes
   No

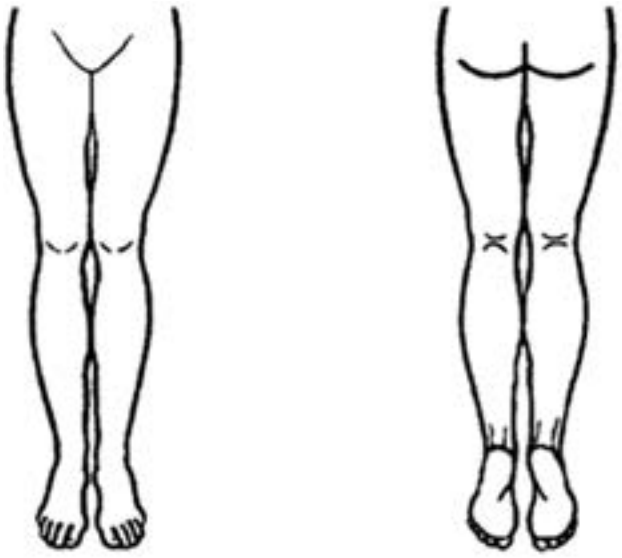
4) Do you get it when you walk at an ordinary pace on the level?
   Yes
   No

5) What happens to it if you stand still?
   Usually continues more than 10 minutes
   Usually disappears in 10 minutes or less

(6) Where do you get this pain or discomfort? Mark the place(s) with "x" on the diagram below

Definition of positive classification requires all of the following responses:
   'Yes' to (1),
   'No' to (2),
   'Yes' to (3), and
   'Usually disappears in 10 minutes or less' to (5);
   grade 1 = 'No' to (4) and grade 2 = 'Yes' to (4).

If these criteria are fulfilled, a definite claudicant is one who indicates pain in the calf, regardless of whether pain is also marked in other sites; a diagnosis of atypical claudication is made if pain is indicated in the thigh or buttock, in the absence of any calf pain. Subjects should not be considered to have claudication if pain is indicated in the hamstrings, feet, shins, joints or appears to radiate, in the absence of any pain in the calf.



A Randomized Controlled Trial Comparing Adequacy of Anticoagulation Between Traditional INR Management Versus Nomogram-Based INR Management Among Post - Mechanical Valve Replacement Patients

Bermillon S. Faderan, MD; Normita C. Manapat, MD

***Background* ---** At present, the adequacy of anticoagulation at the Out-Patient Department of the Philippine Heart Center for post valve replacement patients is not known. The general objective of this study is to determine a more effective method of anticoagulation titration in patients with prosthetic mechanical heart valve in the Philippine Heart Center. The specific objectives are to determine the outcomes of anticoagulation among patients receiving traditional INR management and nomogram-based INR management, to compare embolic and bleeding outcomes between the two methods of INR management and to determine anticoagulation control in the two methods of INR management.

***Method* ---** We randomly allocated post mechanical valve replacement patients who required warfarin either to the traditional or nomogram-based INR management arm. The quality of oral anticoagulant management was evaluated by comparing the proportion of time that the international normalized ratio (INR) of patients receiving warfarin was within the target therapeutic range in both arms. The rates of thromboembolic and major hemorrhagic events were measured.

***Results* ---** A total of 62 patients were enrolled with 31 patients randomized to each arm of the study. There were no bleeding or thrombotic complications observed in either study group. The INR of patients in the traditional INR management arm were within range 36.46 ± 27.91% of the time, while the INR of patients in the nomogram INR management arm were within range 42.55 ± 27.64% of the time (p = 0.391). There was no significance difference in the percentage of time INR values were within range between the traditional INR management arm and nomogram-based INR management arm (p = 0.96) in patients with target INR of 2.0-3.0. Among patients with target INR of 2.5-3.5, the percentage of time INR values were within range was higher in the nomogram-based INR management arm (38.48 ± 27.82) than that in the traditional INR management arm (24.11 ± 20.10) as but this difference did not reach statistical significance (p = 0.059). Patients who underwent mitral valve replacement or mitral and aortic valve replacement in the traditional INR management arm had a higher percentage of time INR values were below range (70.67±21.55) than patients in the nomogram based INR management arm (51.01 ± 29.52) which was statistically significant (p = 0.017).

Conclusion* ---** There was no significant difference in the anticoagulation control as measured by percentage of time INR values were within range between the traditional and nomogram-based INR management arm. However, patients who underwent mitral valve replacement or mitral and aortic valve replacement in the traditional INR management had a higher percentage of time INR values were below therapeutic range as compared to those who received titration of warfarin based on nomogram. ***Phil Heart Center J 2015;20(1):40-45.

Key Words: INR Management ■ anticoagulation ■ warfarin ■ valvular heart disease

Correspondence to ***Dr. Bermillon S. Faderan,*** Department of Adult Cardiology. Philippine Heart Center, East Avenue, Quezon City, Philippines 1100 Available at **http://www.phc.gov.ph/journal/publication** ISSN 0018-9034

Long-term anticoagulation therapy is needed for prevention of systemic thromboembolism among patients with mechanical prosthetic heart valves.[1] Risk of thromboembolism is about 1% to 2% per year even with the use of warfarin and the risk is considerably higher without treatment with warfarin.[2] Therefore, anticoagulation therapy is a key part of the management of patients who have undergone mechanical valve implantation. Common indications for valve replacement include rheumatic heart disease patients presenting with severely diseased valves not suitable for open repair or percutaneous valvuloplasty, severe aortic stenosis, and intrinsic or secondary severe aortic valve pathology like aortic regurgitation from thoracic aortic aneurysm, and severe ischemic mitral regurgitation.

The 2008 ACC/AHA guidelines on the management of valvular disease states that "for mechanical prostheses in the aortic position, the INR with warfarin therapy should be maintained between 2.0 and 3.0 for bileaflet valves and Medtronic Hall valves and between 2.5 and 3.5 for other disc valves and Starr-Edwards valves; for prostheses in the mitral position, the International Normalized Ratio (INR) should be maintained between 2.5 and 3.5 for all mechanical valves."[3] Locally, a study by Vicente et al, done in 1999 reported that the incidence of both thromboembolic events and bleeding events was lowest when INR was between 1.5-2.5.[4]

More often than not, it is difficult to maintain a patient at a fixed or relatively fixed level of anticoagulation due to several factors. These include changes in absorption of medication, the effects of various foods and medications, and changes in liver function. In clinical practice, INR is maintained at a certain therapeutic range. According to Samsa and Matchar (2002), the INR and its control is the most important predictor of outcome on warfarin therapy.[5]

In the early Self-Controlled Anti-coagulation trial, 79% of the INR values were within the target range of 2.5 to 4.5 in the self-management group compared with only 65% in the group who had their INR values determined by a general practitioner.[6]

Studies done by Wilson et al[7] in 2003 and Poller et al[8] in 2008 have shown that management of anticoagulation by hospital-based anticoagulation clinics is at least as good as routine hospital follow-up, and slightly better than management directed by family physicians.

Several studies have employed the use of nomograms for the initiation of warfarin therapy. The use of such nomograms have use of such nomograms has aided physicians to shorten the time to reach target INR without much difference in the development of bleeding or thrombotic events.[9]

At present, the adequacy of anticoagulation at the Out-Patient Department of the Philippine Heart Center for post valve replacement patients is not known. This study was done to determine if the traditional way of INR management is comparable to warfarin nomogram-based INR management in terms of its effect on clinical outcome, such as incidence of embolic and bleeding episodes. Moreover, this study will like to determine anticoagulation control as measured by percentage of time INR values were within therapeutic range.

METHODS

This study is a prospective, randomized-controlled study comparing nomogram-based INR management and traditional INR management involving patients who are anticoagulated after undergoing mechanical valve replacement in Philippine Heart Center. The study was approved by the Institutional Ethics Review Board (IERB) and informed consent was obtained from the subjects prior to participation.

Included were adult subjects who have undergone mechanical valve replacement, receiving warfarin for post-operative anticoagulation and on regular follow-up at the Out-Patient Department of PHC. Excluded were: (1) patients with known contraindication to anticoagulation; (2) patients who cannot come back for monthly follow-up INR monitoring; (3) female patients of childbearing age; and (4) patients with no contact numbers.

All valve patients receiving warfarin after valve replacement were screened for eligibility during their OPD follow-up. Those who agreed to provide written consent were randomized to the traditional INR management arm or the nomogram-based INR management arm according to a computer-generated table with random assignment in blocks of four. Baseline demographic data were recorded through interview and chart review. *See Figure 1.*

Traditional INR management. Patients randomized to the traditional INR management arm had their INR monitored and warfarin dose adjusted on the discretion of cardiology fellow-in-charge guided by the appropriate INR levels for the particular valve type and location. Monthly INR monitoring was done for a period of one year. Patients were checked for symptoms of bleeding and thromboembolic events during each visit.

Nomogram-based INR management. Patients randomized to the nomogram-based INR management arm had their INR monitored and warfarin dose adjusted based on warfarin nomogram adopted from Salem et al.[10] INR Monitoring was done monthly for a period of 1 year or as dictated in the nomogram. Patients were checked for symptoms of bleeding and thromboembolic events during each visit. Bleeding complications and warfarin excess was managed based on adapted guideline by Ansell et al, 2004.[11]

Outcome Measures. The primary clinical outcomes measured were the occurrence of embolic events and hemorrhagic events on each arm of the study. Patients were interviewed at each follow-up visit to capture the incidences of warfarin-related major events requiring medical attendance or treatment, such as unscheduled outpatient clinic visits, emergency room visits and hospitalization. Major bleeding events include haemorrhagic stroke, gastrointestinal bleed, genitourinary bleed and hemoptysis. Major embolic events include thrombotic prosthetic valve dysfunction, transient ischemic attack, stroke, limb ischemia, recurrent venous thrombosis and pulmonary embolism. Each event was confirmed by reviewing the patient's medical record.

Bleeding events were classified according to a modified version of the Warfarin Optimized Outpatient Follow-up Study Classification as described by Chiquette et al in 1998.[12] Minor bleeding had little or no clinical significance and did not require referral or additional visits. Significant bleeding required evaluation or referral or was associated with a decrease in hematocrit greater than 3% or a decrease in the hemoglobin level of more than 1.2 mg/dL. Major bleeding required hospitalization and transfusion of at least 2 units of blood, and life-threatening bleeding led to cardiopulmonary arrest, surgical or angiographic intervention, or irreversible sequelae. In fatal bleeding, death was directly related to the bleeding. Embolic events were also classified by severity as described by Chiquette et al. in 1998.[12] A minor embolic event had no significant health care impact, while a significant embolic event required evaluation or hospitalization. A life-threatening embolic event caused irreversible damage, required an emergency procedure, or necessitated admission to an intensive care unit.

The secondary outcome measure was the proportion of time the patients' INR were within therapeutic range. Therapeutic INR ranges for low-intensity (INR = 2–3) and high-intensity (INR = 2.5–3.5) indications were adopted from the ACC/AHA 2006 Guidelines for the Management of Patients with Valvular Heart Disease. The defined expanded therapeutic ranges for this study were 1.8-3.2 for low intensity and 2.3-3.7 for high intensity indication.

Sample Size: Based on a study by Wilson et al in 2003,[7] patient's INR values will be in the therapeutic range at 86% and 77% of the time in anticoagulation clinic and family physician managed groups, the sample size computed was 63 per group or a total of 126 patients with 95% confidence level and 80% power to detect significance.

Data Analysis: Patient characteristics were compared using an unpaired t-test, 2x2 test, or the Fisher exact test, were appropriate. Event rates were calculated as the number of events divided by the total number of patient-years of follow-up in each group. Differences in event rates were calculated as relative risks with 95% confidence intervals. The mean INR associated

with events and the number of events that occurred above or below a given INR was examined to further assess the impact of INR control on complications. These differences were compared by a 2x2 test. Anticoagulation control was calculated as the percentage of INRs and the percentage of patient-time spent within the target range. Calculating patient-time within range required using a modified version of the program developed by Rosendaal et al.[7] The proportion of time that INR values are within the therapeutic range on both arms was compared using an unpaired Student's t-test. For patients who had their warfarin therapy interrupted temporarily either in preparation for upcoming surgical or dental procedures or because of bleeding or thrombotic complications, the interval between when the warfarin dose was withheld until 5 days after it was resumed was not included in the analysis.

RESULTS

Table 1 shows the demographic data of patients included in this study. A total of 62 patients were enrolled in this study with 31 patients randomized to each arm of the study. There was no significant difference in the mean age between the study population (p = 0.266). There were more males in the nomogram-based INR management arm, while there were more females in the traditional INR management arm. Majority of the patients underwent aortic valve replacement. There were no bleeding or thrombotic complications observed in either study group.

The INR of patients in the traditional INR management arm were within range 36.46 ± 27.91% of the time, while the INR of patients were within range 42.55 ± 27.64% of the time in the nomogram INR management arm (p value= 0.391) as shown in Table 2.

In patients with target INR of 2.0-3.0, there was no significant difference in the percentage of time INR values were within range between the traditional INR management arm and nomogram-based INR management arm (p value= 0.96) as shown in Table 3.

On the other hand, among patients with target INR of 2.5-3.5, the percentage of time INR values were within range was higher in the nomogram-based INR management arm (38.48 ± 27.82) than that in the traditional INR management arm (24.11 ± 20.10) as shown in Table 4. However, this difference did not reach statistical significance (p value = 0.059). Moreover, patients in the traditional INR management arm had a higher percentage of time INR values were below range (70.67 ± 21.55) than patients in the nomogram-based INR management arm (51.01 ± 29.52) and this difference was statistically significant (p value= 0.017).

Table 1. Clinical and Demographics of Post Valve Replacement Patients According to INR Management (PHC, 2010-2011)

	Traditional INR Management n = 31	Nomogram-based INR Management n = 31	p value
Mean Age	42.13 ± 11.36	45.16 ± 9.85	0.266
Male	7 (22.6%)	16 (51.6%)	0.034
Female	24 (77.4%)	15 (48.4%)	
Surgery Type			0.153
Mitral Valve Replacement	11 (35.5%)	6 (19.4%)	
Aortic Valve Replacement	15 (48.4%)	14 (45.2%)	
Both Mitral and Aortic Valve Replacement	5 (16.1%)	11 (35.5%)	

Table 2. Anticoagulation Control of All Post Valve Replacement Patients Included in the Study Patients According to INR Management (PHC, 2010-2011)

	Traditional INR Management (n = 31)	Nomogram-based INR Management (n = 31)	p value
% of time values were within range	36.46 ± 27.91	42.55 ± 27.64	0.391
% of time values were below range	55.45 ± 29.76	47.8 ± 28.09	0.302
% of time values were above range	9.68 ± 16.45	9.64 ± 12.24	0.992

Table 3. Anticoagulation Control of Post Valve Replacement Patients with Target INR 2.0-3.0 According to INR Management (PHC, 2010-2011)

	Traditional INR Management (n = 15)	Nomogram-based INR Management (n = 14)	p value
% of time values were within range	58.90 ± 21.63	59.54 ± 20.98	0.960
% of time values were below range	27.77 ± 29.76	34.44 ± 16.89	0.302
% of time values were above range	13.18 ± 13.18	6.02 ± 10.31	0.372

Table 4. Anticoagulation Control of Post Valve Replacement Patients with Target INR 2.5-3.5* According to INR Management (PHC, 2010-2011)

	Traditional INR Management (n = 16)	Nomogram-based INR Management (n = 17)	p value
% of time values were within range	24.11 ± 20.10	38.48 ± 27.82	0.059
% of time values were below range	70.67 ± 21.55	51.01 ± 29.52	**0.017**
% of time values were above range	7.76 ± 16.07	10.51 ± 12.69	0.5230

**** For patients who underwent MVR or MAVR***

DISCUSSION

The results of this study showed poor anticoagulation control in both study groups with only 36.46 ± 27.91 and 42.55 ±27.64 percent of time INR values were in range in the traditional and nomogram-based INR management arm, respectively. This was in contrast to a previous published study by Wilson et al in 2003,[7] wherein patient's INR values were in the therapeutic range at 86% and 77% of the time in anticoagulation clinic and family physician managed groups, respectively. Whether this represents poor patient compliance to warfarin or poor efficacy of warfarin is unknown. This also shows that nomogram-based INR management does not guarantee better anticoagulation control.

Previous studies have shown that mortality from all causes of death was strongly related to level of INR. Samsa and Matchar concluded that the INR and its control within the target range selected according to the indication is the most important predictor of outcome on warfarin therapy.[5] In this study, although anticoagulation control was poor, no thromboembolic or bleeding complications were noted.

This study has shown that anticoagulation control was not statistically different between the traditional and nomogram-based INR management arm. However, in patients with target INR of 2.5-3.5, the percentage of time INR values were within range was higher in the

nomogram-based INR management arm than that in the traditional INR management arm, although this difference did not reach statistical significance (p = 0.059). Also, patients in the traditional INR management arm had a higher percentage of time INR values were below range compared with patients in the nomogram-based INR management arm (p = 0.017). This did not translate to a better clinical outcome as no thromboembolic or bleeding events were noted in both study arm.

In summary, there was no statistical difference in the anticoagulation control between the traditional and nomogram-based INR management arm. Although patients in the traditional INR management arm had a higher percentage of time INR values below range compared with patients in the nomogram-based INR management arm (p = 0.017), this did not translate to a better clinical outcome as no thromboembolic or bleeding events were noted in both study arm.

An important limitation of this study is that it did not achieved the adequate sample size, which was computed as 63 per group or a total of 126 patients with 95% confidence level and 80% power to detect significance due to difficulty in the recruitment of participants. We therefore recommend continuation of this study until the adequate number of participants is enrolled.

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Determination of Critical Threshold Value of SPO_2/FiO_2 Ratio in the Diagnosis of Acute Lung Injury

Rhea Louela G. Jusi, MD; Ma. Encarnita B. Limpin, MD; Rommel DLR. Bayot, MD; Fernando G. Ayuyao, MD

Background --- A study done in Philippine Heart Center conducted by Malicdem et al, concluded that SPO_2/FiO_2 (S/F) ratio can be a substitute for PaO_2/FiO_2 (P/F) ratio in the diagnosis of Acute Lung Injury (ALI) and Acute Respiratory Disease Syndrome (ARDS) in adults. However, the critical threshold value for S/F ratio is not determined. The focus of this research paper is to determine the critical threshold value of S/F ratio in the diagnosis of ALI particularly among critically ill Filipino patients.

Method --- This is an analytical, cross-sectional study conducted in Philippine Heart Center from June 2008 to December 2011. All admitted patients diagnosed to have ALI/ARDS were included in this study. All patients had measured O_2sat and PaO_2 with documentation of inhaled concentration of oxygen at the study enrolment. SPO_2 values were documented at the time of ABG sampling. The following measures was observed to improve the accuracy of the SPO_2: optimal position and cleaning of the sensor; satisfactory waveforms; no position changes or endobronchial suctioning for at least 10 minutes prior to the measurement and no invasive procedures or ventilator manipulation for at least 30 minutes prior to the measurement. SpO_2 were observed for a minimum of one minute before the value is recorded. SpO_2/FiO_2 was then computed and was compared with PaO_2/FiO_2 ratio. We determined the best cut off value for S/F ratio as well as the sensitivity, specificity, and likelihood ratio.

Results --- The determination of the critical threshold of S/F ratio for ALI/ARDS was conducted and evaluated. Corresponding measurements of PF and SF ratio was obtained from 106 intubated patients with the diagnosis of Respiratory Failure Type I, non-cardiogenic (ALI). A Linear Regression Model [S/F = 29.6 + 1.09 (P/F); $p < 0.000$] was obtained to determine the critical threshold of the SF ratio. A correlation coefficient of 0.804 was obtained between the P/F and S/F ratio which yielded the critical threshold for SF ratio of 248 for PF ratio ≤ 200 and a critical threshold SF ratio of 357 for PF ratio ≤ 300. Analysis between ROC AUC of 0.645 and the inverse of FiO_2 correlates with PF ratio (r=0.604) indicate a consistent agreement between that S/F and P/F ratios. The SF ratio threshold of 248 (corresponding to P/F ≤ 200) yielded a sensitivity of 100% and specificity value of 96.23% with a likelihood ratio of 26.5 (95% CI: 6.80 – 103.20) for ARDS, while S/F ratio threshold of 357 (corresponding to P/F ≤ 300) had a sensitivity and specificity of 100% and 98.19%, respectively with likelihood ratio of 66.23 (95% CI: 18.7 – 283.8) for ALI.

