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Cardiac Surgery Procedures in a Rural Tertiary Care Teaching Hospital: Our Experience

Arasappa Arun Kumar[1], Bazardeen Riaz[2], Subburaj Ramkumar[3], Mani Rajan[4]

Authors Affiliation:
[1]Assistant Professor [2]Assistant Professor [4]Consultant, Department of Cardiothoracic & Vascular Surgery, [3]Assistant Professor, Department of Anaesthesiology, Sri Manakula Vinayagar Medical College and Hospital, Puducherry 605107, India.

Corresponding Author:
A. Arun kumar,
Assistant Professor, Department of Cardiothoracic & Vascular Surgery, Sri Manakula Vinayagar Medical College and Hospital, Puducherry 605107, India.

Email: ddkmmc@rediffmail.com

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Abstract

Background: A successful cardiac surgery centre requires a lot of resources, skilled professionals, ancillary services and a defined patient population. Such centres are functional in super-specialty hospitals of big cities and is hard to reach for the rural poor. Hereby we are presenting the implementation process of a cardiac surgery centre in a rural tertiary care hospital and its successful service. *Methods:* our hospital is a 750 bedded tertiary care center with all specialties of medicine and is located in a rural area of Puducherry, India. We have cardiac cases reported from general medicine and general surgery. We built up team with a primary CT surgeon, an assistant surgeon, cardiac anesthesiologist, perfusionist, physician assistant, scrub nurses and the ICU & post operative ward nurses. Procurement of machines were made and was followed by setting up an operation theatre, ICU ward and post operative wards. *Results:* Our first case was an SVC type of Atrial Septal Defect, successfully operated on 21st April 2017. Till then we have completed 211 open heart procedures and our centre is getting advanced everyday. *Conclusion:* Establishing a cardiac surgery centre in a rural hospital setup is a challenging but feasible task. Emergence of such centers would help the rural community in terms of affordability and inconvenience in reaching super specialty centers of big cities.

Keywords: Cardiac Surgery; Mitral Valve Replacement; Cardiothoracic Surgery; Lobectomy.

Introduction

Cardiac surgery is a refined branch of surgery which has enriched tremendously in the recent 50 years. Cardiac surgery is usually performed in a big tertiary care centre or a well equipped super specialty hospital [1,2,3]. Most of the cardiac centers were placed only in big cities and urban places as it involves lot of special equipments to perform these great procedures. We here present our model of starting a cardiac surgery programme in a tertiary medical college hospital located in a rural setup in Puducherry.

We personally hope that such centre's when started in rural setup would greatly benefit the poor patients who has to travel a lot of distance to undergo these surgeries. So starting these procedures in rural centers may help the society in a long way [4,5,6].

Methods

To start a cardiac surgery programme we need a lot of materials. Firstly, we need to assess the feasibility of doing these procedures in the hospital. Sri Manakula Vinayagar Medical College and Hospital is a Tertiary care center with 750 beds located in Madagadipet, Pondicherry. We have almost all the specialties of medicine and surgery under one roof in this hospital. We took advantage of the situation and started building our department.

We started our outpatient service in a special clinic wing to start with. We maintained a register of all the cardiac patients who were referred to us from various branches of General Medicine and General Surgery. We have a separate register for valvular heart diseases, coronary heart disease, thoracic surgery diseases and vascular surgery

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disease. We gathered patients as far as we could to start the programme.

Next to patient's register, we started developing our team which included a primary CT surgeon, an assistant surgeon, cardiac anesthesiologist, perfusionist, physician assistant, scrub nurses and the ICU & post operative ward nurses. We could gather like minded people under one motto "we can do it". In view of the situation we gathered only people who are well trained and experienced in CT field and slowly as we progressed we took fresher's who wanted to get experienced in this field.

Our next herculean task was to procure the machines involved in cardiac surgery which was a huge list. We purchased heart lung machine, IABP machine, mechanical ventilators, multi parameter monitors, OT table, OT lights, anesthesia work stations, perfusion related items like oxygenators, tubings, cardioplegia solution, cannulae, myocardial stabilizer, suture materials, artificial mechanical valves and coronary shunts. We took efforts to procure all these materials within a month and made sure they were all the best in the market.

Theatre set up

An existing fully furnished and well equipped theatre including laminar flow, HEPA filter fitted theatre was identified and was renovated according to our specification which would cater the need of starting a cardiac programme.

The theatre was washed thoroughly after the renovation works and was then fumigated. We took 3 cultures after washing and fumigation including anaerobic & fungal cultures. When we did this our chief microbiologist was involved to verify the accuracy of the culture report and made him to visit the theatre complex regularly till we got a green signal to go ahead and start the surgeries.

