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# Cardiac Anaesthesia in the Philippines

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## Historical Background: The development of Cardiovascular Anaesthesia in the Pilippines

### The Santo Tomas University Hospital(STUH) and the University of the Philippines-Philippine General Hospital (UP-PGH)

Since the inception of the medical schools of both universites, a friendly intellectual competition has been evident. The Santo Tomas University is the oldest institution of higher learning established by the Spanish Dominican Fathers, while UP is a state university organized by Congress of the Philippines and functions autonomously by its charter.

The academic environment existent in both these hospitals has allowed each to pioneer new-trends and techniques in the practice of Medicine. In 1959, in close chronological proximity to each other, both hospitals started cardiac surgery and anaesthesia. The first one was performed in the STUH by Dr. Benjamin A. Belmonte with the help of the famed cardiac surgeon from Texas, Dr. Denton A. Cooley.

Both hospitals had similar conduct of anaesthesia. STUH favoring the use of meperidine while UP-PGH the use of morphine in the perioperative period. Barbiturates were used for hypnosis and succinylcholine was the favored relaxant (bolus and drip). Nitrous oxide with oxygen was used for inhalation.

For many years, cardiac surgery and anaesthesia has experienced periodic spurts of activity and growth resulting from the availability or the lack or funds. Todate the output of both hospitals are low, mostly because surgeies are performed on charity patients who are fully dependent on government or private dole-outs.

### The Philippine Heart Center (PHC)

The Philippine Heart Center is considered the "hub of heart specialists and reserchers" in the county. It was built from government funds through the Ministry of Human Settlements headed by then First Lady Imelda R. Marcos. Its was inaugurated on 14 February 1975. Until 1986, it was considered the service hospital of the Philippine Heart Foundation, a civic organization tasked with the provision of financial assistance to needly heart patients. The PHC became a hospital of the Department of Health during the change of government in 1986 and has since functioned as a charity and pay hospital with a ratio of 52% service to 48 % private patients. Todate, the PHC turns over the most number of cardic patients, surgical and otherwise.

### The St. Lukes Medical Center

While the hospital has been in existence for many years, cardiovascular surgical activities only started in the last decade. The thrust for modernization of the hospital has fueled the development of the cardiac surdiac surgical service.

Although equipments and personnel (especially in the intensive and postsurgical units) are still lacking, the number of surgeries are increasing

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with good results.

Being strictly a private hospital, surgeries are referred by cardiologiests, who likewise manage the postsurgical rehabilitation of operated patients.

## The Makati Medical Center

For several years, affluent patients requiring open heart operations bring themselves to the United States for the surgery and for the rehabilitation that followed. Interestingly, most of them sought the services of a Filipino or an Asian cardiac surgeon practicing in the United States. Obviously what was lacking in the Phillippines is not surgical technical expertise but the support systems (i.e. intensive care unit, blood bank) personnel (i.e. perfusionist, intensivist, cardiovascular surgical nurse) and consumable (i.e. oxygenator, Swan-Ganz catheters, vascular cannulae, valves and durgs). In spired by one of the Medical Staff members, who himself was once a cardiac patient in the United States, the Makati Medical Center started the conversion of one of its wings into 2 cardiac operatig rooms, one 6-bed intensive-care unit and a 6-room telemetry unit for immdiate prepoeratife and intermediate postoperative care patients. The critical hard ware (i.e. heart-lung machine, ventilators) was brought by the Fillipino surgeon, who also transported the whole cardiac team and most of the consumables. The initial success of the endeavor encouraged interest and more hospital participation in terms of procurement of surgical instruments and training of personnel. Todate, 4 years after its inception, the Cardiac Surgical Service of the Makati Medical Center is fully operational. Imported members of the heart team to include the surgeon, now total only 5. Along with this, it has also become an income generating endeavor, leading to the origanization of the Makati Heart Foundation, where excess moneys payment of operational expenses are accumulated for assistance toward the expenses of less financialiy capable patients.

## Training in Cardiovascular Anaesthesia

The most intensive training in cardiovascular anaesthesia is offered at the Philippine Heart Center. Unitil 1992, training in anaesthesiology at the PHC involve a 3-year accredited program. Training residents rotate in cooperating hospitals belonging to what is very aptly called consortium, in order for them to complete a well rounded experience in the different anaesthesia techniques for various surgeries. The consortium also provides a comprehensive didactic course in anaesthesiology for participating residents. the predominance of cardiac surgery at the allows for greater experience on the part of the residents in cardiovasular anaesthesia. Accreditation is for anaesthesiology in general, and not exclusively for cardiovascular anaesthesia.

Owing to the paucity of logistics in other large government medical centers (i.e. UP-PGH) training of anaesthesiologists in these centers are limited to close heart surgical anaesthesia, Additional experience are gathered eleswhere on a temporal basis (i.e. rotation for three months at the PHC). Anaesthesiologists in charge of the cardiovascuar service gain experience by the number of cases performen or through fellowships abroad (i.e. USA or Netherlands) on a short term basis (4-6 months).