Conclusion --- The high correlation between the S/F and P/F ratio as well as the consistent relationships between ROC AUC and inverse FiO_2 vs. PF ratio, excellent sensitivity and very satisfactory specificity for ARDS and ALI indicate that the threshold S/F ratio of 248 and 357 for P/F ratio of 200 and 300 can measure and discriminate ARDS and ALI among critically ill Filipino patients. ***Phil Heart Center J 2015;20(1):46-52.***

Key Words: Acute Lung Injury (ALI) ■ Acute Respiratory Distress Syndrome (ARDS) ■ Pao_2/fraction of inspired oxygen ratio (PF ratio) ■ O_2 saturation/ fraction of inspired oxygen ratio (SF ratio)

It has been known, since World War I that some patients with non-thoracic injuries, severe pancreatitis, massive transfusion, sepsis, and other similar conditions develop respiratory distress, diffuse lung infiltrates, and respiratory failure, sometimes after a lag of hours to days. It was Ashbaugh and colleagues who coined the term "adult respiratory distress syndrome" to describe 12 such patients in 1967 with these findings.[1] To proceed with the investigation of the pathogenesis and development treatment, it is essential to devise a clear definition of the syndrome. Such a definition was developed in 1994 by the American-European

Correspondence to ***Dr. Rhea Louela G. Jusi, MD,*** Department of Pulmonary and Critical Care Medicine. Philippine Heart Center, East Avenue, Quezon City, Philippines 1100 Available at **http://www.phc.gov.ph/journal/publication** 2015 ISSN 0018-9034

Consensus Conference (AECC) on acute respiratory distress syndrome (ARDS).[2] The term "acute respiratory distress syndrome" was used instead of "adult respiratory distress syndrome" because this syndrome is not limited to adults only.

Devastating clinical syndromes such as acute lung injury (ALI) and the ARDS are described as inflammation of the lung parenchyma leading to impaired gas exchange with concomitant systemic release of inflammatory mediators causing inflammation, hypoxemia and causing multiple organ failure and usually requiring use of mechanical ventilator and admission to ICU. ALI and ARDS are highly associated with high morbidity and mortality. One of the criteria for ALI and ARDS that was developed by an AECC in 1994 is acute hypoxic respiratory failure which is defined by PaO_2/FiO_2 ratio (or P/F ratio) of $\leq$300 and $\leq$200.[3] To obtain this ratio, arterial blood gas (ABG) analysis is needed. Complications of frequent and excessive drawing of blood such as anemia, hematoma, swelling of the site of puncture, pain and nerve damage have led to use of minimally invasive approaches resulting to fewer ABG measurements in critically ill patients.

With the use of pulse oximeters from its introduction in the 19th century, numerous investigations were undertaken on the viability of SpO_2 to replace PaO_2. In normal individuals, variations in PaO_2 correlate well with changes in pulse oximetric saturation (SpO_2) for oxygen saturation in the range of 80 to 100%. The potential usefulness of pulse oximetry as a screening tool in the detection of hypoxemia (defined as SpO_2 <90%) revealed that pulse oximetry can assists titrations of the fraction of FiO_2 in ventilator dependent patients.[4] However, studies in critically ill patients, particularly those with ALI/ARDS, are insufficient. Furthermore, threshold values for SpO_2/FiO_2 (S/F) ratios could be used as non-invasive criteria for diagnosing ALI/ARDS.[3] In the study done by Rice and co-workers, they sought to derive and validate the relationship between S/F and P/F ratios in critically ill patients with ALI/ARDS and hypothesized that the continuously available S/F ratio can be used as a surrogate for the P/F ratio in the diagnosis of ALI/ARDS.[3] As such, they stresses that future studies and researches are necessary to validate the relationship between S/F and P/F ratio in more heterogeneous populations of patients especially the critically ill.[3] The non-invasive and continuously available SpO_2 is standard monitoring in most ICUs.[4]

With the use of the S/F ratio, the clinicians may better facilitate the screening and rapid identification of patients with ALI/ARDS while avoiding the blood use and cost for blood gas determinations.[3] In a study done by Bernard and co-workers, they found that S/F ratios of 235 and 315, were found to correspond to P/F ratios of 200 and 300, respectively, which are the oxygenation criteria defining ARDS and ALI, respectively. These threshold S/F ratios showed favourable sensitivity and good specificity in predicting the corresponding P/F ratios in a validation data set. To our knowledge, these results demonstrate the first large study of the relationship between SpO_2 and PaO_2 in our ICU patients.[2] However, there is no definite critical threshold value set for S/F ratio for the Filipino patients.

A study done in Philippine Heart Center conducted by Malicdem et al, concluded that S/F ratio can be a substitute for P/F ratio in the diagnosis of ALI/ARDS.[5] However, the critical threshold value for S/F ratio is not determined. The focus of this research paper is to determine the critical threshold value of S/F ratio in the diagnosis of ALI particularly among critically ill Filipino patients. Considering the economic glitch of our setting, ABG is a costly diagnostic tool to derive PF ratio which is important in defining ARDS/ALI. Using S/F ratio in our daily practice will certainly be cost-effective without compromising the quality of our health care among our patients. Using S/F ratios to assist the diagnosis of ALI/ARDS should help to deal with the under diagnosis of these sydromes. Based on the available and published literatures on the viability and use of SF ratio as surrogate to PF ratio, it is not remote for the study to determine the critical threshold of SF ratio among critically ill Filipino patients.

METHODS

This is cross-sectional analytic study done at the Philippine Heart Center from June 2008 to December 2011. This study was approved by the Institutional Review Board (IERB) and informed consent was obtained from each subject prior to participation. Included were intubated adult patients with the diagnosis of Respiratory Failure Type I, non-cardiogenic. Excluded were patients who are hemodynamically unstable.

All patients had measured O_2sat and PaO_2 with documentation of inhaled concentration of oxygen at the study enrolment. SPO_2 values were documented at the time of ABG sampling. The following measures was observed to improve the accuracy of the SPO_2: optimal position and cleaning of the sensor; satisfactory waveforms; no position changes or endobronchial suctioning for at least 10 minutes prior to the measurement and no invasive procedures or ventilator manipulation for at least 30 minutes prior to the measurement. SpO_2 were observed for a minimum of one minute before the value is recorded. SpO_2/FiO_2 was then computed and was compared with PaO_2/FiO_2 ratio. We determined the best cut off value for S/F ratio as well as the sensitivity, specificity, and likelihood ratio.

Sample Size: Total enumeration was used in determining the sample size for this study. This included all patients in the Philippine Heart Center intubated with the diagnosis of Respiratory Failure Type 1, non-cardiogenic (ALI) for the period of June 2008 - December 2011. Based on the recent study by Rice and co-workers,[3] sample size of n=95 is sufficient at 95% confidence interval 20% relative error using assumed specificity of S/F ratio of 315. This study included 106 patients.

Statistical Analysis: The demographics of the respondents solicited to describe the population are expressed as mean, SD, range, and % relative frequency for co-morbidities and etiology. The correlation between SF and PF ratio was determined by a mixed Linear Regression Model using Pearson Product Moment Analysis and Goodman-Kruskal Predictive Index of Association for Criterion-Related Validity using gold standard PF values of 200 and 300 for ARDS and ALI, and the significance in the relationship between S/F and P/F ratio were obtained using Minitab Statistical Software version 16. Graphical presentations such as ROC AUC curve, scatter plots, and normal pro-probability plot of residuals were generated using SPSS version 14, Excel and Origin Pro 8, respectively. Overall specificity, sensitivity, PPV, NPV and likelihood ration including CIs at 95% were obtained using sensitivity, specificity calculator of Clinical 1 statistical software v. 4.0.[15]

RESULTS

As shown in Table 1, the mean age of the respondent is 55.33 years with a standard deviation of 18.34 years, ranging from 19 to 95 years old. Majority (57%) of the patients are males. Among the co-morbidities observed, the top three noted to be highest and most common among the patients were smoking (43%), CAD (43%), sepsis (38%) and COPD (25%). Co-morbidities such as those listed in Table 1 are considered due to its influence or interference in the level of inspiratory O_2 which usually results in fluctuating cardiac outputs and changes in the concentration of hemoglobin.[14] In addition, the influence of these co-morbid conditions in the diagnosis of respiratory failure have been documented in many literatures elsewhere, resulting to the decreased ability of patients to recognize hypoxemia and inability to increase cardiac output. Some cases are reported to affect hormonal and chemical secretions that often results to non-specific clinical manifestations of respiratory failure.

As to the etiology, sepsis (33%) is the leading cause of ALI among Filipino patients. This is followed by pneumonia (29%), multiple transfusion (18%), aspiration (16%) and chest injury (4%).

A high correlation coefficient ($r = 0.804$) was obtained between S/F and P/F ratio, indicating that S/F ratio can be a good indicator of a patient's P/F ratio. The Linear regression model equation of [$S/F = 29.6 \pm 1.09$ (PF); ($p<0.000$)] identified the critical S/F threshold of 248 and 357 for P/F ratio of 200 and

300, respectively. ROC curves for P/F value of 300 demonstrated the ability of the S/F ratio to discriminate P/F ratio indicative of ALI with AUC = 0.645. This is lower than that obtained by Rice et al,[3] on the same study conducted for Americans but is consistent with the plot of P/F ratio against the inverse of FiO_2 (r = 0.604). This means that P/F ratios obtained from patients are indicative of the patient's FiO_2.

The S/F threshold of 248 (P/F = 200) accurately discriminated all cases of ARDS yielding a sensitivity of 100% and specificity of 96.23; and. Likelihood ratio of 26.15 with 95% CI of 6.80 – 103.20. Similarly, the S/F threshold of 357 (P/F = 300) yield a sensitivity of 100% and specificity of 98.19% with a likelihood ratio of 66. 23 and 95% CI of 18.7 – 283.80.

Table 1. Baseline Characteristics of Patients who was Diagnosed to Have ALI/ARDS Included in the Study (PHC, 2012)

Total cases = 106	N	%
Age (in years)	55.33 ± 18.34	
Gender		
Male	57	54
Female	49	46
Co-morbidities		
Smoker	46	43
Asthma	16	15
Sepsis	40	38
CAD	46	43
COPD	27	25
DM	35	33
HPN	29	27
VHD	23	22
Etiology of ALI		
Pneumonia	15	29
Sepsis	17	33
Aspiration	8	16
Chest Injury	2	4
Multiple transfusion	9	18
	Mean ± SD	Mean ± SD
Baseline P/F	97.21 ± 22.97	56-175
Baseline S/F	135.88 ± 31.25	72-232

CAD = Coronary Artery Disease ; COPD = Chronic Obstructive Pulmonary Disease; DM = Diabetes Mellitus; HPN = hypertension VHD = Valvular Heart Disease

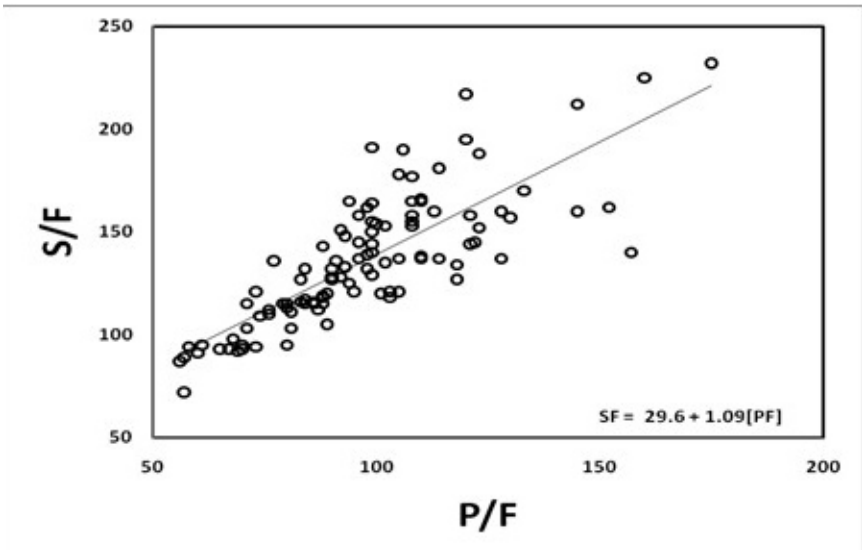

Figure 1. SF ratio vs. PF ratio scatterplot for critically ill Filipino patients in Philippine Heart Center (2008-2011). Best Fit Linear Model S/F = 29.6 + 1.09(P/F); p < 0.000; r = 0.804.

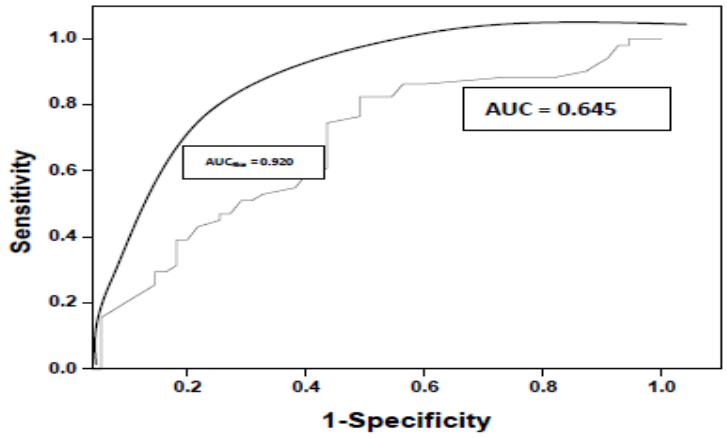

Figure 2. ROC curves for S/F vs P/F ratios for the derivation data set Best Fit Linear Model S/F = 29.6 + 1.09(P/F); p < 0.000; r = 0.804.

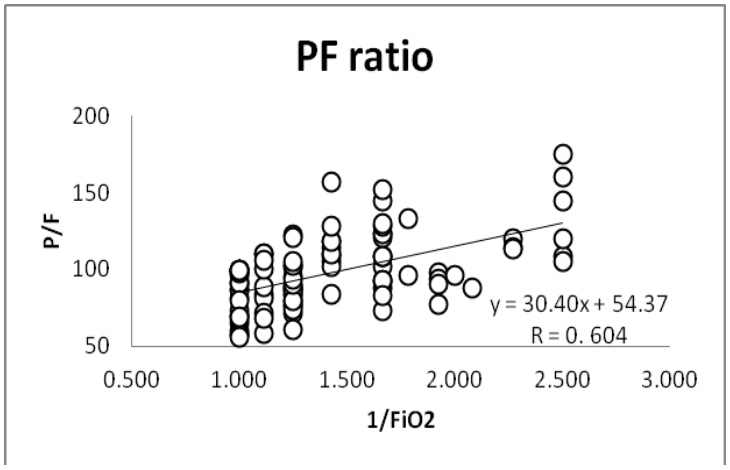

Figure 3. Relationship of P/F ratio vs. 1/FiO2 ratio [PF = 54.37 + (30.40/ FiO2)]; r = 0.604

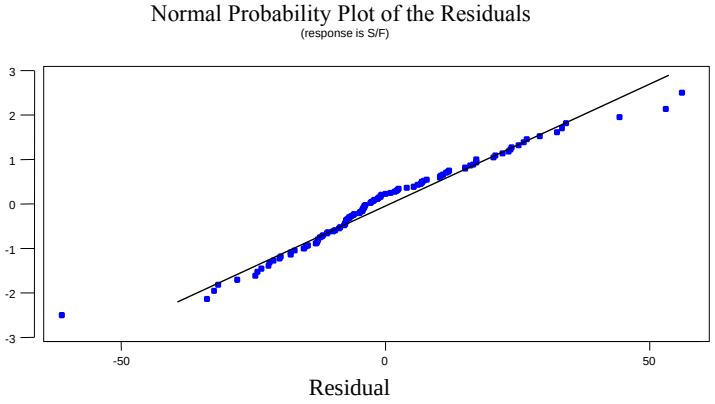

Figure 4. Normal Probability Plot of residuals indicates that the error committed is not as large as expected. Majority of the data points lie within or proximate to the trend line.

DISCUSSION

As hypothesized, critical threshold of S/F ratio can be obtained from continuous measurement of SpO_2. The threshold S/F ratio of 248 for P/F $\leq$ 200 and 357 for P/F $\leq$ 300 demonstrated excellent sensitivity and specificity. This means that the threshold S/F ratios obtained in this study can be used to predict P/F ratios among critically ill Filipino patients, since this is the first study in the Philippine setting on S/F ratio threshold determination. The other study done by Malicdem[5] was the determination of utility of S/F ratio in the diagnosis of patients with ALI/ARDS which concluded that it can be a substitute for P/F ratio in the diagnosis of ALI/ARDS.

As observed, the threshold value of 248 for ARDS and 357 for ALI is slightly higher than the ones obtained by Rice and co-workers.[3] This can be attributed to the fact that the S/F threshold values are characteristically higher than that of P/F ratio as evidenced by their positive correlation coefficient (r=0.804). Thus, high SpO_2 thresholds were needed to identify significant hypoxemia with satisfactory sensitivity.

The substantial coefficient (r=0.604) obtained between the P/F and FiO_2 as well as the AUC (0.645) of the ROC curve can be attributed to several factors. Since AUC obtained is lower than that documented in the literature, model adequacy check was performed by examining the normal probability plot of the residuals of the S/F ratio. The model is adequate to navigate the design space once the points resemble a straight line 16. From the Figure 4, majority of the points lie within, if not, are proximate to the straight line indicating the error committed is not as big as expected. Literatures elsewhere stressed that there are varying

factors that may affect the patient's SpO_2 such as patient's race, oximeter location, and disease states such as those associated with low cardiac output, may reduce the accuracy of the readings. As such, etiology of ALI, oximeter condition and patient background are primary considerations in the measurement of S/F ratio to be used as a screening tool for the diagnosis of other clinical cases where PaO_2 is considered as the primary data.

The p-values obtained during the t-test between S/F and P/F ratios indicated that S/F and P/F ratios are two totally different data that but are highly correlated. This is supported by the Predictive Index Association values of 98.15% for ARDS and 95.5% for ALI. This means that the probability of committing error in diagnosing ARDS and ALI was reduced by 98.15% and 95.5%, respectively. These results simply reveal that S/F threshold "rule in" the discrimination of ARDS and ALI. Likelihood ratio (LR) >1 indicate S/F ratio is more likely a surrogate to P/F ratio while a LR >10 can indicate a very high probability that S/F ratio can be used as a replacement for P/F ratio.[17] Since the LRs for S/F ratio threshold of 248 and 357 is far greater than 1 and 10, S/F ratio can be considered as a reliable and accurate non-invasive method in assessing changes and trends in oxygenation and PaO_2 among Filipinos. Making the most of S/F ratios can assist us to facilitate the clinical diagnosis of ALI/ARDS and help us to improve the under diagnosis of these syndromes.

Based on the results of the study the following recommendations are studies to be conducted to determine the correlation of S/F and P/F ratios by incorporating the effect of other factors such as PEEP and hemodynamic factors such as cardiac output. A multi-centered study involving a larger sample size and more heterogeneous patients can be conducted to determine the applicability in other subjects. With regards to practice, we can increase the institutional inclusion of S/F ratio as a surrogate to P/F ratio in diagnosing ARDS/ALI as cost-effective alternative to ABG.

In conclusion, the critical threshold of S/F ratio among Filipino patients was determined as excellent sensitivity and very high specificity, which indicate that S/F ratio can be a surrogate and/or supplement for P/F ratio. As such, S/F ratio threshold of 248 and 357 for P/F ratio of 200 and 300 can be used among Filipino patients that are critically ill. Thus, this is the first study in the Philippines that determined the critical threshold values of S/F ratio for the diagnosis of ARDS/ALI. Likelihood ratios for both S/F ratio threshold of 248 and 357 indicates that the possibility of S/F ratio replacing the P/F ratio and is a cost-effective alternative for Arterial Blood Gas Analysis. In this case, S/F ratio can be used as a screening/diagnostic tool that will determine if the patient really needs to undergo ABG analysis.

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Association of Medical Research Council Dyspnea Scale to the Quality of Life Among COPD Patients

Stefanni Nonna M. Paraguas, MD; Ma. Encarnita B. Limpin MD

Background --- Medical Research (MRC) Dyspnea Scale, a reliable and valid measure of the level of physical activity that precipitates breathlessness, is a simple, quick, self-administered tool. St. George Respiratory Questionnaire (SGRQ) consists of 50 items divided into symptoms, activity and psychosocial impact. This study demonstrates the association between MRC Dyspnea Scale with the quality of life in COPD patients, providing clinicians with the ability to quantify and monitor the change in dyspnea in response to physical therapy interventions.