ICU ward + post op wards set up

The secret of any cardiothoracic surgery lies not only in the surgery itself, but more in the post operative follow up of the patients and more so is the ICU ward, where we receive the immediate post operative patients.

So we started getting all gadgets necessary to take care of the patients and left no stones unturned to make sure that we do the work perfectly. Next in our way was to get other paraclinical workers who are complimentary staffs who makes life easy in setting the things done in right time. Our staff nurses in CT – ICU were given a check list of things to be done (According to WHO standard) when a postoperative patient is received. Our main aim was to have "Safe patients in safe hands, so hand washing and using a disinfectant hand rub was made mandatory for all personnel involved in patient care which included patient's relatives too.

Patients who were admitted to preoperative wards and waiting for surgery were taken care of by trained staff nurses and this also included social councilors before the surgery. All the preoperative wards were also fully equipped including a mechanical ventilator and multiparameter monitors.

Blood bank and lab facilities

Blood is one of an integral part of our surgeries and so we made sure that we get a good support from the blood bank available in the hospital. We made sure that we get fully screened fresh blood for all our cases including blood components and fresh frozen plasma.

We made sure that we have a 24 x 7 Biochemistry lab and Pathology lab which helps us in setting our blood investigation at the earliest on a purity basis.

We specially requested our Radiology department to dedicate a latest digital x-ray machine to be stationed in our CT-ICU ward to take x-rays as and when required.

We involved a team of physiotherapist who were trained in doing chest physiotherapy and other cardio respiratory physiotherapy both preoperatively and post operatively.

Result

Day of surgery

The first theatre day 21st April 2017 was a memorable day akin to Dec 3, 1967 when the first heart transplant was done in South Africa by Dr. Christiaan Bernard (7,8). Yes, the day we dreamt was this, our first cardiac patient was a 23 year old male patient who had an SVC type of Atrial Septal Defect and who needed an open heart procedure (Intracardiac repair) to be done with a heart lung machine support. We rolled out our first patient to the CT-ICU after 2 hours of surgery in the theatre with stable hemodynamic status and thanked god for helping us.

From thereon, it was a non-stop journey for us and today we have performed more than 211 open heart procedures including Beating Heart Surgeries

and other thoracic surgical procedures including VATS procedures (Table 1 & 2). We have come to the state of performing Minimal Access Surgery (MICS) in our long journey of establishing a cardiac surgery programme.

Table 1: Patients Distribution

Outpatient	No. of cases
Male	120
Female	110
Paediatrics	20
Total	250

Table 2: Procedures done

Open Heart Surgeries	Male	Female	Total
CABG – on pump	30	20	50
CABG – off pump	29	10	39
Mitral valve replacement surgeries	23	16	39
Aortic valve replacement surgeries	04	02	06
Double valve replacement surgeries	10	03	13
Valve replacement with CABG	04	01	05
Intracardiac repair ASD, VSD, TOF	12	01	13
Paediatric cardiac surgeries	06	05	11
Lobectomy	06	01	07
Decortication	03	01	04
Pneumonectomy	05	01	06
Mediastinal surgeries + VATS	03	01	04
Vascular procedures	02	02	04
Wound infection [Supeficial Sternal Infection(SSI)]	02	02	04
Death	04	02	06
Total	143	68	211

Discussion

Out of 250 cases which were referred to us in the outpatient department, 211 cases were operated on. The remaining cases were found to be either inoperable or had severe co-morbid factors which were treated by optimal medical management only.

Most of the cases referred to us were only Coronary Artery Disease which needed Coronary Artery Bypass Grafting either by on pump or off pump surgery. We used the standard protocol to prepare these patients which included Routine Doppler study of bilateral carotids, venous and Arterial systems of lower limbs. We used both Arterial (LIMA) for LAD most often and Reversed Saphaneous Vein Graft (RSVG) for the other vessels as conduits. We had a mortality of 4 out of 80 cases operated on Coronary Artery Disease.

We also had 5 (211) cases of combined valve replacement and Coronary Artery Bypass Grafting.

Grafting

We performed 58 cases of valve replacement which included Mitral valve, Aortic valve and Double valve Replacement (DVR) out of 211 cases (Figure 1).

We had performed 11 paediatric cardiothoracic surgery cases out of 211 which included intracardiac repair of ASD, VSD, AV canal defect, Tetralogy of Fallot, Ruptured Sinus of Valsalva.