## Organization of Cardiovascular Anaesthesiologists

The Philippine Society of Cardiovascular Anaesthesiologists was formally organized in November of 1992. Although conceptualization of the organization occurred much earlier. The formation of society took a protracetd course owing to the small number of Fillipino anaesthesiologists actually involved primarily in cardiovascular anaesthesia.

The initial membership number is nineteen. Admission requirement is not stringent. There are two categories of members. Regular members are anaesthesiologists who received 2-3 years of formal training in cardiovascular anaesthesia.

Associate members are those specialists anaesthesiologists involved with cardiovascular anaesthesia. Associate members do not enjoy voting privileges as regular members do. The society is affiliated with the mother organization, the Philippine Society of Anaethesiologists Inc. All members must hold a Diplomate of the Philippine Board of Anaesthesiologists. Foremost in the problems to be addressed is that of credentialing of cardiac anaesthesiologists. If a subespecialty examination is to be initiated, roles have to be filled:

Who are qualified to take the examination?

Who are qualified to give the examination?

## Distribution of cases in the Hospitals with Cardiac Surgery Service

For the past several years, the UP-PGH has not preformed an open heart surgery. The last reported case was in 1984. The main problem is that there is no longer any functional heart-lung machine and monitoring equipments are scarce. This hospital would have been the most fertile ground for cardiac surgeries because it is mainly a tertiary hospital which is 75% charity and cahrity and consequently enjoy a huge array of patients. However surgical cases have decimated to close heart surgeries mainly for cardiac tamponate from in fectious or malignant effusions and close heart repair of congenital cardiac anomalies.

The PHC is the most prolific source of data for all types of cardiac surgery. However, SLMC and MMC are closing in on the number of patients undergoing coronary artery bypass graft (CABG). A comparison of mortality rate for CABG between PHC and MMC for the past four years are as follws: PHC- 5.0 % MMC- 2.4 %.

There is a decided reduction in mortality rate even as the numer of CABG increases at the PHC. CABG at the MMC is performed by a seasoned cardic surgeon, and the 2.4% mortality rate represents patients with end-stage ventricular function.

| YEAR | TOTAL | MOTALITY | %MORTALITY |
|---|---|---|---|
| 1988 | 98 | 11 | 11.22 |
| 1989 | 140 | 8 | 5.71 |
| 1990 | 144 | 7 | 4.86 |
| 1991 | 197 | 12 | 6.09 |
| 1992 | 206 | 7 | 3.40 |

The following is a 5-year cumulative date of cardiac surgeries in the five aforementioned hospitals. Also included is the output of the cardiac catheterization laboratories of the five hospitals (Table 1).

## The Anaesthetic Plan

The following is a representative plan of management for the PHC:

**Essential Monitoring:**

Arterial Blood Pressure

Electrocardiogram

Ventricular Filling Pressures

Central Venous Pressure (CVP)

This is used alone for patients with good preoperative left veniricular function

Pulmonary Artery Pressure/Pulmonary Artery Wedge Pressure (PAP/PAWP)

When there is a discrepancy in the functional status of the right and left ventricle especially in patients with poor left ventricular function, a Swan-Ganz catheter is inserted to monitor both CVP and PAP/PAWP. Some makes this routine monitoring.

Urine Output

Rectal and Esophageal Temperature

Esopgageal Stethoscope

Blood gas and serum potassium analysis

Oximetry

Capnography

**Specialized Monitoring:**

Transesophageal echocardiography for determination of ejection fraction and regional wall motion abnormalities intraoperatively.

Cardiac output determinations by thermodilution techniques.

**Table 1.** FIVE YEARS CUMULATIVE
1988–1992

| Cardiac Surgery | STUH UP–PGH | PHC | SLMC | MMC | |
|---|---|---|---|---|---|
| I. With Cardiopulmonary Bypass: | 128 | | 2277 | 393 | 284 |
| A. Acquired | 78 | | 1507 | | 271 |
| 1. Adult | 78 | | 1507 | | 271 |
| a. CABG | 7 | | 785 | 287 | 240 |
| b. Valvular/others | 71 | | 722 | 106 | 31 |
| 2. Pediatric | 0 | | 82 | | 0 |
| B. Congenital | 50 | | 638 | 38 | 13 |
| 1. Adult | 5 | | 242 | | 12 |
| 2. Pediatric | 45 | | 441 | | 1 |
| II. With Cardio Pulmonary Bypass | 37 | 91 | 1878 | 34 | 5 |
| A. Accquired | 4 | 58 | 1047 | 4 | 0 |
| 1. Adult | 4 | 58 | 1047 | 4 | 0 |
| 2. Pediatric | 0 | 7 | 80 | | 0 |
| B. Congenital | 33 | 33 | 831 | 30 | 5 |
| 1. Adult | 3 | 1 | 52 | | 0 |
| 2. Pediatric | 30 | 32 | 779 | | 5 |