Methods --- Subjects were asked to complete a self administered Tagalog validated dyspnea scale using MRC Dyspnea Scale and SGRQ. Data was presented as means ± standard deviations. Patient characteristics were related to HRQL scores using linear regression and Spearman correlation. Separate, one-way analysis of variance was used to evaluate the association between MRC Dyspnea Scale and SGRQ. A p-value of less than 0.05 was considered significant.

Results --- A total of 153 patients were included in the study. Majority of the subjects were male, with mean age of 61.97 ± 5.64. All were smokers diagnosed to have COPD based on spirometry. COPD patients were subdivided on the basis of GOLD 2010. The association of MRC Dyspnea Scale with SGRQ level of quality of life was statistically significant = 0.000), with a mean of 1.50 for SGRQ level of ≤6 and a mean of 2.74 for SGRQ level >6. Correlation of MRC Dyspnea Scale with SGRQ with a correlation coefficient of 0.68 that was statistically significant (p = 0.000). There was a significant association between the mean SGRQ by MRC Dyspnea Scale (p = 0.000). As the MRC score is increased, so does the SGRQ level, signifying that increased breathlessness is associated with poor quality of life as seen by the patient's SGRQ score.

Conclusion --- MRC Dyspnea Scale Score has been shown to correlate well with the quality of life using St. George's Questionnaire, indicating its usefulness as a measure of quality of life and well being in patients with COPD. ***Phil Heart Center J 2015;20(1):53-56.***

Key Words: Medical Research (MRC) Dyspnea Scale ■ St. George Respiratory Questionnaire (SGRQ) ■ Chronic Obstructive Pulmonary Disease (COPD)

Individuals with respiratory disease such as COPD would always complain of breathlessness. This could affect the daily function of these individuals. A useful way of measuring outcomes in terms of efficacy of interventions is through quantification of the relationship between dyspnea and physical exertion that aims to reduce dyspnea or improve one's functional ability. The MRC Dyspnea Scale is a reliable and valid measure of the level of one's functional ability. The MRC Dyspnea Scale is a reliable and valid measure of the level of MRC Dyspnea Scale has been used in COPD and other respiratory diseases such Asthma, Bronchiectasis, Idiopathic Fibrosis and Cystic Fibrosis.[1,2] The St. George Respiratory Questionnaire consists of 50 items divided into symptoms, activity and psychosocial impact. Calculating the answers of patients by empirically determined weights for each response, a score is obtained. A highest score in the category and total scores would signify an impact of the respiratory disease on health-related quality of life. A lowest score would have no impact on the respiratory disease with the health-related quality of life.[3] Currently, there are no studies to demonstrate the association between MRC Dyspnea Scale with the quality of life in COPD patients. As such, this outcome measure provides clinicians with the ability to quantify dyspnea

Correspondence to ***Dr. Stefanni Nonna M. Paraguas,*** Department of Pulmonary and Critical Care Medicine. Philippine Heart Center, East Avenue, Quezon City, Philippines 1100 Available at **http://www.phc.gov.ph/journal/publication** 2015 ISSN 0018-9034

in a meaningful way and to monitor the change in dyspnea in response to physical therapy interventions. This study aims to determine the association of Medical Research Council Dyspnea Scale with the quality of life among COPD patients using the St. George Questionnaire.

METHODS

This cross-sectional study was approved by the Institutional Ethics Review Board (IERB) and informed consent was obtained prior to participation. From January 2011 to 2012, all diagnosed COPD patients at the Philippine Heart Center were screened for inclusion in the study. Excluded were the following: subjects diagnosed with bronchial asthma, bronchiectasis, and upper airway obstruction; and subjects diagnosed with concomitant disease capable of altering breathlessness (congestive heart failure, decompensated diabetes mellitus, chronic renal failure).

Eligible subjects were identified and asked to sign informed consent. Subjects were interviewed and medical records were reviewed. PFT data were reviewed. Subjects were asked to complete a self-administered Tagalog validated dyspnea scale using Medical Research Council Dyspnea Scale. Subjects were asked to complete a self-administered Tagalog validated respiratory Questionnaire using St. George Respiratory Questionnaire.

After completing the questionnaire, the results were computed and were associated with the quality of life among COPD patients.

Sample Size: Sample size computed was based on 12% prevalence of COPD based on Philippine BOLD Study at 95% level of confidence and relative error of 10% where $n \geq 150$.

Statistical Analysis: Data were presented as mean ± standard deviations. Patient characteristics were related to HRQL scores using linear regression and Spearman correlation. Separate, one-way analyses of variance were used to evaluate the association between MRC Dyspnea Scale and SGRQ. Statistical Analysis System software was used for statistical analysis. A p-value of less than 0.05 was considered significant.

RESULTS

During the study period, 153 patients were included in the study. The baseline characteristics of patients are shown in Table 1. The majority of the population were male, with mean age of 61.97 ± 5.64. The mean weight was 61.42 ± 5.86, mean height was 161.89 ± 3.33 and the mean BMI of 23.39 ± 2.21. Majority of the patients had Hypertension (94%). Twenty-eight patients had Diabetes Mellitus (18%) and Forty patients had Coronary Artery Disease (26%). All patients were smokers diagnosed to have COPD based on spirometry. COPD patients were subdivided on the basis of GOLD 2010. Sixteen patients (11%) had Stage I COPD, sixty-nine (45%) Stage II COPD, sixty-three (41%) Stage III COPD, five (3%) Stage IV COPD.

The association of MRC Dyspnea Scale with SGRQ level of quality of life are shown in Table 2. Their association was statistically significant ($p = 0.000$), with a mean of 1.50 for SGRQ level of ≤ 6 and a mean of 2.74 for SGRQ level >6.

Table 3 shows the comparison of mean SGRQ by MRC Dyspnea Scale. Of the patients studied, seventeen were classified as having MRC Grade 1 dyspnea, thirty-nine MRC Grade 2 dyspnea, eighty MRC Grade 3 dyspnea, thirteen MRC Grade 4 dyspnea and none for MRC Grade 5 dyspnea. There was a significant association between the mean SGRQ by MRC Dyspnea Scale ($p = 0.000$). As the MRC score is increased, so does the SGRQ level signifying increase breathlessness is associated with poor quality of life as seen by the patient's SGRQ score.

DISCUSSSION

St. George's Respiratory Questionnaire is one of the several health status measures used to determine quantification of disability related to dyspnea.[3] However, it is complex to administer and score. An alternative measure is the Medical Research Council (MRC) Dyspnea Scale. The

MRC breathlessness scale comprises five statements that describe almost the entire range of respiratory disability from none (Grade 1) to almost complete incapacity (Grade 5). It can be self-administered or it can be administered by an interviewer. All the questions relate to every day activities which are simple and easily understood by patients. The score is the number that best fits the patient's level of activity. A score can usually be obtained in less than 5 minutes and has been used successfully in patients age 6 to>80 years of age.[1,2] The MRC breathlessness scale quantifies the disability associated with breathlessness by identifying that breathlessness occurs when it should not (Grades 1 and 2) or by quantifying the associated exercise limitation (Grades 3–5). When compared with other dyspnea evaluation measures, it has been shown to have acceptable validity for use with individuals with respiratory disease. The MRC Dyspnea Scale and the St. George's Respiratory Questionnaire present questions regarding the level of dyspnea that is provoked by performing activities of daily living.[4] Score distributions of the MRC Dyspnea Scale, and the Activity subscale of the St. George's Respiratory Questionnaire have been demonstrated to have approximately the same level of discriminatory power in accordance with a wide range of disease severity despite differences in the number of items, grading scales, and scoring.[4] In this study, the MRC Dyspnea Scale scores demonstrate concurrent validity with measures of health-related quality of life. The quality of life for individuals with respiratory disease has been shown to be lower and has been attributed to a limitation in physical functioning.

MRC Dyspnea Scale Score has been shown to correlate well with the quality of life using St. George's Questionnaire, indicating its usefulness as a measure of quality of life and well-being in patients with COPD.

Table 1. Baseline Characteristics of Subjects with COPD Included in the Study (PHC, 2012)

	Mean ± Standard Deviation or Frequency (%) n = 153
Age	61.97 ± 5.64
Gender (M:F)	125 (82) : 28 (18)
Co-morbidities	
Hypertension	143 (94)
Diabetes Mellitus	28 (18)
Coronary Artery Disease	40 (26)
Weight in kg	61.42 ± 5.86
Height in cms	161.89 ± 3.33
BMI	23.39 ± 2.21
Severity of COPD	
Stage I	16 (11)
Stage II	69 (45)
Stage III	63 (41)
Stage IV	5 (3)
Oxygen Saturation	96.31 ± 1.42
Smoking History	153 (100)
MRC Dyspnea Score	2.61 ± .80
SGRQ Total Score	31.68 ± 14.10

*BMI, Body Mass Index; COPD, Chronic Obstructive Pulmonary Disease; MRC Dyspnea Scare, Medical Research Council Dyspnea Scale, SGRQ, St. George Respiratory Questionnaire

Table 2. Association of MRC Dyspnea Scale with SGRQ Level of Quality of Life

SGRQ Level	MRC	
	MEAN	SD
> 6	2.74	0.69
≤ 6	1.50	0.82
p-value	0.000	

*MRC Dyspnea Scale, Medical Research Council Dyspnea Scale; SGRQ, St. George Respiratory Questionnaire; SD, Standard Deviation

Table 3. Comparison of Mean SGRQ by MRC Dyspnea Scale Score

MRC Dyspnea Scale	SGRQ	
	MEAN	SD
1	7.92	7.48
2	27.08	9.50
3	36.06	10.53
4	46.68	9.46
5	0	0
p-value	0.000	

*MRC Dyspnea Scale, Medical Research Council Dyspnea Scale; SGRQ, St. George Respiratory Questionnaire; SD, Standard Deviation

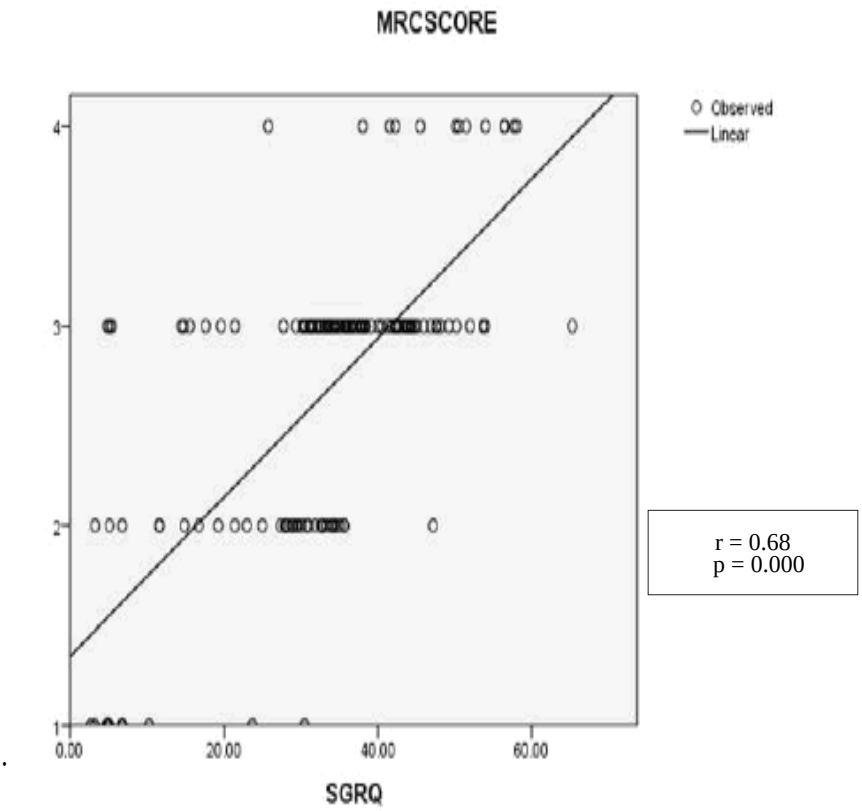

Figure 1. Association Of MRC Dyspnea Scale Score with SGRQ level with a correlation coefficient of 0.68 (p = 0.000)

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Case Report

Two Concurrent, Pathologically Distinct Left Atrial Masses

Jetz-Marion P. Cruz, MD; Ramon O. Ribu, MD

Background --- Primary cardiac neoplasms are rare, and majority of these are benign. A rarer occurrence is two distinct tumors within the heart.

Case --- A 68-year old female presented with dizziness and dyspnea. A previous echocardiography showed a left atrial mass, which was confirmed on a repeat examination. However, on further scrutiny, the mass was noted to be distinct in its echocardiographic features. On surgical exploration, there were indeed two distinct masses within the left atrium. The masses were confirmed histologically to be distinct from each other.

Conclusion --- In the evaluation of cardiac masses, the possibility of two distinct masses within the same cavity should be considered. In this case, echocardiography was able to demonstrate such occurrence, and was confirmed by surgery and pathology. ***Phil Heart Center J 2015;20(1):57-60.***

Key Words: Cardiac neoplasm ■ Myxoma ■ Inflammatory Myofibroblastic Tumor

Cardiac neoplasms are rare. The most common are metastatic tumors. Primary cardiac neoplasms – those arising from the heart – are rare, with a reported incidence of <1%.[1-6] About three-fourths of these are benign. They usually occur singly. The location in the heart depends on the histology of the particular tumor. Here we report an even rarer occurrence: two concomitant, pathologically distinct primary cardiac tumors.

Case

A 68 year-old female presented to our institution with dizziness and dyspnea. Her symptoms started a month before when she had an episode of dizziness described as a spinning sensation of her surroundings. She neither had loss of consciousness nor weakness. She was initially diagnosed and managed as a case of vertigo. She initially improved, but later was awaken by a drowning feeling and chest discomfort. It was immediately relieved upon standing up. A two-dimensional echocardiography was done and it showed a left atrial mass. She subsequently was referred to PHC for further management.

She was seen stable, with normal vital signs and not in cardiorespiratory distress. Cardiac findings revealed a tumor flop on the apical area. No distinct murmurs were noted. Other physical findings were normal.

Chest x-ray showed only borderline cardiomegaly. Initial two-dimensional echocardiography revealed a left atrial mass protruding into the left ventricle during diastole. The mass measured 5.09 x 2.73 cm, and is attached to the left atrial wall. However, on further scrutiny, there seems to be two types of masses within the left atrium. One is a solid, echogenic mass, while the other is a cystic mass (*Figure 1*). A cardiac CT angiogram showed the mass at the left atrial appendage and extending into the left atrial cavity, encroaching into the opening of the left superior pulmonary vein. Other work-ups revealed two-vessel disease on coronary angiography (*Figure 3*).

The patient subsequently underwent excision of the LA mass and CABG. Aortic and bicaval cannulation was done. Cardioplegia was given antegrade via the aortic root, and retrograde via the coronary sinus. The distal coronary bypass grafts were performed first, after which the mass was approached via the biatrial route, opening the right atrium and then the left atrium along the Waterstone groove. On

Correspondence to ***Dr. Jetz-Marion P. Cruz,*** Department of Thoracic and Cardiovascular Surgery. Philippine Heart Center, East Avenue, Quezon City, Philippines 1100 Available at **http://www.phc.gov.ph/journal/publication** ISSN 0018-9034

gross examination, the mass had two components: a solid, firm mass and a gelatinous mass. It was removed in toto. Both chambers were closed, then the proximal anastomoses were carried out. The cross-clamp was removed and weaning from cardiopulmonary bypass was done. Decannulation was performed soon after. The rest of the intra-operative course was unremarkable. Post-operatively, no complications were encountered. She was discharged well. Histopathologic examination confirmed the presence of two distinct pathologic entities. One of the mass was a cardiac myxoma. The other was an inflammatory myofibroblastic tumor. The latter stained positive for vimentin and desmin, and mildly for p53, and stained negative for smooth muscle actin and S-100.

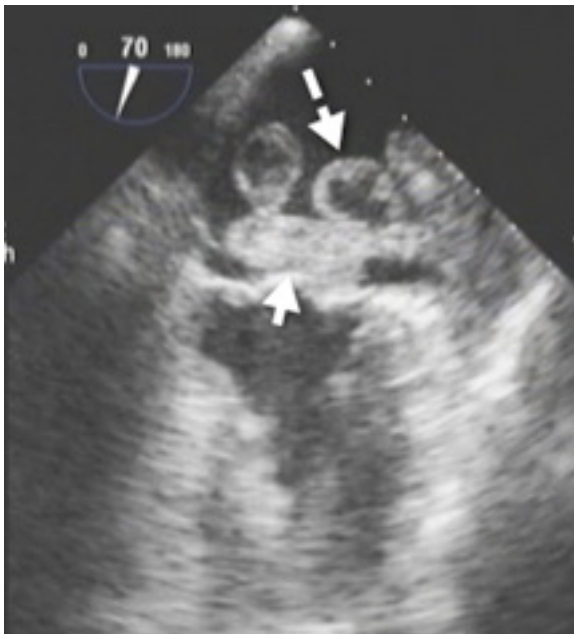

Figure 1. Transesophageal echocardiogram of a 68/F presenting with dizziness and dyspnea. There is note of two distinct masses within the left atrium- one is solid and the other one is cystic.

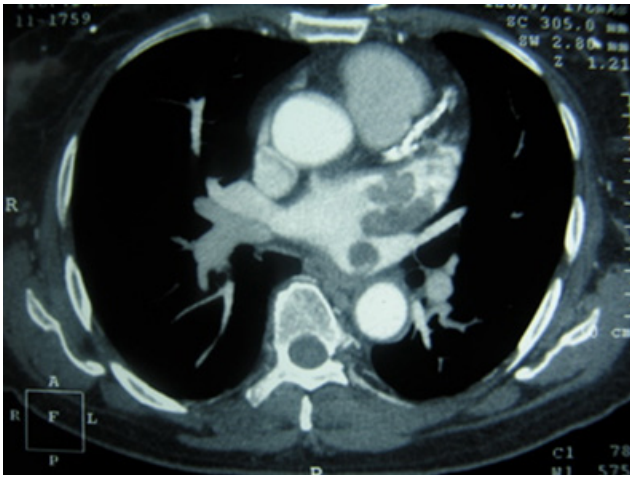

Figure 2. Cardiac CT scan of 68/F with left atrial masses. The masses is at the left atrial appendage, extending into the left atrial cavity.

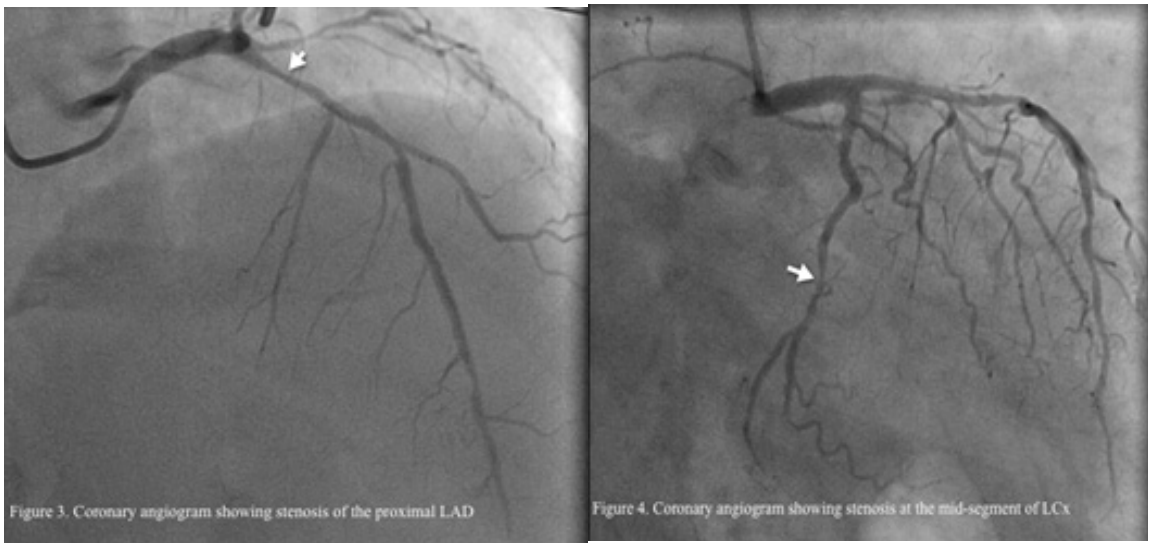

Figure 3. Coronary angiogram of a 68/F with left atrial masses. There are stenoses of the proximal left anterior descending artery and mid left circumflex artery.