We have done 15 (211) Thoracic procedures which included Lobectomy, Pneumonectomy and Mediastinal Tumors Excision. We also did 1 VATS lung biopsy surgery for an Interstitial lung disease patients.

We had done 4 vascular procedures out of 211. Unfortunately we had 6 (211) deaths in this 23 months period and they were all in the post operative ICU ward due to low cardiac output failure post open heart surgeries.

We had 4 (211) Superficial Wound Infection – Superficial Sternal Infections (SSI) which was treated with local dressings and Antibiotics.

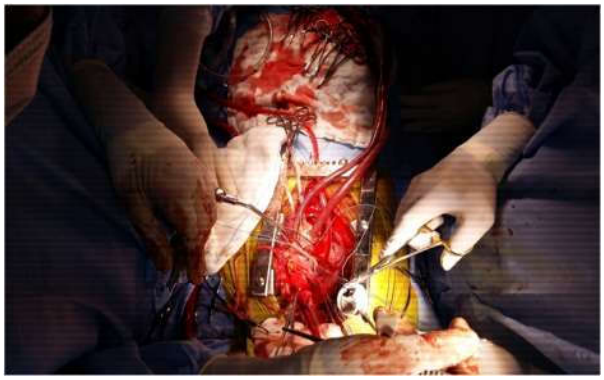

Fig. 1: Mitral valve replacement with mechanical prosthesis

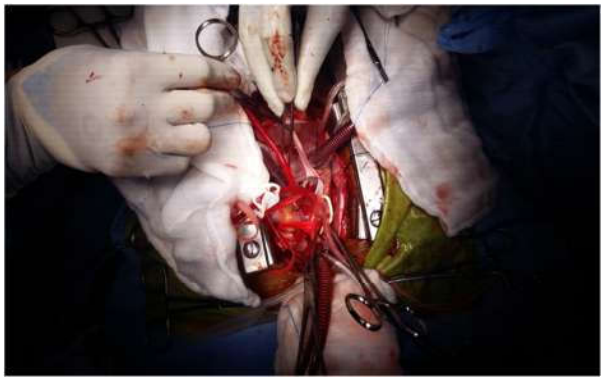

Fig. 2: Congenital heart disease – Atrial Septal Defect- Pericardial path closure

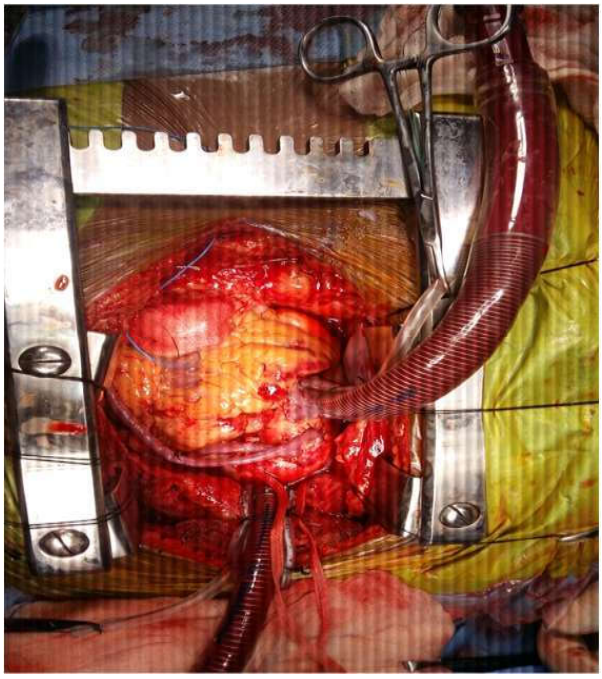

Fig. 3: Coronary Artery Bypass Grafting – Onpump surgery

Fig. 4: Post operative – ICU setup

Fig. 5: Coronary Artery Bypass Grafting – Off pump surgery using octopus stabilizer

Conclusion

To start a cardiac surgery programme in a rural or semi urban centre was a herculean task to achieve. Most of the people with cardiac ailments in this rural areas couldn't afford the cost of treatment at urban centers or had to travel a long distance to get it. If cardiac centers started in rural centers with necessary infrastructure and necessary facilities including faculties these patients would be benefitted in a long way and especially the cost factor involved in treating these patients can be drastically reduced. This would be a boon for these financially weak population who live in these areas.

Our motto of "Good health service to all" was fulfilled by starting a cardiac surgery programme in this rural setup which could set a role model for future projects to come! So we conclude that it is possible to start a Cardiac Surgery Programme in Rural centre!!

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