FIVE YEARS CUMULATIVE
1988–1992

Cardiac Catheterization Laboratory:

| | PHC | SLMC | MMC |
|---|---|---|---|
| I. Coronary Angiography Hemodynamics Studies | 4309 | 1218 | 778 |
| II. Percutaneous Balloon Mitral Valvotomy/Pecuaneous Transmitral Commissurotomy | 248 | 61 | 0 |
| III. Percutaneous Transluminal Coronary Angioplasty | 179 | 47 | 91 |

**Pre-anesthetic Medication:**

Morphine sulfate, 0.2mg/kg with precautions

Hyoscine hydrobromide, 0.01mg/kg

Continuation of beta-blockers orally with a sip of water (15-30mℓ)

Nitroglycerine ointment, transdermal

**Induction of Anesthesia:**

Fentanyl, 10-100mcg/kg , subsequent dose given at hourly intervals

Pancuronium bromide, 0.1mg/kg for intubation.

Subsequent does given at hourly intervals. Small doses of pancuronium is given before any narcotic to prevent muscular rigidity as well as bradycardia resulting from narcotic use.

Stress Response and Depth of Anesthesia (Increased Blood Pressure/Increased Heart Rate)

Controlled by nitroglycerine infusion; deepning level of anesthesia with volantile anesthestic (i.e., isoflurane) ; and/or controlling the heart rate with verapamil, 2.5mg given slowly intravenously; or beta blocler; or carotid massage. Esmolol is still under clinical trial at the PGH.

**Maintenance of Anaesthesia:**

Hourly doses of pancuronium and fentanyl with or without inhaled anaesthetics.

**For CABG with difficult airway problems i.e. difficult intubation**

Induction: fentanyl 0.5 to 1.0mg thiopental or benzodiazepine (diazepam or midazolam) and in halational anaesthetic, succinylcholine for intubation

**For patients with borderline kidney function:**

Dopamine at 2-3mμg/kg/min started during cardiopulmonary bypass and continued up to the postoperative period untill patient is stabilized (urine output is adequate)

**Some salient points:**

Heparin 3mg/kg is given through a central line, three minutes before aortic cannulation.

During cardipulmonary bypass, perfusion pressure is maintained at 60 mmHg mean arterial pressure.

KCl drip is started depending on serum post-assium level and urine output.

Minimum serum potassium:

digitalized patient- 3.5 mmol/L

non-digitalized patient- 3.0 mmol/L

Protamine Sulfate is given after removal or venous cannula. May be given at a dose ratio to heparine of 1:1 until 1:3 (heparine: protamine) . Activated clotting time curve is used for monutoring adequacy of reversal of heparin effect. For additionl pump blood transfused, protamine 50mg is given.

**Available drug therapy:**

Vasopressors phenylephine
ephedrine
norepinephrine

Inotropes: dobutamine
dopamine
epinephrine
norepinephrine
isoproterenol

Other Inotropes:
calcium chloride or gluconate

Anti-arrhythmics:
lidocaine/defibillator
magnesium sulfate (1-2 gms until 5 gms by slow Ⅳ for membrane stabilization)

Vasodilators: Nitroglycerine
Sodium nitroprusside

At the Recovery Room

Mechanical Ventilation:

$F_IO_2$- 0.6 to 1.0

RR- 12 breaths/minute

Vt- 10-15mℓ/kg

PEEP is started at 3-5 $cmH_2O$ when there is suspicion of bleeding (tamponade effect)

For Valvular Surgery:

Generally similar anaesthetic management

as CABG

For insufficient valves:

Dilator used is sodium nitroprusside to decrease regurgitant flow

Constrictor (vasoprssors) used to in crease diastolic pressure.

Balance of dilator and constrictor is utilized to achieve desired hemodynamic parameters.

For setnotic valves:

Heart rate is contolled with anesthesia, verapamil or betablockers.

Cardiac assist device (i.e. intraaortic baloon pump) is sometimes inserted for intractable cardiac failure.

## Summary

Cardiovascular anaesthesia in the Philippines has tenaciously remained on its feet for 25 years. It has experienced rapid and gratifying growth spurts as well as periodic growth stunts and retardation. Despite all the drawbacks, we take pride at what has been accomplished.

Several problems remain existent:

1. There is a rapid turn-over of trained per sonnel (many drained into more affluent environs),
2. Cardiac support durgs especially the new ones are either unavailable or expensive because of a limited local market.
3. Similarly, consumables are unavailable or prohibitively priced.
4. Monitors, heart-lung machines, ventilators and similar equiqments are difficult to access and when available suffer a shortened life span because of poor or inadequate maintenance, not to mention huge patient loads.
5. Subspeciality training locally, and abtoad are not readily available to all who wish to avail of them.

One provocative question keeps surfacing: How much can an impocerized economy really afford to spend in salvaging damaged hearts? We ponder over the fact that the number one cause of death in the country remains to be infection. We also have to reckon with the number of our children born health who are dying of childhood diseases because of our inability to immunize them. What about the control of increasing birthrate and the attendant religious donsiderations in a Catholic country? For people with limited resources the rational endpoint is: The greatest good for the largest number of people. **Where to draw the line is a decision very often difficult to make.**

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