DISCUSSION

Predominantly, cardiac tumors are metastatic lesions from varied sites. Rarely, a primary cardiac tumor arises, with an incidence of less than one percent.[1-6] Most these primary cardiac neoplasms are benign. Even rare is the occurrence of two synchronous and pathologically distinct tumors in the heart. Five other cases were found in the literature.[7-11]

Four consisted of a myxoma and a papillary fibroelastoma,[7-10] while the other one was a cardiac lipoma and a myxoma.[11] Myxomas are the most common primary cardiac tumor, accounting for nearly 50% of all primary benign cardiac tumors.[11] They are often pedunculated lesions, but may also have a broad base. Microscopically, they have uniform, small, polygonal cells with round or oval nuclei and moderate amount of cytoplasm. These are mainly located at the atria, but with a predilection for the left side.[10] If attached to the septum, they are commonly located at the limbus of the fossa ovalis. The presentation is that of an obstructive physiology and is dependent on the location of the mass. It may obstruct the pulmonary veins, the outflow tracts, or the atrioventricular valves. Another common presentation is peripheral embolization,[11] ranging from peripheral occlusive disease to cerebrovascular accidents.

Echocardiography is the diagnostic tool of choice. It can characterize the mass, show its location within the particular cavity, and demonstrate its behavior during the cardai cycle. While the left is the most commonly involved side, other possible locations are the right atrium, either ventricle, or even biatrially,[11] rarely, the it can arise from the atrioventricular valves.[8]

Inflammatory myofibroblastic tumor is described in the literature as a quasineoplastic lesion.[12] This is because of its seemingly malignant behavior despite its benign nature and features. It has been termed in many different ways, but usually in the heart, it is also called as plasma cell granuloma and inflammatory pseudotumor.[12] It was initially seen in the lungs, it can be practically located anywhere in the body. Grossly, it is commonly a polypoid, broad-based structure projecting into the lumen.[13] Microscopically, it consists of spindle-shaped cells with admixed inflammatory cells.[12,14-15]

Clinical presentation is referable to the cardiorespiratory system. Chest pain,[12,15] dyspnea, pallor, diaphoresis, and syncope,[12,16] are common symptoms.[12,13] A pediatric patient presented with recurrent convulsions,[14] while another with sudden cardiac death.[13,15] A murmur can be heard, either from the tumor or its effect on surrounding structures, especially the valves.

The treatment for both tumors consists mainly of excision. For the myxomas, urgent surgery is recommended because of the fatal nature of an embolic complication. For inflammatory myofibroblastic tumors, surgical resection is the still the best option. Other possible options include radiotherapy, chemotherapy and steroids, but the response to treatment is variable.[12]

In summary, our patient presented with cardiorespiratory symptoms later found out to be referable to an intracardiac mass. Echocardiography was able to demonstrate two distinct masses, and this was confirmed intra-operatively and histologically. While the occurrence of two separate and distinct intracardiac masses are rare, it should still be a consideration when evaluating and treating such patients.

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Case Report

Renal Artery Bypass Surgery Using Saphenous Vein Graft For Renovascular Hypertension Secondary to Bilateral Renal Artery Stenosis

Ali Macatanong, MD

Background --- Renal artery bypass surgery is rarely done for primary renal indication. The procedure is done usually as part of abdominal aortic surgery. This is the first case done at Philippine Heart Center (PHC) for renovascular hypertension.

Case --- The patient is 30-year-old male known to have chronic refractory hypertension and had a failed percutaneous transfemoral renal angioplasty (PTRA) days earlier. He underwent renal artery bypass surgery using saphenous vein graft which relieved his hypertension.

Conclusion --- Renal artery bypass surgery is a viable option to manage renovascular hypertension. ***Phil Heart Center J 2015;20(1):61-67.***

Key Words: Renovascular Hypertension ■ Bilateral Renal Artery Stenosis ■

Renal artery bypass surgery rarely has a primary renal indication. The surgery is usually performed as a concomitant procedure for aortic surgery when the renal artery needs reconstruction or implantation. The author reports the first renal artery bypass surgery done using a saphenous vein graft in the Philippine Heart Center for a renovascular hypertension secondary to bilateral renal artery stenosis. The procedure was done after a failed PTRA to young male patient who presents with long-term refractory hypertension.

Case

The patient is a 30-year old male who is known to have hypertension since high school. He had no associated co-morbidities. No meds were taken nor was any work up done until three months prior to admission when he was admitted at a local hospital due to a persistent headache. His BP was 180-210/100-140 mmHg. He was given metoprolol and amlodipine which both afforded only partial relief.

Work-ups were as follows: 12-Lead ECG was normal; chest x-ray showed mild cardiomegaly; echocardiography only showed functional regurgitation; and cranial CT scan was essentially normal. Ultrasound of the KUB showed normal sized kidneys with parenchymal calcifications on the left. Renal doppler scan showed normal-sized kidneys with evidence of parenchymal disease on the left and bilateral renal artery stenosis. There was a focal increase in peak systolic velocity in the take off of the right renal artery (~185cm/sec) and renal artery-aortic ratio was 3:1. There was no significant increase in the peak velocity in the left but collateral circulations were present. Nuclear studies showed 50% GFR in both kidneys.

Percutaneous transfemoral renal angioplasty (PTRA) was attempted; however, there was a total occlusion that could not be relieved by balloon angioplasty (*Figure 1)*. Open surgery was then planned. CT angiogram showed total occlusion of the left renal artery with reconstitution coming from lumbar collaterals (*Figures 2 and 3*), and severe stenosis of the proximal right renal artery with collaterals from the lumbar arteries (*Figure 4*). Infarction of the upper pole of the left kidney was also noted (*Figure 5*).

Correspondence to ***Dr. Ali P. Macatanong,*** Department of Thoracic and Cardiovascular Surgery. Philippine Heart Center, East Avenue, Quezon City, Philippines 1100 Available at **http://www.phc.gov.ph/journal/publication** ISSN 0018-9034

Figure 1. Representive films of the failed PTRA of a 30 year old male who have resistant hypertension secondary to bilateral renal artery stenosis. Note that there was no passage of dye beyond the ostium of the renal arteries. The catheter could not pass beyond the obstruction.

Figure 2. CT angiogram of a 30 year old male with resistant hypertension. CT scan axial view shows the stenosis of the left renal artery (arrow). There was a total cut off in the ostium of the left renal artery suggesting total occlusion but there was a passage of dye into the left renal system.

Figure 3. CT scan, sagittal view of a 30 year old male with resistant hypertension. There was obstruction of the left renal artery with presence of collaterals. There was a reconstitution of flow coming from the lumbar arteries into the left renal system.

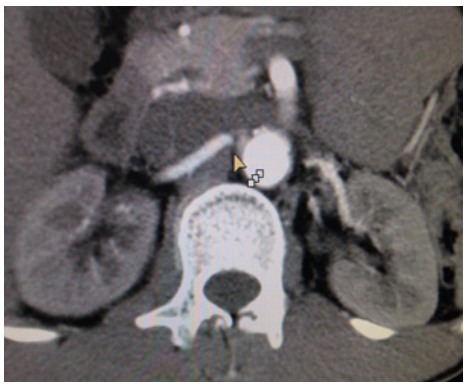


Figure 4. CT scan, axial view showing stenosis of the right renal artery (arrow). There was a filling defect occupying almost the entire ostium of the right renal artery.

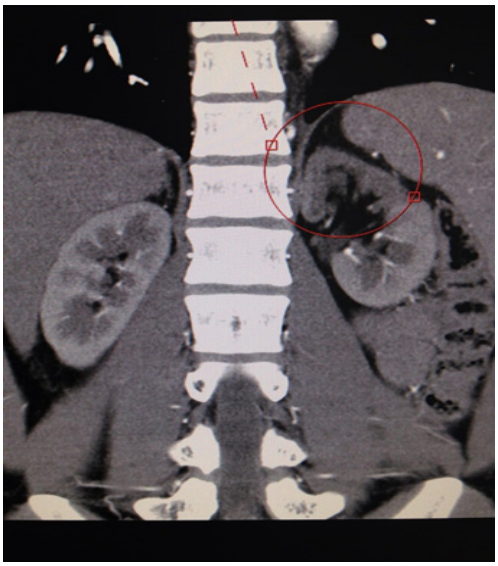


Figure 5. CT scan, sagittal view showing poor contrast enhancement of the left kidney with differential hypodensity in the superior pole (encircled), suggestive of renal infarction.

The patient subsequently underwent bilateral renal artery bypass surgery. General anesthesia was used to induce the patient. Good-sized saphenous vein grafts (~ 5mm diameter) were harvested from both thighs. The abdomen was entered through midline incision, and the right lateral peritoneal reflection was dissected and extended beyond the midline to expose the abdominal aorta, inferior vena cava and renal vessels. Several collateral vessels were encountered during the dissection and were carefully preserved (*Figures 6a and 6b*). Mannitol IV was given after the dissection. The right renal artery was first exposed by retracting first the renal veins cephalad, and second, the inferior vena cava to the patient's right. The right renal artery was about 5mm in diameter and stenotic (*Figures 7a and 7b*). Heparinization was done to achieve ACT >480 seconds just before cross-clamping the right renal artery. The right renal artery was transected in between clamps and anastomosed end-to-end with a saphenous vein graft using 6-0 monofilament polypropylene continuous sutures (*Figures 8a and 8b*). The left renal artery was exposed, transected and anastomosed to another saphenous vein graft in a similar fashion. The left renal artery was only 3mm in diameter and stenotic (*Figures 9a and 9b*).Tissue samples from the aorta and left renal artery were taken for biopsy. The problems encountered were mainly due to the difficulty in exposing the renal artery due to their deep location compounded by presence of heavy collaterals.

The proximal end-to-side anastomosis between the aorta and the saphenous vein graft was performed using 6-0 monofilament polypropylene continuous sutures (*Figures 9a and 9b*). Protamine was given and hemostasis performed. The abdomen was closed in layers.

The patient was then extubated without difficulty in the immediate postoperative period and started on progressive diet on post op day 1. The rest of the course in the ward was unremarkable. The mean blood pressure of the patient lowered to 140/80. He was discharged improved.

DISCUSSION

In 1934, Goldblatt documented that occlusion of the renal arteries causes secondary hypertension. He established that renal artery stenosis could cause elevation of blood pressure through the "renin" pathway, which was dependent on the blood flow to the kidney.[1] Hence, the term renovascular hypertension was coined. There was then a paradigm shift from medical control to surgical cure of hypertension. Nephrectomy was first tried as proposed by Leadbetter and Burkland in 1938, and was later abandoned due to unpredictability of the outcomes. Since then, the focus was shifted to the relief of the renal artery stenosis.

Renal artery stenosis (RAS) can be caused by a variety of pathology. Atherosclerosis accounts for more than 90% of cases. Other less common causes include Fibromuscular Dysplasia (FMD), dissection, trauma, vasculitis, external compression and the congenital hypoplastic syndromes of the aorta and renal artery.[2] There was a strong correllation between coronary artery disease and RAS among patients with atherosclerosis. There was a study done by Arellano[3] about the prevalence of RAS among PHC patients who underwent cardiac catheterization for suspected coronary artery disease using "drive by" renal angiography. Thirteen out of the 53 subjects had significant renal artery stenosis.

There are three major treatment options for renovascular disease due renal artery stenosis.[4] These are medical management, percutaneous approach and the open surgery. The general consensus is that all patients should undergo intensive medical treatment, and they are usually given a combination of at least three different antihypertensive drugs. The bulk of the these patients undergo PTRA for the definitive management of the RAS. Rarely do patients with renal artery stenosis go to the surgeon for the open revascularization procedure. Surgical revascularization has been proven to be effective but the relatively higher incidence of morbidity and mortality[5] makes it less attractive. But the study of Balzer, et al.[6] contradicts the

previous findings. His results showed no significant difference in long-term morbidity or mortality and even a significant improvement of longterm results among patients who underwent surgery.

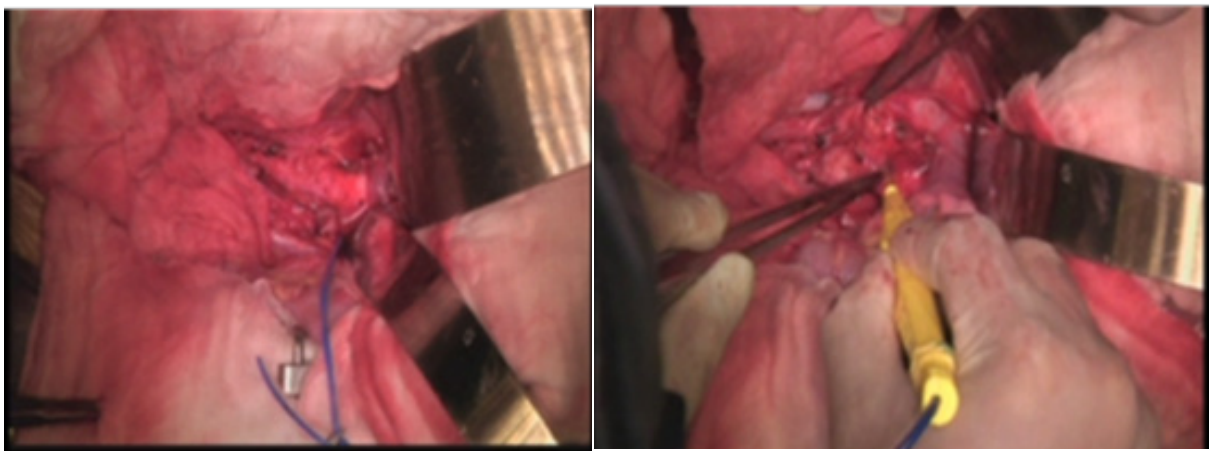
Based on international data, renal artery bypass procedure is rare even in large volume vascular centers.[7] In a study conducted by Knipp et al[8] the procedure was performed at a frequency of 3.5 operations per l00,000 discharges in the United States National Inpatient Sample census. The data also showed a decrease by 30% from 2000 to 2004. In the Philippine Heart Center, most significant RAS lesions underwent PTRA. The patient presented here is the only case with isolated renal artery stenosis who underwent renal artery bypass based on the official record of the Cardiovascular Surgery Department since 1975. There were 5 documented cases of renal artery revascularization procedures using implantation technique that were done as part of abdominal aortic aneurysm repair. This is consistent with the data abroad. Most of the revascularization were done in conjunction with aortic pathology and rarely for isolated renal indications. The usual indication for isolated RAS is failure of PTRA. Wong et al[7] reported on 51 consecutive patients undergoing surgical repair after failed percutaneous angioplasty, and only 2 patients were reported from the series whose indication were thrombosis.

There are 3 major surgical approaches to alleviate renal artery stenosis: aortorenal bypass, renal endarterectomy and renal implantation. Aorto-renal bypass grafting is more preferable due to its simplicity, durability and good patency rate. The patient is a perfect candidate for aortorenal bypass. CT scan showed non-aneurysmal abdominal aorta (*Figure 3)*. On inspection intraoperatively, the aorta was confirmed non-diseased with adequate thickness and good landing zones for anastomosis *(Figure 6a)*. The saphenous vein graft was chosen (on purpose) over prosthetic conduit for its longer patency rate and lower risk of morbidity. Though study by Paty et al[9] found a comparable patency rate of PTFE graft of 98% and 96% at 1 year and at 5 years, respectively. Extraanatomic bypass such as hepato-renal bypass is worth considering in cases where the aorta is diseased, especially that Cambria et al[10] demonstrated that performance of aorto-renal and extraanatomic bypass grafting was equivalent, though technical difficulty is usually encountered.

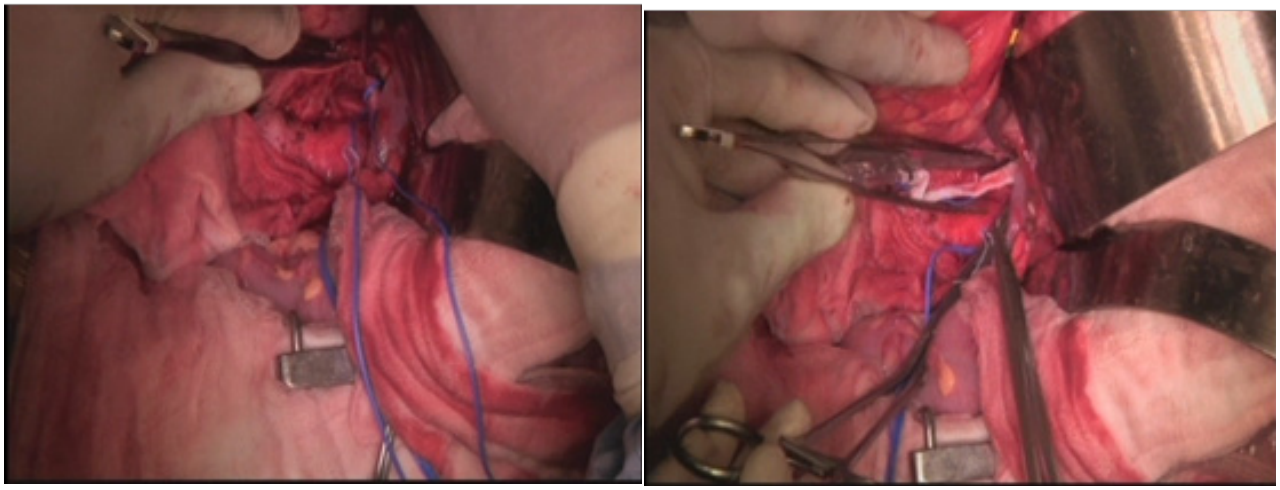
There are measures that we should not overlook in performing renal artery operations to avoid morbidity. Blood pressure should be controlled before the operation. Extended bowel mobilization should be undertaken to achieve good exposure. Mannitol IV should be given early in the dissection, and just before inducing renal ischemia. Heparin is given just before renal artery occlusion.

Surgical revascularization results in a durable relief of renal artery stenosis. Studies are consistent in improving blood-pressure and kidney function. However, concerns have been raised about the safety of surgical revascularization. Modrall et al[11] had shown a 10% in-hospital mortality. But several groups documented lower mortality rates.[12] The overall result for renal artery reconstruction is excellent. The failure rate averages at 5%.[8] The patency rate of all renal reconstruction was 99% at 30 days, 98% at 1 year, 97% at 3 years, and 95% at 5 years. When further stratified by type, bypasses had a 1-, 3-, and 5-year patency rate of 98%, 97%, and 97%.[12]

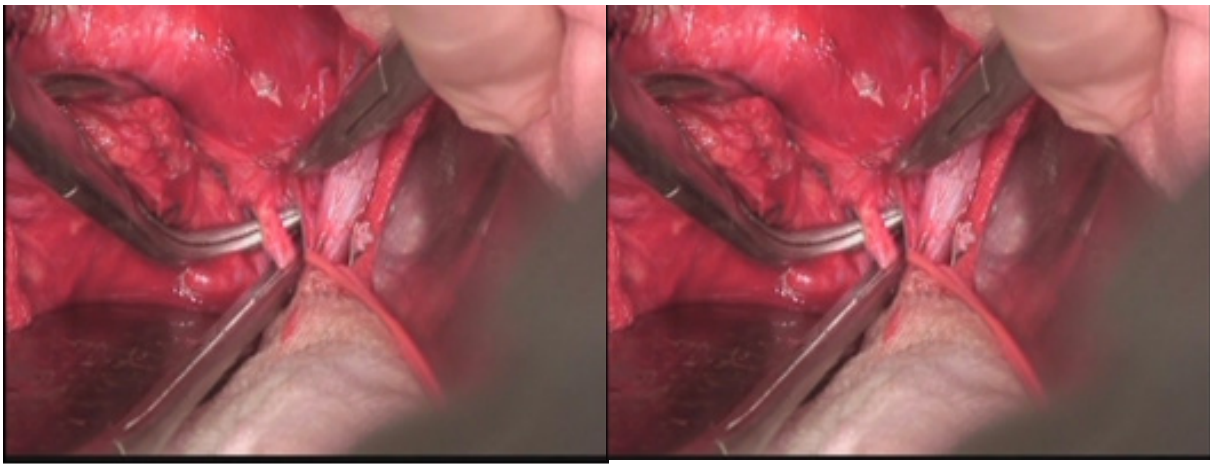
There is significant improvement of blood pressure control, though heterogeneous result among studies.[14-16] The effect on renal function is usually limited by the presence of long standing renal parenchymal disease among subjects, but there is significant improvement of functional parameters such as effective renal plasma flow, glomerular filtration and tubular transport time as evidenced by radionuclide techniques conducted by Torsell et al.[17]



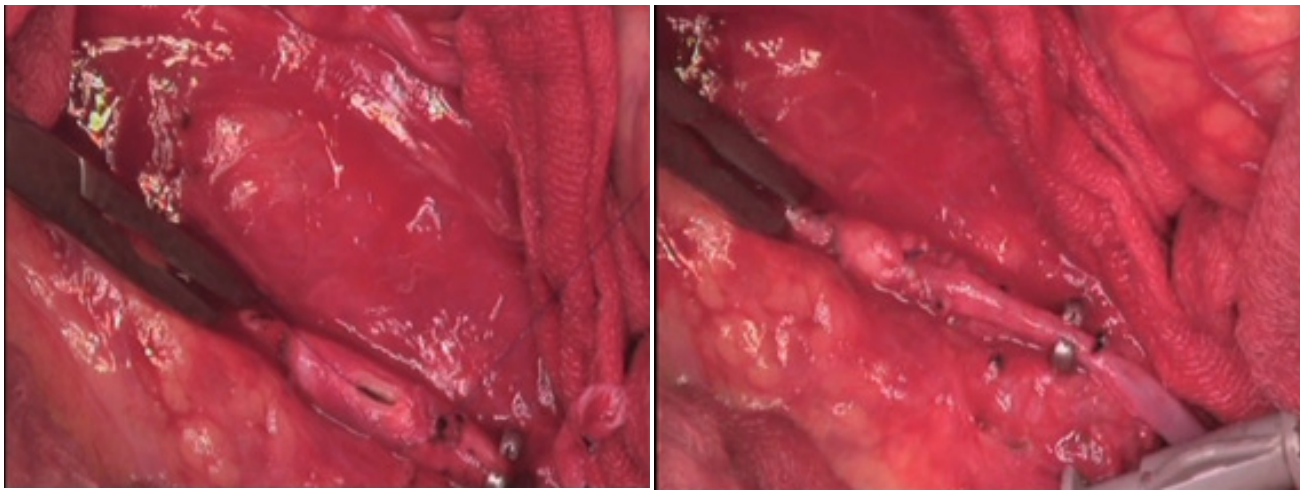
Figures 6a & 6b. Exposure of the para-aortic area to expose the aorta and renal vessels (6a).The aorta was normal-sized and non-calcified. Sufficient length of the infrarenal aorta was freed and prepared for the proximal anastomosis. Note the left renal vein traversing the aorta and covering the deeply located renal arteries. Dissection of the aorta from surrounding adhesions and paraortic tissues (6b). Note the heavy adhesions and collateral vessels encountered during the dissection. Collateral vessels were carefully preserved.



Figures 7a & 7b. Exposure of the right renal artery (7a). The right renal artery was exposed by retracting the left renal vein cephalad and the inferior vena cava to the right. The right renal artery was about 5cm and stenotic. The proximal segment was loosely tied with vessel loops and prepared for the right renal artery-saphenous vein graft anastomosis. Anastomosis of the right renal artery and the saphenous vein graft (7b). The right renal artery was transected first in between clamps. The anastomosis was done using 6-0 monofilament polypropylene continuous sutures. The patency was clarified after the anastomosis by releasing the clamps which showed blood coming out from the saphenous vein graft.



Figures 8a & 8b. Exposure of the left renal artery (8a) . The left renal artery was exposed by retracting the left renal vein cephalad and dissecting the heavy adhesions over the left para-aortic area. The right renal artery was about 3cm and stenotic. The proximal segment was loosely tied with vessel loops and prepared for the left renal artery-saphenous vein graft anastomosis. Anastomosis of the left renal artery and another saphenous vein graft (8b). The left renal artery was transected first in between clamps. The anastomosis was done using 6-0 monofilament polypropylene continuous sutures. The patency was also confirmed by releasing the clamps after the anastomosis which showed blood coming out from the saphenous vein graft.



Figures 9a & 9b. The anastomosis between the aorta and the saphenous grafts (9a). A big C clamp was applied over an area on the anterior wall of aorta to be used for the landing zones for proximal anastomosis. An ellipse of the anterior aortic wall was removed over that using size 4 puncher. A 6-0 monofilament polypropylene continuous sutures were used for the anastomosis.The end–to-side proximal anastomosis between aorta and saphenous vein graft. (9b) The saphenous vein was tapered to achieve 45 degree angulation of anastomosis to prevent turbulence. The clamps were released slowly and the bleeders were checked.

CONCLUSION

Renal artery bypass procedure is a viable option in the management of renovascular hypertension secondary to renal artery stenosis. Though rarely done today, it should be a part of the armamentarium in managing such a case. Surgeons should develop competence by investing experience and knowledge in the procedure to minimize morbidity and to improve outcome when surgery is needed.

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1

PHC.R.003.09

Comparative Study of the Effect of Sildenafil Treatment on Functional Capacity In Children Aged 7-18 Years With Cardiac Shunt Anomalies and Severe Pulmonary Hypertension at 1, 3 and 6 Months Therapy Using The 6 Minute Walk Test

Paul Anthony G. Tan, MD; Ma. Lourdes S.R. Casas, MD; Ma Ina P. Bunyi, MD

Background: One of the newer treatments for pulmonary hypertension is the use of phopshodiesterase inhibitors which have shown to be effective in lowering pulmonary arterial pressure in adult patients with PAH. This study investigates the effect of sildenafil treatment in the functional capacity of children with cardiac shunt anomalies and severe pulmonary hypertension. **Methods:** This is a quasi-experimental study done from May 2009 to March 2011, wherein 19 children diagnosed with cardiac shunt anomalies (ventricular septal defect, atrial septal defect, patent ductus arteriosus) with concomitant severe pulmonary hypertension were given sildenafil at a dose of 0.2-0.3mg/kg/dose every 8 hours. A baseline 6 minute walk test was done prior to treatment and repeated at 1 month, 3 months and 6 months of treatment. Oxygen saturation during these times was also determined. **Results:** Fourteen patients were able to complete the 6 month treatment. Mean 6 minute walk test improved by 13% from the baseline after 6 months of Sildenafil although only statistical trending was noted (p=0.09). Oxygen saturation did not improve in these patients. Among the different lesions, those with atrial septal defects had the greatest increase in 6 minute walk test distance in terms of percentage increase from the baseline. There were no major side effects noted. **Conclusion:** There is a trend that the use of Sildenafil at a dose of 0.2-0.3mg/kg/dose has been shown to improve 6 minute walk test distance in patients with severe pulmonary hypertension.

2

PHC.R.004.09

Predictors of Arrhythmia in Children Undergoing Cardiac Surgery at the Philippine Heart Center: retrospective study

Ada Lisette R. Vinluan, MD; Ma. Lourdes Casas, MD, Magdalena Lagamayo, MD

Background: Arrhythmia is a frequently encountered problem post-operatively in patients undergoing cardiac surgery in adults and children alike that poses additional resource burden and may contribute to unfavourable post-operative outcomes. Despite this, to date we have few data identifying the risk factors in the occurrence of arrhythmia post-operatively in children. **Methods:** Charts of patient aged 0 to 19 years old who underwent open heart surgery between January 2008 to June 2008 were included in the study. Significant post-operative arrhythmia was noted. The following parameters were measured and noted: age during surgery, weight, sex, pre-operative rhythm strips for presence of arrhythmia, type of surgery, cyanotic or acyanotic heart disease, total bypass time, total cross-clamp time, electrolyte levels post-operatively (Na, Ca, K, Mg), blood sugar levels immediately post-op, PRBC transfusions, residual defect post-surgery and redo operations. **Results:** A total of 74 (males, 30 females) patients who underwent open heart surgery for congenital lesions were included. Patients' age ranged from 0.16 to 18 years old. The mean weight was 12.54 kg. Of the subjects, 13.5% developed arrhythmia post-operatively the most common of which is premature ventricular contraction. All of the arrhythmias occurred during the first 24 hours post-operatively. Lower body weight, pre-operative arrhythmia and prolonged cross-clamp time were associated with post arrhythmia ($p<0.05$ <0.05 and 0.002). **Conclusion:** Lower weight, pre-operative arrhythmia and longer cross clamp time are predictors of post-operative arrhythmia. The most common post-operative arrhythmia was premature ventricular contraction.

3

PHC.R.005.09

Profiles and Outcomes of Patients With Primary Cardiac Tumors at the Philippine Heart Center: a 10-year update

Robin Augustine Q. Flores, MD; Ramon O. Ribu, MD

Cardiac tumors are rare entities in the multitude of cardiac surgeries to date. Initial studies

made have described characteristics of these lesions both pathologically and clinically. Recent data may prove of value in further defining these tumors and the effect of surgery on morbidity and mortality.

From January 1999 to December 2008, a total of 121 charts were retrieved from a total of 137 cases done; 114 cases were noted to be benign, myxomas accounting for 111 of them. Seven patient had malignant lesions (myofibroblastic sarcomas (n=4); angiosarcoma (n=1); pleomorphic sarcoma (n=1); and spindle of cell tumor with sarcoma features and moderate atypia (n=1). Females outnumbered males 3:1 with ages ranging from 10 months to 71 years old; eight patients were in the pediatric age group. The most common symptom was easy fatigability and shortness of breath occurring in two-thirds of all patients; majority of patients were in NYHA FC II upon admission. Average LVEF was 66.83± for all patients and varying degrees of pericardial effusion were noted at preoperative echocardiography. Eighty-nine percent of lesions were in the LA, majority were excised by direct LA approach in 78% of patients. Prolonged bypass time and cross-clamp time were noted in 7 patients (6%), and were found to significantly different between groups, together with pre-operative ejection fraction and tumor size. Thirteen cases were done with other cardiac procedures (i.e. CABG, valve surgery) with one mortality due to prolonged time on bypass. Overall morbidity rate was at 33.88% while mortality rate was 5.76% and length of post-operative stay was 10.45 days for all groups combined. Recurrence was observed in 3 patients and were noted to occur within 3 to 4 years from tumor excision. Long-term characteristics were not well documented, and thus long-term morbidity and mortality was not established. The past decade of cardiac surgery in our institution has shown an increase in the number of cardiac tumor cases with improved mortality rates after surgery.

4

PHC.R.008.09

Association of Glucose Levels with the Outcome of Pediatric Patients Undergoing Cardiac Surgery at the Philippine Heart Center

Kim Martin G. Tolentino, MD; Magdalena Lagamayo, MD; Jhuliet J. Balderas, MD

Background: Hyperglycemia in pediatric patients has been associated with significant complications. Several studies have shown the effects of hyperglycemia as a marker for adverse outcome in post-operative pediatric cardiac patients. The main objective of this study is to determine the association of mean glucose levels in the immediate postoperative period during the first 24 to 72 hours on mortality and morbidity among pediatric patients following cardiac surgery. **Methods:** A retrospective cohort study was performed among 109 pediatric patients, less than 19 years of age, who underwent cardiac surgery, from January to December 2009. Baseline information were obtained from review of the chart. Patients were clasified into risk categories according to the consensus-based method of risk adjustment for surgery for congenital heart disease (RACHS-l). Blood glucose levels were taken from the records from the first 24 and 72 hours post-operative period. Operative data were obtained from the anaesthesia and operating room records. **Results:** A total of five patients (4.6%) expired after surgery, while 18 patients had post-operative morbidities. Younger age, higher RACH score, prolonged hospital stay and PICU stay, longer bypass and cross clamp time were all associated with morbidity. Both mean peak glucose levels were associated with mortality. **Conclusion:** This study described the association of hyperglycemia with mortality after cardiac surgery. There were significant differences in the mean and peak glucose levels during the first 24 hours in terms of mortality.

5

PHC.R.009.09

Myocardial and Respiratory Injury in Acyanotic Pediatric Patients Undergoing Blood Transfusion During Open Heart Surgery

Francisco Emilio C. Remotigue Jr., MD; Ma. Lourdes SR. Casas, MD; Jhuliet Balderas, MD; Magdalena J. Lagamayo, MD; Ma. Bernadette Azcueta, MD

Background: Majority of blood transfusion reactions is brought about by the presence of leukocyte in the blood products. It is already a practice to use either irradiated or leukocyte-

depleted blood products when transfusing blood products to avoid the deleterious effects brought about by leukocyte activation. Leukocyte filter devices offer a better alternative for transfusing leukoreduced blood products to our patients. The study was conducted to determine the effects of using Leukocyte Filter Device on preventing respiratory and myocardial injury. **Methods:** A total of fifty-five (55) patients with Acyanotic Congenital Heart Disease who underwent open heart surgery were included in the study. Thirty-three (33) subjects were in the group without leukocyte filter device (LFD) and twenty-two (22) subjects were in the group with LFD. CB C, ABG and Troponin I were extracted at baseline and 30 minutes after the operation. Respiratory index was computed. **Results:** Majority of the cases are ventricular septal defect comprising 78% of the subject population followed by atrial septal defect (14%). In the group with no LFD used, there is a mean increase of the subject's respiratory index to 64, in contrast to an increase of only 23 in the subjects using leukocyte filter device (p = 0.172). The Troponin I of subjects without LFD had a mean increase of 4.54 ng/ml postoperatively compared to only 3.15 ng/ml in the LFD group. (p =0.055). The mean increase in the WBC count of the group without filter device was also higher at 13.11 x 109 compared to the LFD group at only 11.94 x 109 (p =0.415). **Conclusion:** The use of leukocyte filter device during blood transfusion in pediatric acyanotic patients undergoing open heart surgery has beneficial effects by decreasing respiratory and myocardial cell injury exemplified by a lower respiratory index, Troponin I and WBC count postoperatively.

6

PHC.R.011.09

Risk Factors of Pleuro-Pericardial Effusion Among Pediatric Patients Initially Presenting with Pleural Effusion and Pericardial Effusion Alone at Philippine Heart Center

Marisa S. Damian, MD; Ma. Nerissa A. De Leon, MD; Milagros S. Bautista, MD; Teresita S. De Guia, MD; Fernando G. Ayuyao, MD

Objective: To determine the incidence and different factors leading to pleuropericardial effusion among pediatric patients with initial presentation of pleural effusion or pericardial effusion alone. **Methods:** A retrospective chart review of 0-19 years old pediatric patients admitted at our institution during a 9-year period, (2000-2009), with diagnosis of either Pleural effusion. ericardial effusion and eventually developed pleuropericardial effusion as documented by echocardiogram, and chest radiograph was done. All demographic, clinical, radiographic, and laboratory data of these patients were collected and analyzed with the chi-square and Mann-Whitney test. A p value of 0.005 was considered significant. **Results:** Included were 179 patients, of which 91 (51%) had pleural effusion and 88 (49%) with pericardial effusion. Seventy-three (41 %) had pleuropericardial effusion, were much older at 11.71 years (p=0.006), had initial presentation of pericardial effusion, (p=0.000), highly associated with acquired heart disease, 54 (74%), and tuberculosis, 33 (45%), (p=0.000). They have low normal PF ratio=373 (p=0.020), low pleural fluid protein 3.5 g/dl (p=0.000), low pericardial fluid glucose 57 mg/dl (p=0.000) and high pericardial fluid to serum LDH ratio, 3.61 (p=0.031). They have large sized, exudative, and infectious in origin effusions (p=0.000) and with increased incidence of surgical intervention despite medical treatment. A high erum and pericardial fluid LDH, high pericardial fluid WBC and lymphocytes with low pericardial protein, showed a trend towards predicting possibility of pleuropericardial effusion. Dyspnea, 26 (36%) and cough 23 (32%) were the most common symptoms noted. **Conclusion**: There is a high incidence of pleuropericardial effusions in pediatric patients with pericardial effusions associated with newly diagnosed acquired heart diasease and tuberculosis. Low normal PF ratio, low pleural fluid protein, low pericardial fluid glucose and high pericardial fluid to serum LDH ratio, with large sized, exudative, infectious in origin effusions and a propensity for surgical intervention suggest a prognostic relationship between pleural and pericardial effusions to the development of pleuropericardial effusion. The majority of these pleuropericardial collections resolve with treatment of the underlying pleural and pericardial disease.

7

PHC.R.012.09

Comparison Between Adaptive Support Ventilation and Synchronized Intermittent Mandatory Ventilation in Weaning Post-CABG Patients: Philippine Heart Center Experience

Marc Gonzales Gaurino, MD; Veronica Durante, MD; Rex Villagracia, MD

Background: In the Philippine Heart Center Recovery Room (PHC-RR), it has been common practice to utilize the SIMV (Synchronous Intermittent Mandatory Ventilation) mode as the main tool during weaning from mechanical ventilation in the postoperative period. Adaptive Support Ventilation (ASV), a new ventilation mode, promises to provide a safe and effective start up to weaning, ease of operation for the user and adaptation to the different and variable characteristics and needs for the patient. The authors of this study attempts to prove that ASV is comparable to SIMV in terms of ease of weaning during the postoperative period. **Methods:** Patients who underwent uneventful coronary artery bypass graft surgery were enrolled in the study. They were divided into two groups, the ASV group and the SIMV Group. A protocol consisting of admission of the patients into the Recovery Room. Outcome were duration of mechanical ventilation, incidence of prolonged intubation/mechanical ventilation and the number of reintubation after extubation. **Results:** A total of 26 patients were enrolled in the study. Fifteen patients completed the ASV group protocol, while 9 patients completed the SIMV group protocol. There were no significant differences in the preoperative demographic data of the patients or in the dosages of the administered drugs intraoperatively. The primary outcome variable of this study, the duration of mechanical ventilation, was shown to have no significant differences between the 2 groups. **Conclusion:** The trend shows that weaning of patients from mechanical ventilation using an ASV-based protocol is practicable and comparable to weaning based on SIMV.

8

PHC.R.013.09

An Open Label Prospective Study Comparing Dexmedetomidine vs. Midazolam-Opioid Combination for Procedural Sedation of Pediatric Cardiac Patients

John Carl G. Caparas, MD; Ma Luisa R. Jacildo, MD DPBA; Florian R Nuevo, MD DPBA

Background: Procedural sedation, particularly in the catheterization laboratory, ehocardiography units, and PICU for pediatric cardiac patients is a challenge, to render the pediatric patient immobile while the procedure is ongoing. Procedural sedation without the loss of airway in non-intubated patients requires the use of drugs which can effect a loss of consciousness yet maintain good spontaneous breathing and stable vital signs appropriate for age. The objective of this study is to compare the efficacy for sedation and the clinical safety of dexmedetomidine versus the midazolam/opioid combination as a procedural sedation regiment for pediatric cardiac patients undergoing noninvasive or invasive therapeutic procedures or diagnostic work ups. **Methods:** This is an open label prospective cohort study. Patients were divided into two groups, first group recieved dexmedetomidine and the second group recieved midazolam with opioid (fentanyl or nalbuphine) combination. Dexmedetomidine was given initially with a loading dose (0.5 ug/kg x patient's weight in kg) via perfusion pump as recommended by the manufacturer and dosages were titrated to effect based on the level of sedation desired, within the recommended dose range of 0.3 to 0.7 ug per kg per hour. Midazolam/opioid was given as intermittent IV bolus injection based on these dose: Midazolam at 0.2 mg/kg, Nalbuphine at 0.2 mg/kg or Fentanyl at 1-2 ug/kg. Succeeding top-up doses of the combined midazolam/opioid drug at 1 mg/kg of Midazolam and 0.2 mg/kg of Nalbuphine and 2 ug/kg of Fentanyl were based on the level of sedation desired. Adequacy of sedation during the procedure was based on the modified Ramsay sedation scale. **Results:** A total of twenty-two patients were included. The patients were homogenous in terms of the baseline characteristics and the premedications given. The systolic and diastolic blood pressures during the procedure and after the procedure were significantly lower in the dexmedetomidine group. There were no significant differences both in the heart rates and respiratory rates

in both groups of patients. There is a significant difference in the sedation scores during the procedure and after the procedure, with the dexmedetomidine group having higher sedations scores in both observation periods. **Recommendation:** A randomized controlled study of the drug would be better suited once a BFAD approval of the pediatric use of the drug has been approved. Most of the studies of the drug have been limited to the adult population.

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PHC.R.014.19

Comparison of Outcomes Among Diabetic Patients Undergoing Cardiac Surgery Using Insulin Infusion Versus Insulin Bolus in Glucose Management

Raisalam P. Macataman, MD; Veronica S. Durante, MD; Florian R. Nuevo, MD

Background: Perioperative hyperglycemia during on-pump cardiac surgery is associated with increased incidence of postoperative complications. Intraoperative glycemic control can be difficult to control because the stress response of cardiac surgery and cardiopulmonary bypass can induce profound hyperglycemia. Several studies concluded that intraoperative blood glucose control significantly reduces postoperative morbidity and mortality in cardiac bypass. This study aimed to determine and compare outcomes of diabetic patients undergoing open heart surgery receiving insulin bolus versus insulin infusion for glucose control. **Methods:** A prospective randomized controlled study was conducted at the Philippine Heart Center. Included were patients who underwent on-pump cardiac surgery. Patients were randomly assigned to receive insulin bolus or insulin infusion to maintain glucose levels between 80-120mg/dl. Insulin therapy was initiated according to modified Portland protocol. Intraoperative blood glucose level were measured hourly and titrated accordingly. Postoperative blood glucose levels were also determined and titrated until 12 hours. **Results:** Twenty of 43 patients in the bolus group had an hospital event. More deaths (0 vs. 2, [p=0.494]) occurred in the infusion group. Mean glucose concentrations were lower in the bolus group than in the infusion group during induction of anesthesia (171.2±87.5 vs. 158.4±89.81, [p=0.504]), on bypass 396.3±80.33 vs. 398.9±103.5, [p=0.896]), rewarming (399.1±81.14 vs. 402.1±85.21, [p=0.844]), and post bypass (360±101 vs. 386.7±316, [p= 0.599] but were not statistically significant. Mean glucose concentrations postoperatively taken upon arrival at ICU (290±93.87 vs. 291.28±116.53, p=0.979]) were similar in both groups. The average 12 hours glucose concentrations were lower in the infusion group but not significant (214.57±43.15 vs. 206.47±62.58, (p=0.486]). The frequency of intraoperative hypoglycemia was low. Episodes of hyperglycemia were noted in both groups (41 vs. 38, [p=0.433]). Postoperative hypoglycemia was low in both groups. Postoperative hyperglycemia was seen in 27 patients in bolus group and 25 patients in the infusion group. **Conclusions:** Intraoperative hyperglycemia under cardiopulmonary bypass is an independent risk factor for mortality and complications in diabetic patients. Although this pilot study showed no difference in clinical outcomes among the two study groups, the sample size was not large enough to allow for any definite conclusions or recommendations on the effect of glucose control on the outcomes of effect of glucose control on the outcomes of surgery. Insulin bolus can be used intraoperatively and postoperatively with similar outcome as the infusion group.

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PHC.R.015.09

A Comparison of Patient-Controlled Analgesia (PCA) with Nurse-Administered Analgesia (NAA) in Post-Operative Pain Control among Open Heart Surgery Patients at the Philippine Heart Center

Juffey Tabingan, MD; Carina Dipasupil, MD; Veronica Durante, MD

Background: Intravenous Patient Controlled Analgesia (PCA) was compared to a round the clock Nurse Administered intravenous Analgesia regimen (NAA) to determine if the PCA was advantageous in terms of pain scores and satisfaction ratings among post cardiac surgery patients. **Methods:** Eighty patients 22 to 76 years of age undergoing cardiac surgery under the sternotomy approach were randomly

assigned to received Tramadol HCL either by PCA or by NAA for twenty-four hours after admission to the recovery room. Minimum and maximum doses were standardized. Pain intensity was tested four times a day and satisfaction ratings were obtained on the 24th hour after admission to the recovery room. **Results:** There was no difference in pain scores obtained between both groups (p> 0.05) in spite of greater analgesic usage by the PCA group (p=0.000). Satisfaction ratings were higher among the PCA group. (p=0.000). **Conclusions:** In using Tramadol HCL at 150 to 300 mg per day, PCA and NAA methods are equally effective in treating post cardiac surgery pain however, patients are significantly more satisfied with using the PCA pump.

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PHC.R.017.09

Accuracy of Video-Assisted Pericardioscopy-Guided Biopsy in the Etiologic Diagnosis of Pericardial Effusion

Marvin D. Martinez MD; Ramon Ribu, MD; Samuel Andin, MD

Background: Pericardial effusion of different etiologies remains to be a clinical problem with a controversial clinical approach. Some etiologies of pericardial effusion may have poor prognosis, while others may have an unremarkable sequelae. Regardless of their expected course, accuracy and a speedy diagnosis is imperative. **Methods:** A total of 11 patients with confirmed pericardial effusion admitted at our institution from January 1, 2009 to October 31, 2011 were included in the study. These subjects underwent both the conventional anterior pericardial biopsy and the video-assisted pericardioscopy-guided (VAP) biopsy to evaluate the etiology of pericardial effusion. Results from both techniques were compared. **Results:** Anterior pericardial biopsy yielded 5 idiopathic, 5 tuberculous, and 1 malignant pericardial effusion; whereas, video-assisted pericardioscopy-guided biopsy yielded 5 tuberculous, 5 idiopathic and 1 malignant pericardial effusion. Comparing video-assisted pericardioscopy-guided biopsy with the anterior pericardial biopsy in determining tuberculosis (chronic inflammation) as the etiology of pericardial effusion, the sensitivity is 100%, specificity-100%, PPV - l00%, NPV - 100% with a Kappa of 1.00 ± -0.302, and p-value of 0.0004. The VAPs strongly agrees with anterior pericardial biopsy in determining tuberculous pericardial effusion. Comparing video-assisted pericardioscopy-guided biopsy versus anterior pericardial biopsy in determining malignancy as the etiologic diagnosis for pericardial effusion, the sensitivity is 100%, specificity-l00%, PPV-l00%, NPV -100% with a Kappa of 1.00 ± 0.302, and p-value of 0.0004. The VAP strongly agrees with anterior pericardial biopsy in determining malignant pericardial effusion. **Conclusion:** This study conducted on 11 patients showed no significant differences in the diagnostic yield using video-assisted pericardial biopsy and standard anterior pericardial biopsy in the etiologic diagnosis of pericardial effusion. Recommendations for further study of this kind would be: 1) increased number of sample size and; 2) longer duration or period of study.

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PHC.R.020.09

Predictor of Early Mortality and Morbidity in Mitral Valve Repair for Rheumatic Mitral Valve Disease: Philippine Heart Center experience

Ronald Winardi Kartika, MD; Gerardo S. Manzo, MD

Mitral repair is feasible for patients with degenerative or ischemic heart disease, however, the appropriateness of repair for rheumatic heart disease remains controversial. The aims of this study is to evaluate the predictor of outcome of mitral valve repair in the Philippine Heart Center (PHC) from review of clinical and echocardiographic record of all patients who underwent this procedure from January 1999 to December 2009. This was a retrospective cohort study that included patients with rheumatic mitral valve disease admitted for mitral valve repair, mitral valve annuloplasty, OMC from January 2009. Demographic data were obtained from the medical records of the patients. Likewise, the data of the outcomes were obtained from the chart such as mortality, stroke, acute renal failure, infection arrhythmia, reoperation, duration of ventilator support during ICU stay. In our experience, a variety of

surgical repair techniques can be applied successfully to patients with rheumatic mitral valve disease. Early results obtained with mitral valve repair for rheumatic mitral valve disease were satisfactory. It is our recommendation that mitral valve repair be performed whenever possible in Rheumatic Heart Disease.

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PHC.R.021.09

Validation of Tidal Breathing Analysis in the Diagnosis of Asthma Among Filipino Children Aged 1 Month - 6 Years

Sherlyn B. Corpuz, MD; Ma. Nerissa A. De Leon, MD; Milagros S. Bautista, MD; Fernando G. Ayuyao, MD

Background: Asthma is a chronic inflammatory disorder of the airways and is the most common chronic pediatric airway condition. Hence, an early diagnosis is of paramount importance so as not to delay proper treatment. However, establishing a diagnosis of asthma in this age group is hampered by a lack of objective assessment. For this reason there is a growing interest in the tidal breathing analysis, which is a non-invasive method of measuring airway and parenchymal lung function. The purpose of the study was to assess the accuracy of tidal breathing analysis in diagnosing asthma in Filipino children aged 1 month - 6 years as compared with the Philippine Consensus for Asthma as a reference standard. **Methods:** This is a cross-sectional validation study. Lung function was measured and analyzed using the tidal flow-volume loops (masterscreen Paed Jaeger Pediatric) in 119 sedated young children (55 males, 64 females; mean age 2.6 years) who are suspected of having asthma, before and 15 minutes after inhalation of nebulized salbutamol. The result of the tidal volume per kilogram (VT/kg) and the ratios of the time and volume until peak expiratory flow to the total expiratory time and volume, respectively (TPTEF/TE and VPEFNE) were recorded. Reversibility after salbutamol inhalation was recorded. The 119 patients were determined to be asthmatic or non-asthmatic based on the Philippine Consensus algorithm for diagnosis of asthma where spirometry and peak flow meter is not feasible. The results of the tidal breathing analysis and the Philippine Consensus for Asthma were compared to determine sensitivity, specificity, positive predictive value and negative predictive value of tidal breathing analysis. **Results:** Of the 119 patients, there were 33 (27.73%) who showed reversibility during TBA as compared to those who showed no reversibility 86 (72.27%). Patients who were positive using the Philippine Consensus for Asthma were 58 (48.75%) while those who were not were 61 (51.25%). Results showed that the sensitivity of TBA was 36.2% and the specificity was 80.3%. The positive predictive value was 63.6% and the negative predictive value was 57.0%. The Kappa score is 0.167 ± 0.083. **Conclusion:** We conclude that the tidal breathing analysis is not a reliable screening tool for children being suspected to have asthma due to its low sensitivity result. However, the tidal breathing analysis makes a good validating device as shown by its high sensitivity score. Hence, along with a thorough history demonstrating a symptom pattern and a good clinical assessment of both family history and physical findings, the tidal breathing analysis can be used as a confirmatory tool for children being suspected of having asthma.

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PHC.R.022.09

Association of Dipyridamole Induced ST Segment Depression with Myocardial Perfusion Scintigraphy Result and Incidence of Major Adverse Cardiac Events (MACE)

Ferdinand L. Flores, MD; Jerry M. Obaldo, MD

Background: The purpose of this study was to determine the prevalence of significant ST segment depression induced by dipyridamole administration during myocardial perfusion scan and its associations with the scan findings and incidence of MACE. **Methods:** This is a prospective cohort, involving 152 patients who underwent myocardial perfusion scintigraphy using dipyridamole. Presence of ST depression induced by dipyridamole was computed. Subjects were followed-up for a year for occurrence of MACE. Presence of ST depression was associated with MPS results, and with the occurrence of MACE. **Results:** The mean age is 63 (± 11.7) years old, with male predominance. Fifty-six patients developed MACE and 1

mortality was observed. The prevalence of ST depression induced by dipyridamole was 8.6%. Among those with MACE, 13 had ST segment depression. Presence of ST depression was significantly associated with MPS results (RR: 2.05 (95% CIl.75, 2.45), p = 0.001), K = 0.146 ± 0.046. The mean SDS as well as the mean number of reversible segments of patients with ST depression was not statistically different from those without ST depression. There was no significant association between presence of ST depression and occurrence of MACE. **Conclusion:** ST segment depression post-dipyridamole administration occurs infrequently. It also does not have significant diagnostic and prognostic value in patients with CAD.

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PHC.R.036.09

A Cross-Sectional Study of Preoperative Cranial Ultrasound Findings of Infants with Congenital Heart Disease

Joseph Dominic N. Lagman, M.D; Arlene D. Geonzon-Espina, MD, Jose Melvin C. Cosep, MD, Pedro Danilo J. Lagamayo, MD, FPCR; Maria Estrella Ibe-Jlustre, MD

Background: Cranial ultrasound is a safe and cost effective diagnostic tool which can be used to identify and study the incidence of central nervous system (CNS) malformations related to congenital heart diseases (CHD). The objectives of this study were to determine the utility of cranial ultrasound in infants with diagnosed CHD and document the possible associated findings. **Methods:** A cross-sectional population of sixty-six (66) patients was investigated. Cranial ultrasound was performed preoperatively with neurological evaluation to infants diagnosed with congenital heart disease. Findings were recorded, tabulated and compared. **Results:** Acquired data showed a total of 8 participants with aberrant cranial ultrasound findings. These anomalies include five (5) participants with ventriculomegaly, one (1) with hemorrhage, one (1) with cystic focus and another (1) with encephalomalacic changes. **Conclusion:** It may seem that performing cranial ultrasound played no role in preoperative screening of infants with CHD. Inadequate sample population and limited time played significant restricting factors to conclusively say that this particular modality is completely irrelevant and may be foregone as a valuable ancillary procedure.

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PHC.R.039.09

Comparison of Clinical Outcomes of Dual Chamber versus Single Chamber Pacemakers Among Patients with High grade AV Block and Sick Sinus Syndrome: Philippine Heart Center Experience

Maria Christie Mendoza-Reyes, MD; Belen O. Carisma, MD

Background: Dual chamber pacing appears to be more physiologic by restoring atrioventricular synchrony and matching the ventricular pacing to sinus rate, thus with improvement of hemodynamic function. However, the clinical benefits of such pacing have been reviewed with conflicting results. Studies now report that dual chamber pacing does not confer superiority in the improvement of quality of life. This study will compare the clinical benefits by assessing the quality of life and functional capacity among patients with sick sinus syndrome and high grade AV block with single chamber versus the dual chamber pacemakers. **Methods:** Patients who are 19 years old who had permanent pacemaker insertion secondary to AV Blocks or sick sinus syndrome were included in the study. Functional class was assessed using 6 minute walk test and quality of life was assessed using a validated questionnaire. Baseline 6 minute walk test was done and Quality of Life questionnaire was answered within a month from the time the pacemaker was implanted. Patients were followed up every 6 months but a repeat 6 minute walk test and Quality of Life questionnaire was done at 12^{th} and 18^{th} months. **Results:** The mean distance travelled by patients in both dual and single chamber pacemaker groups (315.53 ± 74.73 versus 384.25 ± 92.03, p= 0.94) is not statistically different at baseline and on follow up (401.00 ± 83.95 versus 412.75 ± 74.67, p = 0.818). QOL scores were also not statistically significant. **Conclusion:** There is no difference between dual and single chamber pacemakers in terms of functional capacity and QOL in patients with SSS and high grade AV block.

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PHC.R.040.09

Outcomes of STEMI Patients And Adherence To Recommendations On Door-To-Needle and Door-To-Balloon Time: A Philippine Heart Center Experience

Richie Gaye T. Fernandez-Limbungan, MD; James Ho, MD

Background: International guidelines have been published regarding the optimum time for revascularization (either through fibrinolysis or percutaneous coronary intervention) for ST elevation myocardial infarction patients seen at the emergency room (door-to-needle time of 60 minutes and door-to-balloon time of 90 minutes). Data around the world have shown a relationship between adherence to guidelines and occurrence of morbidity and mortality among these patients. Local data from the Philippine Heart Center (PHC) is examined. This study aims to compare the outcomes of STEMI patients seen at PHC according to adherence to recommended door-to-needle and door-to-balloon time. **Methods:** This is a prospective cohort study involving patients who presented as ST elevation myocardial infarction without any fibrinolytic treatment done prior to ER consult. Information sheets were given out at the emergency room and the catheterization laboratory. We documented the specific events and procedures performed and the time it was done, patient's time of arrival at the ER or catheterization laboratory, time of ECG taking, time of transfer to and arrival at the catheterization laboratory, time when thrombolysis or percutaneous coronary intervention (PCI) was done. Outcomes were defined as in-hospital mortality, improvement of condition leading to discharge, or morbidities: life-threatening arrhythmia (ventricular tachycardia, ventricular fibrillation), hypotension, congestive congestive heart failure, and others. Prolonged hospital stay due to complications like hospital-acquired infection and non-cardiac problems were not included. **Results:** A total of 94 patients underwent PCI; 26 adhered to the door-to-balloon time, while 68 did not. There was no significant difference in mortality and complications up to 72 hours post-procedure in both groups, but there was statistically significant difference in the length of hospital stay, with shorter hospital stay in the group that adhered to recommended door-to-balloon time. Subjects were few in the thrombolysis group, so no statistical analysis was done, but trend shows shorter hospital stay in the group that adhered to the recommended door-to-needle time, and with more procedures like PCI and CABG further done in the non-adherent group. **Conclusion:** This study showed that in majority of patients at the Philippine Heart Center who underwent emergency thrombolysis and PCI, the re commended door-to-needle and door-to-balloon time were not met. This has no effect on mortality and complications in all patient subgroups, but resulted to a shorter hospital stay in those who adhered to the guidelines.

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PHC.R.041.09

Accuracy of Cardiac Computed Tomography in the Diagnosis of Congenital Heart Disease: a retrospective study at the Philippine Heart Center

Arlene D. Geonzon, MD; Marvin T. Tamaña, MD

Background: Improvements in the diagnosis of congenital heart disease during infancy have resulted in outstanding increase in the prevalence of this condition. Management, may it be surgical or medical, has been given appropriately. Aside from clinical assessment, imaging techniques contributed much from this medical phenomenon. Echocardiography, cardiac catheterization, cardiac computed tomography and magnetic resonance angiography are the most popular of these techniques. Although most information from these modalities is redundant, they also are frequently complementary. The objective of this study is to assess the diagnostic accuracy of a 40-slice computed tomography in the evaluation of pediatric patients with congenital heart disease at the Philippine Heart Center. **Methods:** This is a validation study of pediatric patients who underwent cardiac CT at the Philippine Heart Center from October 2005 up to September 2008. A 40-s1ice Philips Brillance Computed Tomographic Scanner was used and followed a standard cardiac CT protocol. Cardiac CT findings were reviewed. The true diagnosis is considered to be

the findings shown by surgery. **Results and Conclusions:** Cardiac CT shows no significant difference in the test characteristics to diagnose ASD, VSD, P DA, overriding of the aorta, right-sided aorta, right ventricular outflow tract abnormality, pulmonary artery abnormality and presence of collaterals as compared to that of echocardiography. However, significant difference lies in their evaluation of intracardiac structures specifically left atrium and right ventricle. Cardiac CT scan is an important additional diagnostic tool in the evaluation of congenital heart disease especially for the great vessels. However, intracardiac structures remain to be better diagnosed using echocardiography. It may be used to add information to echocardiography prior to contemplated surgery. The short acquisition time in cardiac CT scan makes it more practical to use in patients who are unstable.

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PHC.R.044.09

Electrocardiogram Derived Ejection Fraction as Predictor for Clinical Outcome in Non-ST Segment Elevation Myocardial Infarction on Unstable Angina

Maria Johanna Matheu Jaluague, MD; Gilbert Vilela, MD

Background: The electrocardiogram (ECG) is a mainstay in the diagnosis of acute and chronic coronary syndromes and it provides information on prognosis depending on the type, location, and extent of injury. Patrick Krake demonstrated the use of electrocardiogram in the estimation of ejection fraction, but has not yet been validated in any of the studies. Demonstration of the possible relationship of electrocardiogram-derived ejection fraction as computed using the formula of Patrick Krake, with the morbidity and mortality of patients developing ACS might support the utility of electrocardiogram derived EF in prognosticating patients with ACS. The objective of this study is to determine association of ejection fraction measured by electrocardiogram, with the in-hospital, 30 day-, 6 month-morbidity and mortality of patients admitted for ACS. **Methods:** Patients admitted for ACS were included in the study. Electrocardiographic ejection fraction was computed using the formula derived by Krake [EF = (AVR X 2.264) + (Age X 0.645]. The patients were then followed up in terms of morbidity and mortality, from admission up to discharge, then after 1 month, then after 6 months. Ejection fraction by ECG was then correlated with the morbidity and mortality of the patients, in terms of days of hospital stay, both in the CCU/ICU and in the regular room, number of medications, and extra procedures for heart failure, such as temporary pacemaker insertion, percutaneous coronary intervention, coronary artery bypass grafting, and intraaortic balloon pump insertion. **Results:** Seventy-six patients were enrolled in the study, however only 73 patients had full follow up after 1 month and 6 months. The 3 remaining patients were lost to follow up after 1 month. Out of the 76 patients enrolled, only 4 patients had an electrocardiogram ejection fraction (ECG EF) of less than 40%. Thirty of the subjects enrolled had major adverse cardiovascular events (MACE), of which, only 3 of them had an ECG EF of <40%. There were a total of 15 cardiovascular related deaths at 6 months and another 15 were either readmitted for recurrence of myocardial infarction, revascularization and occurrence of congestive heart failure, or very much symptomatic but were not readmitted due to financial constraints. Most of them are suffering from recurrent chest pain and shortness of breath on exertion. There was no significant correlation of the duration of hospital stay with ECG EF using Pearson correlation ($p = 0.927$), as well the number of extra procedures done ($p = 0.479$). **Conclusion:** There is a trend on patients having a ECG EF of <40% towards cardiovascular related morbidity and mortality. Lack of significance can be a result of a smaller size and a short follow-up.

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PHC.R.045.09

Optimal Medical Therapy With or Without Coronary Artery Bypass Graft for Stable Triple Vessel Coronary Artery Disease

Ray P. Aswat, MD; Gilbert Vilela, MD

Background: Coronary Artery Bypass Graft (CABG) is recommended for patients with left main coronary artery disease and the preferred

revascularization strategy for patients with multi-vessel coronary disease, with depressed systolic function, Left Ventricular Ejection Fraction (LVEF) <50%, and diabetes mellitus. However, recent trials are suggesting that medical therapy may prove to be as effective as interventional techniques in patients with stable coronary artery disease. This study aims to compare the outcomes of patients with stable triple vessel coronary artery disease on optimum medical therapy with or without CABG. **Methods:** This is a prospective cohort study wherein a total of 70 patients diagnosed with triple vessel coronary artery disease with a recommendation of CABG were enrolled Those who underwent CABG with optimal medical therapy were analyzed among the "CABG" group and those who did not undergo CABG were analyzed under the "optimal medical therapy (OMT)" group. Outcomes included assessment of the Canadian Classification Society of angina pectoris grade, occurrence of acute coronary syndrome, cerebrovascular events, congestive heart failure and all cause mortality. **Results:** There were 70 patients enrolled in the study with similar baseline variables but with male preponderance. Likewise, there were similar modifiable risk factors including blood pressure, lipid profile, and HgbAlc between the two groups at baseline and at the end of study as well as similar medications except for the added use of calcium channel blockers in the OMT group. Outcomes including CCS grade for angina pectoris, occurrence of ACS, CHF, stroke and all cause mortality was similar in both group. **Conclusion:** Among patients with triple vessel coronary artery disease, those who underwent CABG with OMT and those who had OMT alone did not show any difference in the occurrence of ACS, CHF, stroke, all cause mortality and CCS classification of angina pectoris.

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PHC.R.048.09

Factors Affecting the Resolution of Chronic Moderate Ischemic Mitral Regurgitation in Patients Undergoing Coronary Artery Bypass Graft Without Undergoing Mitral Valve Annuloplasty

Karl Fernand R. Franco, MD; Edwin Tucay, MD

Background: Ischemic mitral regurgitation (IMR) is a threatening and a progressive disease which is usually insidious in nature. It is frequently associated with and a complication of coronary artery disease (CAD). Coronary Artery Bypass Graft (CABG) surgery has long been recognized as the optimal choice for the treatment of multi vessel coronary artery disease. Currently, the American Heart Association guidelines are available for severe MR and concomitant coronary artery bypass grafting (CABG). Because of conflicting data on the management of moderate MR, this study was undertaken to examine the factors affecting the resolution of ischemic MR and early outcomes in patients with moderate ischemic mitral regurgitation undergoing CABG not undergoing mitral valve annuloplasty in the Philippine Heart Center. **Methods:** This is a prospective cohort study which involved chronic moderate ischemic mitral regurgitation patients admitted at the Philippine Heart Center who underwent coronary artery bypass graft without undergoing mitral valve annuloplasty from January 1, 2010 to September 31, 2011. After coronary artery bypass grafting, patients were followed up for a period of six months. A repeat transthoracic 2D-echo was performed prior to discharge or 1 month (whichever comes first) and six months after surgery to determine the severity of mitral regurgitation. **Results:** Among the 21 patients eligible, 3 of them died because of postoperative complications and were not included in the analysis because postoperative 2D-echo was not made. From the 21 eligible subjects, only 8 of them followed up for a repeat 2D-echo 6 months postoperative, 3 of the 21 subjects died due to postoperative complications and 11 did not follow up despite the advice. The incidence of resolution of ischemic MR immediately post CABG was 77% and about 11% has complete resolution of moderate IMR, while 6% of the population had severe MR after CABG. At follow up 50% of the population had resolution of IMR. The left atrial and left ventricular diameters are higher among patients with resolution of IMR compared to those without resolution of IMR, but are not statistically significant except of the LVES diameter with a p value of 0.048. There was a significant increase in LV systolic function among patients with resolution

of IMR compared to those without resolution of IMR. **Conclusion:** More than half of patients with moderate IMR, MR regress with CABG alone, but after follow-up of 6 months, residual MR increases by 50% of the population. Ischemic MR may be associated with increased mortality. Resolution of MR is related to pre-operative LV size and improvement in LV function. Presence of chronic renal insufficiency and use of hypoglycaemic agents may be critical for MR non resolution following CABG alone.

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PHC.R.051.09

Adherence to ACF/ AHA Guidelines for the Management of Chronic Congestive Heart Failure in Adults and its Impact on Patient's Outcome: The Philippine Heart Center Experience

Sheila Mae L. Abadonio, MD; Jesus Jorge, MD

Background: The physicians' management of congestive heart failure has been known to be varied. This prospective cohort clinical study aimed to determine the adherence of physicians to the ACCF/AHA practice guidelines in the management of chronic congestive heart failure (CHF) in the Philippine Heart Center (PHC) and its impact on patients' outcome. **Methods:** It included 62 eligible patients diagnosed with CHF Stages C and D, admitted at PHC from June 1, 2010 to June 30, 2011. Baseline characteristics were obtained through patient interview, personal or though phone call and review of medical records. An adherence indicator was developed using a two-step procedure on the basis of the five pharmacological classes of drugs used in treatment of CHF. The same algorithm used in the MAHLER study was used to determine whether a physician is adherent or non-adherent to the guidelines for each medication. Patients were then followed up for the occurrence of death either through phone, review of medical records and through his attending physician during the index hospitalization and 6 months after discharge. **Results:** The baseline characteristics did not differ significantly. Thirty five were males and 26 were females. Most of the subjects were hypertensive (n=28) and has diabetes mellitus (n=11). Almost half of the subjects (48%) had smoking history. Forty-four subjects (72%) had ejection fraction" less than 40%. The medications that were often prescribed were beta-blockers (79%), diuretics (72%), cardiac glycosides (77%) and spironolactone (79%). Most of the subjects belong to the NYHA Class 11 (71%) and Class III (29%). The three most common causes of the underlying causes of chronic heart failure were rheumatic heart disease (25 %), ischemic cardiomyopathy (20%) and dilated cardiomyopathy (11%). Most of the subjects were in sinus rhythm (77%). The adherence to guidelines did not differ significantly among the baseline characteristics. Out of the 61 subjects, 2 (3.3%) died because of stroke and heart failure, respectively. **Conclusion:** There is no significant difference between the outcome of patients with congestive heart failure who are treated according to the 2009 updated ACCF/AHA Guidelines for the diagnosis and management of heart failure and those who were treated otherwise (p-value = 1.000).

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PHC.R.055.09

Utility of Brain Natriuretic Peptide As Predictor Of Outcome of Corrective Surgery In Congenital Heart Disease With Pulmonary Hypertension

Irenee Faustina J Casino, MD; Ma. Encarnita B. Limpin. MD; Ma. Paz Mateo, MD

Background: Brain natriuretic peptide (BNP) is a neurohormone secreted in the cardiac ventricles in response for pressure overload. It is also a non-invasive biomarker that has been used for pulmonary hypertension. The aim of this paper is to determine the utility of BNP in predicting post operative outcomes for CHD patients with pulmonary hypertension. **Method:** This is a cohort study involving 45 adult patients diagnosed with pulmonary hypertension secondary to congenital heart disease admitted in Philippine Heart Center for surgical correction. BNP was taken pre operatively and correlated with the surgical outcome. **Results:** Results showed that there was no significant correlation on actual values of BNP and PAP. However, there seems to be a direct relationship between PAP and BNP levels but the standard deviation is wide for the relationship to be

significant. **Conclusion:** With the small number of patients who develop morbidity in the study as to prolonged intubation, prolonged stay in the intensive care unit, events of pulmonary hypertension crisis and RV failure symptoms post surgery, nothing can be said on the utility of BNP to predict the outcomes of adult patients with congenital heart disease with pulmonary hypertension after surgery.

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PHC.R.061.09

Prognostic Value of SYNTAX Scores Among CAD Patients with 3VD Undergoing Revascularization: a PHC experience

Editha P. Jacer, MD; Timothy Dy, MD; Melissa Co-Sia, MD; Catherine Tan, MD

Background: Coronary artery disease (CAD) is one of the major causes of morbidity and mortality in the world. Surgical and percutaneous catheter revascularizations are options for treatment of CAD. **Methods:** This is a cohort study. Included in the study were adult patients with 3VD (without left main involvement), admitted for revascularization from the period Novemer 2009 to April 2010. Sample size was computed n≥52 based on 95% confidence level, relative error of 20% and assumed rate of MACE of 15.1%. **Results:** There were 52 patients enrolled. Follow-up of patients was performed at 7 days, 30 days and 6 months post discharge. All surviving patients had complete 6 months follow-up. Of the 52 patients, 48 were males and 4 were females. Of the 48 males, 29 of them had a history of hypertension, 28 of them had a history of diabetes, 24 of them were smokers, 8 had hypercholesterolemia and 3 of them had chronic kidney disease. The mean age of the population was 60. Out of 52 patients, 6 had previous myocardial infarction. Forty-one presented with chronic stable angina, 3 with unstable angina, 8 with non-S'T elevation MI and 4 of them presented with ST elevation MI. The mean LVEF is 54.80±13.91. For the SYNTAX score, the mean is 30.05±10.22 with a euroscore mean of 3.50±10. **Conclusion:** The SYNTAX score is an angiographic grading tool to determine the complexity of coronary artery disease, in this study the predictive value of SYNTAX score was utilized to determine the clinical outcomes of 52 patients undergoing revascularization. Limitations of this study included the limited number of subjects and the short duration of follow-up at 6 months.

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PHC.R.064.09

Correlation of Physiologic Functional Variable with Hemodynamic Variables Among Filipino Children with Pulmonary Arterial Hypertension: Philippine Heart Center Experience

Kim DY. Daban, MD; Ma. Paz Mateo, MD; Dulce Requiron-Sy, MD; Milagros Bautista, MD; Fernando Ayuyao, MD; Teresita S. De Guia, MD

Background: Six minute walk test (6MWT) is one of the most widely used tests to assess the functional capacity of a patient especially those with cardiopulmonary disease. Most of the studies on 6MWT were performed among adult patients. This study focused on the correlation of the hemodynamic parameters such as the arterial blood gas and pulmonary artery pressure with the six minute walk test particularly in a group of pediatric patients with congenital acyanotic heart disease. **Methods:** We prospectively studied patients with congenital acyanotic heart disease with pulmonary arterial hypertension. All subjects had 2D Echo to determine pulmonary arterial pressure (PAP), arterial blood gas (ABG) analysis, 6MWT and Borg scale. We also classified them using the WHO functional classification for patients with pulmonary hypertension at the beginning of the study. **Results:** A total of 30 patients were enrolled in the study. Patients were classified in the WHO Functional Class I and II. No correlation was seen between ABG parameters and distance. A higher proportion of patients in WHO Class II had severe pulmonary hypertension compared to Class I but was not significant (p 0.64). No correlation was found with the severity of pulmonary hypertension and 6MWT distance. **Conclusions:** No correlation was noted with ABG, pulmonary pressure and distance walked in the 6MWT.

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PHC.R.066.09

Outcomes of Patients with Mitral Valve Disease after Mitral Valve Surgery

Mercilyn C.Yap, MD; Ma. Lourdes S. Casas, MD; Eden Latosa, MD; Jhuliet J. Balderas, MD

Background: Mitral valve repair and mitral valve replacement have been the mainstays in the management of mitral valve disease. This study was done to determine the outcomes of pediatric patients undergoing mitral valve surgery. **Methods:** We reviewed the records of patients aged 0-19 years old who underwent mitral valve surgery from 2002 to 2004. We obtained the clinical, echocardiographic and outcome characteristics of these subjects. We followed them up for a period of 1 to 6 years and determined the echocardiographic characteristics during these times. **Results:** Forty-five (45) subjects were enrolled, with 24 patients underwent MV repair and 21 patients underwent MV replacement. Majority of the lesions were mitral regurgitation and rheumatic in etiology. There were 3 mortalities reported in this study. There is a significant decrease in LVESD, LVEDD and left atrial size and in increase in mitral valve area noted one year after surgery. **Conclusion:** Majority of the subjects who underwent mitral valve surgery had a rheumatic etiology of their mitral valve lesions. Majority of the lesions are mitral regurgitation. Mitral regurgitation and mitral stenosis improved over time after the mitral surgery.

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PHC.R.067.09

Prevalence of Clopidogrel Resistance Among Filipinos With Coronary Artery Disease: A Philippine Heart Center Experience

Frederick Gabriel, MD, Ana Beatriz Medrano, MD, Jose Navarro, MD, and Ariel Miranda, MD

Background: Clopidogrel is an antiplatelet medication used in patients with coronary artery disease. A considerable number of patients still experience recurrent ischemic events secondary to thrombosis despite its use. A myriad of factors might contribute to individual responsiveness to clopidogrel. We evaluated the prevalence of clopidogrel resistance among Filipinos and its associated risk factors. **Methods:** One hundred eleven (111) patients with documented stable coronary artery disease and who had acute coronary syndrome for more than 6 weeks on a maintenance dose of 75mg Clopidogrel for at least two weeks were enrolled. Baseline clinical characteristics were gathered. Whole blood sampling was done to measure platelet function by impedance aggregometry using a point-of-care testing (Multiplate® analyzer; Dynabyte Medical, Munich, Germany). **Results:** Seventeen (15%) out of 111 patients recruited in the study were classified as low responders to Clopidogrel. The mean age of patients recruited was 60 years old and majority of those recruited were males (n=83, 75%). On multivariate analysis, the use of proton pump inhibitors (PPls) was associated with statistically significant greater odds of Clopidogrel resistance (OR 6.5, 95% CI: 1.96-22.09 p=0.010). On further analysis of patients taking proton pump inhibitors, we found that only those exposed to omeprazole had a significant association with Clopidogrel resistance (OR 9.83, 95% CI: 2.54 to 39.35). No significant correlation was demonstrated in the other clinical parameters observed. **Conclusion:** The prevalence of clopidogrel resistance using the Multiplate assay in Filipinos with stable CAD was 15%. Concomitant use of the proton pump inhibitors, specifically omeprazole, significantly increases the odds of clopidogrel resistance by 9.83.

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PHC.R.069.09

Empiric Activated Clotting Time (ACT) Monitoring Versus Non ACT Monitoring Prior to Cardiopulmonary Bypass: A Cohort Study

Edwin M. Valencia, MD; Merceditas Althea D. Quinon, MD; Reynante T. Gamponia, MD

Background: In cardiac surgery, heparin administration is an essential step before establishing cardiopulmonary bypass. Prior to the commencement of cardiopulmonary bypass (CPB), Activated Clotting Time (ACT) is determined in a structured manner. It is determined 5

minutes after heparin 3 mg/kg induction; and every 30 minutes while the patient is on CPB, and 10 minutes after heparin reversal with protamine. However necessary in Heparin titration during CPB, several patients were noted to have been given heparin 3 mg/kg prior to CPB but no ACT determination were taken 5 minutes after heparin induction. Do patients undergoing cardiopulmonary bypass with no serial ACT determination will have similar post-operative outcome as those who underwent serial ACT determination? **Methods:** This is a cohort study which aims to compare the postoperative outcomes in terms of Post-operative CTT drainage and cerebrovascular events among patients who underwent ACT monitoring 5 minutes post heparin 3 mg/kg administration and those who do not have ACT monitoring 5 minutes after. Data were analysed using the Statistics/ Data Analysis (STATA version 11.0). T-test and Levene's Test and Chi-Square test were done in comparing the baseline characteristics of the study population between the two groups. Univariate Analysis of Variance and Chi-Square tests were likewise used to analyze the outcomes in terms of post-operative CTT drainage and CVA. **Results:** A total of 139 patients were included. The data have shown that the subjects in those with ACT determination and those without ACT determination are comparable in terms of demographic characteristics such as age, gender, type of surgery and co-morbidities. As to comparing the CPB variables between the two groups, the CPB time, temperature and ACT levels after protamine reversal were noted to be statistically insignificant. There is a significant increase in the chest tube drainage in the non-ACT monitoring group as compared to the group which monitors ACT. With regards to the incidence of CVA, the data is inconclusive since. The study have shown that 96% of patient who underwent monitoring of ACT prior to initiation of CPB have achieved the desired level even with a single dose of heparin, indicating that the heparin dosage is adequate and would favor more on non ACT monitoring, but it does not discount the fact that still 4% among the this population may have developed, in one way or another, resistance to heparin hence the desired ACT level may not be achieved, resulting to a catastrophic post-operative outcome. **Conclusion:** There is a significant increase in the post-operative CTT drainage among patients without ACT monitoring after heparin administration. Based on the literatures reviewed, the mechanism can be best explained by inadequate anticoagulation among this group since the other factors present which are possible contributory are not comparable.

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PHC.R.074.09

The Philippine Heart Center Experience on Descending Thoracic Aneurysm: 8 year study with 42 patients

Edwin M. Valencia, MD; Merceditas Althea Quinon, MD; Edgar Tuazon, MD; Florimond Garcia, MD

Background: The objective of this study is to review the experience of this institution on descending thoracic aneurysm for the past 8 years. **Methods:** Included in the study were patients operated for descending thoracic aneurysm in the Philippine Heart Center from January 2000 to December 2007. A total of 47 patients were identified, however only 42 records of patients are made available for review. A systematic chart review was done to obtain data on the demographic profile, presenting symptoms, associated medical illnesses, whether patient was operated on elective or emergency basis, and postoperative morbidity and mortality. A review of the operative details in terms of bypass and ischemic time were also noted. **Results:** A total of 47 patients were operated on for a diagnosis of descending thoracic aneurysm from January 2000 to December 2007. Among these, there are only 42 patients that are available for review. DTA were more commonly noted among male patients at approximately 3:1 ratio as compared to females. As for the age distribution, about 52% of these patients diagnosed with DTA are from the age of 50 to 70. **Conclusion:** With the volume of patients operated on for descending thoracic aneurysm in this center, the operative mortality related to the disease is still high especially when dealing on an emergency basis. This is due to high mortality rate among patients with ruptured aneurysm upon presentation, prolonged bypass procedure and ischemic time.

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PHC.R.075.09

Effects of the Implementation of Point-Of- Care Satellite Laboratory on Tests Turnaround Time: The Philippine Heart Center Emergency Room Experience

Roselle Tetejano-Tolentino, MD; Arlene M. De Luna, MD; Felipe S. Templo, Jr. MD

Background: Point-of-care-testing (POCT) is one of the innovations in laboratory medicine that has been recently employed in medical institutions to facilitate timely management of patients at the emergency room. This study aimed to evaluate the turnaround time (TAT) of the critical laboratory tests (K+, Troponin I, CK-MB) and compare with the TAT of the same tests done at the main laboratory before implementation of ER-POCT satellite laboratory. The effects of the implementation of POCT to common critical tests TAT, the phases of workflow were identified and other factors that may contribute to those effects, such as workload, shift and number of staff, were considered. **Methods:** This was a retrospective-prospective study of TAJ of three tests namely serum K, Troponin I and CK-MB during pre-implementation (September 2008 to 2009) and implementation (April 2010-April 2011) of the ER-POCT Satellite Laboratory. TAT was further classified to the following work flow phases: charge-to-receipt, receipt-to-draw, and draw-to-report. Comparison between pre-implementation and implementation sample TAT was done using t-test. Other factors that may affect TAT such as shift, workload and number of staff had been analysed using ANOCOVA. Percentages of test completion within time periods (30 rnins, 1 hour, 2 hours, >2 hours) were compared. **Results:** Comparison of TAT between pre-implementation (n=634) and implementation (n=764) in all three tests and in different work flow intervals have shown a remarkable shortened TAT (58-78% decrease). The major part that contributed to decreased TAT came from the lessened receipt-to-draw phase. Overall analysis of different factors such as shift, workload and number of staff had no significant association with TAT in both pre-implementation and implementation samples, with an improved effect on receipt to draw time on a highly frequent test (Troponin I) by increase number of staff at POCT. Majority (>50%) of tests were completed within 1 hour at POCT compared to >2 hours at main laboratory. **Conclusion:** Implementation of POCT satellite laboratory at the ER have shown a shortened TAT of the three tests (serum K, Troponin I and CK-MB) compared to the pre-implementation test TAT. There was no overall association of between shift, workload, numbers of staff and TAT of tests in both pre-implementation and implementation samples.

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PHC.R.076.09

Long Term Outcome of Aortic Valve Regurgitation After Repair of Ruptured Coronary Sinus of Valsalva: PHC experience

Samuel Anthony R. Yadao, MD; Reynante Gamponia, MD

Background: The purpose of this study is to determine the incidence of mild to moderate AR among patients undergoing RCSOV repair, the severity of AR after long term follow-up from RCSOV repair and determine factors affecting the degree of aortic regurgitation post-RCSOV repair. **Methods and Results:** This is a cohort study on outcome of aortic valve regurgitation after RCSOV repair. Study population consist of patients who underwent RCSOV repair with a follow-up 20 echo done ≥1 year after the operation done at Philippine Heart Center from March 1999 to April 2009. The follow-up transthoracic echocardiogram done at least 2 years from RCSOV repair were reviewed for the severity of AR. The follow-up 2D echo were evaluated for status of the AR. During the 10 - year period from March 1999 to April 2009, 48 patients underwent an operation for ruptured coronary sinus of valsalva aneurysm, however only 24 patients had completed post-op echo and follow-up echo and were included in the study. Seventy-nine percent of the patients were men. The mean age of patient at repair or RCSOV was 32 ± 11 years, ranging from 18 to 58 years. There were 21 patients originated from the right coronary sinus and 3 in the non-coronary sinus. The mean interval of postoperative echo and follow-up echo 4 ± 2 years (ranging 1-8 years). We have 3 mortality, one hospital death due to myocardial failure and two late

deaths occurred on their 6th and 7th year after operation probably due to congestive heart failure as mentioned by the parents in a phone conversation. Morbidity noted were the following: 2 re-operation for bleeding, 3 post pericardiostomy syndrome, and 3 had transient arrhythmia. **Conclusion:** The fate of aortic regurgitation after RCSOV repair depends on the status of the aneurysms, associated lesion contributing to the sinus wall and aortic valve annulus morphology. The number of years does not affect the severity of AR.

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CR.003.09

Small Intestinal Atypical Carcinoid Tumor with Clear Cell Features: a case report and its differential diagnosis

Jose H. Caduhada, MD; Arlene M. De Luna, MD

Carcinoids are rare, slow growing tumors that arise from neuroendocrine cells which involve many organs and most frequently the gastrointestinal (GI) tract. Common morphology and patterns are solid nests, trabecular, tubular, atypical or poorly differentiated and mixed. Clear cell types have been described without atypia. The objective of this report is to present an unusual multifocal carcinoid tumor with atypia and clear cell changes. The patient was a 75 year old hypertensive male with anemia due to blood loss secondary to lower gastrointestinal bleeding from the polyps, which was not usual for carcinoid tumors. The differential diagnosis included poorly differentiated adenocarcinoma, paraganglioma including the gangliocytic type, metastatic clear cell tumors aside from the adenocarcinoids and clear cell carcinoids. The clinical presentation of GI bleeding and histologic pattern mimicked closely that of paraganglioma. The diagnosis of atypical carcinoid with clear cell features was achieved using mucicarmine and PAS stain and immunostains using cytokeratin, NSE and chromogranin. Co-morbid conditions in this patient such as hypertension and intestinal irritation due to bleeding were believed to mask the symptoms of a possible carcinoid syndrome.

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CR.004.09

Coronary Artery Fistula to the Right Ventricle in Six-Month Old Infant: a case report

Paul Anthony G. Tan, MD

This is the case of a six-month old male who was referred to our institution for evaluation and management of a heart murmur. The patient had an unremarkable prenatal and birth history, and the murmur was an incidental finding on physical examination. He presented as a well nourished infant with no dyspnea, diaphoresis or cyanosis. There was a grade 3/6 continuous murmur at the apex with radiation to the back. Chest radiograph showed cardiomegaly and mild congestion. Electrocardiogram showed biventricular hypertrophy with strain pattern. 2D echocardiogram revealed a dilated RCA and prominent LCA with a fistulous connection to the right ventricle. Coronary angiogram showed a fistulous tract to the right ventricle from the LCA. The RCA was not demonstrated. The patient underwent triple ligation of the fistulous tract distal to the LCA. Intraoperative findings include a dilated LCA with fistulous tract draining to the RCA. The RCA was not visualized although its branches were clearly seen. The post-operative course of the patient was unremarkable. Repeat 2D-echocardiogram still showed the dilated RCA and prominent LCA but with no flow to the right ventricle.

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CR.005.09

Multi-Loculated Intracardiac Myxoma in a Fourteen Year Old Male: a case report

Jose Melvin C. Cosep, MD

This is the case of a 14 year old male who was referred for evaluation and management of a cardiac mass. Four years prior to consult, patient had constitutional symptoms of fever and cough, managed as a case of upper respiratory tract infections. Two years PTA, he had chest pain and loss of consciousness. 2D Echo showed left ventricular mass and was

managed as a case of bacterial endocarditis. Six months PTA, he had left sided weakness, hemianopsia and headache. He was treated as cerebrovascular accident and was then referred to Philippine Heart Center for evaluation of cardiac mass. On physical examination, there was a grade 2/6 regurgitant systolic murmur heard best at the apex. 2D-echo showed large echo dense mass occupying the left ventricle extending to the left atrium producing mitral regurgitation. Chest x-ray showed normal heart size. ECG showed normal result. He underwent surgical excision of cardiac mass. Intraoperative findings showed tan-red and tan-gray mass in the left atrium and left ventricle. Pathology report loosely distributed stellate cells embedded in a predominantly myxoid stroma. Patient was then discharged improved after the 4th postoperative day.

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CR.006.09

Dicephalus Dibrachius Conjoined Twin (Double Heart with a Shared Common Right Atrium): a case report

Francisco Emilio Remotigue, Jr., MD

This is a case of a one day old, female, dicephalic dibrachius conjoined twin born to a 29 year old G5P5 mother via caesarian section. At birth, the patient was noted to have two heads with a single trunk and a single pair of upper and lower extremity. Two cardiac impulses were noted. Echocardiography revealed two hearts sharing a common atrium The right sided heart was Dextroposed with TGA IIB, ASD and a PDA. The left sided heart was normal. Cardiac CT angiogram further revealed both hearts to have a common morphologic right atrium, draining the common superior and inferior vena cava. The right heart showed right atrial isomerism, a large ASD and VSD, a hypoplastic right ventricle, PDA and malposed great arteries. The left heart was normal. Chest and abdominal CT scan showed each twin to have a pair of lungs, a common liver and spleen, two stomachs, two kidneys and a single urinary bladder. The twins were treated medically addressing the respiratory, cardiac, infectious and nutritional problems. Dicephalus twins is rare variant of conjoined twins in which there are two heads sharing a common trunk from upper chest downward having only two legs and one set of reproductive organs. In dicephalus twins, anomalies of the heart are common with the right sided twin usually having complex cardiovascular anomalies not amenable to surgical correction. Management is usually conservative allowing the twins to remain conjoined. Accurate early prenatal diagnosis thru ultrasonography is important for optimal obstetric management and decisions regarding delivery approach and providing options to parents for the nonviable ones. Ethical issues regarding management of conjoint twin is one major factor which physicians and other health care givers should consider when dealing with this rare condition.

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CR.007.09

Recurrent Abdominal Pain in Takayasu's Arteritis: a case report

Kim Martin G. Tolentino, MD

A 12 year old female was admitted for recurrent abdominal pain. Initial abdominal diagnostic examination showed abdominal aneurysm. The patient underwent thoraco-abdominal aneurysmorrhaphy. Evaluation via MRA revealed a patent graft. However the patient was admitted several times for recurrent abdominal pain. CT scan revealed recurrence of abdominal aneurysm. Patient underwent redo of aneurymectomy, right and left renal artery reimplantation, superior mesenteric artery re-implantation.

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CR.008.09

Composite Lymphoma: a rarity in form; a case report and review of literature

Sherlyn B. Corpuz, MD; Ramon Ribu, MD; Milagros S. Bautista, MD; Anjanette de Leon, MD;

The simultaneous occurrence of Hodgkin's and non-Hodgkin's lymphoma, also termed as composite lymphoma, in a single lymph node is an extremely rare condition, as substantiated

in literatures. In this article, we report a fifteen year old female with such rare disease. The patient presented with two month history of cough, easy fatigability and chest heaviness. Chest roentgenogram demonstrated a complete opacification of the left hemithorax with contralateral shifting of the mediastinal structures and an anterior superior mediastinum with lobulated margins, considering anterior mediastinal mass. This was established by doing a chest computed tomography. Patient underwent chest thoracotomy and tumor debulking of the anterior mediastinal mass. Biopsy revealed mixed large B-cell Non-Hodgkin and Hodgkin's Lymphoma. Patient was treated as an aggressive form of lymphoma and was given high dose chemotherapy.

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CR.009.09

Arteriovenous Malformations (AVM) Presenting as Multiple Caraniofacial Mass: a case report

Cherry Rose Taguba-Banez, MD

This is a rare case of craniofacial arteriovenous malformations in a 26 year old, male who presented with multiple pulsatile craniofacial mass on both frontal, right parieto-occipital, right temporal, both periorbital and right infraorbial regions. Condition was present since birth with the masses gradually increasing in size as patient ages.

Patient underwent conventional four (4) vessel angiography revealing multiple soft tissues and dural arteriovenous malformations. The complexity and severity of the arteriovenous malformations sets the limitation on how to manage the case.

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CR.012.09

A Case of a Pleomorphic Sarcoma from the Pulmonary Artery Exhibiting Epitheliod Features

Paulo Enrico P. Belen, MD; Arlene M. De Luna, MD

Background: Pulmonary artery sarcomas (PAS) are rare with around 200 reported cases in the current literature. Undifferentiated or pleomorphic sarcomas immunohistochemically and ultrastructurally exhibit rnyofibroblastic differentiation. These tumors are commonly of the intimal type and comprise over 53%. We report an intimal type of PAS not with myofibroblastic differentiation but with epithelioid features. **Case Report:** The case was a 29 year old female who presented with syncope with a 9 month history of easy fatigability, difficulty of breathing and a murmur. CT angiography revealed a 7.4 x 1.7 x 2.0 cm supravalvular MPA mass extending to the right and left pulmonary arteries, initially suspected as thromboembolic. Excision was tolerated. She survived for the next 4 months. **Result:** The histology revealed a pleomorphic tumor with bizarre cells and foci of monotonous epithelioid cells. Necrosis was present. Mitotic count was 6/10 per hpf. Desmin and SMA were negative. Cytokeratin and vimentin were positive. These features were more consistent with an epithelioid sarcoma. Proliferation markers namely MIB-I and p53 were 15% and 2% respectively. **Conclusion**: Pulmonary artery sarcomas exhibit varied histologic features and poor prognosis. The rapid clinical course with a poor outcome reflected a proliferation activity of 15% for MIB-I and 2% for p53. The pleomorphic to epithelioid histology and the non-myofibroblastic immunophenotype are unusual for intimal type of PAS.

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CR.013.09

The New Face of An Old Foe: a 3 month old female with a throat swab positive for Novel Influenza A (H1N1) viral RNA presenting initially as Pneumonia

Jerome V. Senen, MD

Patient was a 3 month old female infant who presented with difficulty of breathing and was born full term via NSD to a 23 year old G3P2 mother, with regular check-up. Mother was noted to have German measles during first trimester of pregnancy. Patient was noted to be small for gestational age with birth weight of 1.5 kg. Murmur was also noted, 2D-echo done revealed PDA, PFO and severe PS.

Patient had history of confinement due to cough and tachypnea and was treated for Pneumonia. One week prior to admission, she was noted to have low-grade febrile episodes, poor appetite, coughing, watery nasal discharge and difficulty of breathing. Antibiotics was started and oxygen support was given. It was noted that patient was exposed to maternal uncle who had cough and developed symptoms of respiratory tract infection 1 week prior to patient admission.

ABG showed normal acid base balanced with uncorrected hypoxemia. Repeat chest x-ray showed increase haziness. Patient's condition and patient eventually died on the 25th hour of hospital stay. A post mortem throat swab for Novel Influenza A (H1N1) test showed positive results.

The CDC and WHO anticipates that there may be more cases for the next wave of infections. More hospitalization and even deaths associated to the H1N1 virus is expected since the population has little to no immunity against it. Instead, we should work together to limit and control the transmission of this novel A (H1N1) influenza virus.

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CR.014.09

Hip Pain: presenting sign of mediastinal mass in a four year old, a case report of Neuroblastoma

Kim D.Y. Daban, MD

We present a case of a four year old male with a huge posterior mediastinal mass. Patient had persistent pain and limping of the lower left extremity after he accidentally slipped and hit his left pelvis on the floor. He was initially treated in a local hospital for collection of pus on the left pelvis. Nosocomial pneumonia was entertained because of the development of fever on the fourth day of treatment for the pelvic infection.

Chest roentgenogram showed pleural effusion and inhomogenous opacification of the left hemithorax. A subsequent chest CT scan showed left hilar/suprahilar mass with calcification and minial pleural effusion on the left.

Patient was transferred to Philippine Heart Center for further management. Surgical resection of the mass was performed and biopsy of the mass confirmed the diagnosis of neuroblastoma.

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CR.015.09

Predicting the Unpredictable: pulmonary hypertension, a rare complication of multiple myeloma

Rhea Louela G. Jusi, MD

We have presented a case of a 70-year old female diagnosed to have pulmonary hypertension secondary to multiple myeloma. Pulmonary hypertension is a rare complication of multiple myeloma. According to studies, pulmonary hypertension is significantly reduced and subsequently resolve after treatment with steroid and chemotherapeutic agents. In our patient, melphalan and prednisone were started and close monitoring of pulmonary hypertension was advised.

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CR.017.09

Anomalous Connection of the Left Coronary Artery to Pulmonary Artery (ALCAPA) in a 25 year-old female S/P Atrial Septal Defect Closure and Patent Ductus Arteriosus Ligation

Marvin D. Martinez, MD; Zab Diel Villanueva, MD; Aquileo Rico, MD

A 25 year old female presented with exertional dyspnea of three months duration. Patient is previously diagnosed with Congenital Heart Disease, Atrial Septal Defect, Patent Ductus Arteriosus and underwent ASD closure and PDA ligation. Patient experienced chest pains while giving birth to her first child as described as non-radiating, During pre-employment medical examination, systolic murmur was heard

done showed Congenital heart disease status post atrial septal defect closure and patent ductus arteriosus ligation, and an anomalous left coronary draining into a pulmonary artery (ALCAPA).

With this case, the efficacy of surgery with ligation/CABG approach was affirmed by the uneventful post-operative period. However, just like any other case of ALCAPA, extensive and comprehensive follow-up is necessary to determine long-term success of the surgery. An objective parameter of the surgery's success would be confirmed by myocardial scintigraphy in the immediate post-operative period as well as a stress myocardial scintillography four weeks after surgery. Although the surgery may be considered successful for this patient, emphasis remains on the benefit of earlier diagnosis and correction of this anomaly. A persistently high index of suspicion and an unbiased clinical eye can reduce the morbidity and mortality arising from this condition.

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CR.018.09

Left Atrial Sarcoma in a 42-Year Old Male: a case report

Ramiro Thadeus P. Pablo, MD

Primary cardiac tumors are rare and majority of these tumors are benign. Malignant tumors are aggressive in behavior and present treatment modalities are still ineffective. These tumors metastasize despite complete resection. We present a case of a 53 year old male, who presented with recurrent pleural effusion. Patient at that time was undergoing PTB treatment. On the latest admission he complained of 2 weeks history of progressive dyspnea, and massive pleural effusion was noted on chest x-ray. He was managed by CTT insertion but remained symptomatic despite adequate drainage. CT scan was revealed a left atrial mass. 2D-echo showed a large heterogeneous left atrial mass. with irregular border measuring 3.9 x 4.4 cm attached to the interatrial septum and obstructing the left ventricular inflow. Patient underwent excision of left atrial mass, with CABG 3VG. Intraoperatively the mass was about 4x4cms lobulated with a smooth surface and invaded the full thickness of the posterior wall of the LA. Complete resection was not feasible and tumor de bulking was done. Patient was discharged improved with a final histological and immunohistochemical diagnosis of PLEOMORPHIC SARCOMA FAVORING LEIOMYOSARCOMA, FNCLCC GRADE 2.

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CR.021.09

Persistent-Uncorrected Respiratory Acidosis in Blalock-Taussig Shunt Surgery

Marc Gonzales-Gaurino, MD

Tetralogy of Fallot represents 10% of all congenital heart defects and is the most common form of cyanotic heart disease. The clinical manifestation of TOF ranges from extreme cyanosis at one end of the spectrum, because of profound right-to-left shunting through the VSD, to normal saturation for patients who have minimal RVOT obstruction and who exhibit a net left-to-right shunt. This latter group is also known as the 'pink tets' because of the lack of cyanosis.

Survival beyond the fourth decade of life in untreated patients is very rare. Without some form of surgery, 25-35% of patients with TOF die in the 1st year of life, 40-50% by year 3, 70-76% by year 10, 90% by year 21 and 95% by year 40. Without surgery, most of these children do not survive beyond infancy.

Presently, the use of palliative surgery in the initial management of patients with TOF have been as significant as the total correction itself. Originally conceived by Blalock and Taussig in 1944, it has provided clinicians with an invaluable tool to initially alleviate the deadly symptoms of TOF. Here in the Philippine Heart (enter the number of patients undergoing BTS is steadily increasing, due in part to the increasing knowledge in the management of such patients. However, not all patients subjected to surgery are recipients of a favorable out-

come. On occasion, a harsh catastrophe occurs resulting in a patient's demise. So it is equally important that occasions such as these are presented and investigated, not to prosecute, nor to point fingers, but to learn more and improve ourselves for the sake of our patients.

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CR.022.09

I.E. Illegal Entry: a case of pacemaker endocarditis

Thad S. Ciocson, MD

Endocarditis related to pacemaker lead infection is a rare, but serious condition in permanent pacing. Majority of these infections involve staphylococci. Appropriate antibiotic therapy pursued for 6 weeks and complete removal of all hardware, including the leads, is mandatory to ensure eradication of infection and to avoid lead endocarditis.

A 70-year-old hypertensive, non-diabetic was admitted at our hospital due to unremitting fever and chills for 3 months. She had undergone DDD pacemaker implantation in 2004 because of severe bradycardia. A year after, a seroma was noted on the pacemaker site. She then underwent evacuation of seroma and re-implantation of pulse generator. Three months after, patient noted swelling at the pacemaker site. She was then re-admitted for debridement of pulse generator site. Two months before admission, she underwent open cholecystectomy due to cholelithiasis. She denies intravenous drug use.

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The Philippine Heart Center Journal is devoted to the publication of original articles related to cardiovascular diseases and allied fields. The scope of articles includes original publications, editorials, current reviews, meta-analysis, critically appraisal (CATs) and case reports.

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The title page must contain:
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Braunwald E and Rutherford JD. Reversible ischemic left ventricular dysfunction: evidence for the "hibernating myocardium." J Am Coll Cardiol 1986;8:1467-1470.

Dilsizian V, Rocco TP, Freedman NM et al. Enchanted detection of ischemic but viable myocardium by the reinjection of thallium after stress -redistribution imaging. N Engl J Med 1990;323:141-146.

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Dillman WH. The Cardiovascular System in Thyrotoxicosis. In Braverman LE and Utiger RD, eds. The Thyroid - A fundamental and Clinical Text. 6th ed. Philadelphia: JB Lippincott Co; 1991,759-770.

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