CARDIAC BYPASS: APPLICATION OF A MECHANICAL HEART AND LUNG APPARATUS

Paul C Njoku + James Thomas* G.Rau++
+Post-Doctoral Fellow Department of Electrical Engineering Indian Institute of Technology New Delhi 110016 India,
*Cardio Thoracic Surg., Department of Cardio Thoracic Surgery St Stephen's
Hospital Tis Hazari Delhi
++Director Helmholtz Institut Fur BioMedinische Universitat Aachen Germany

ABSTRACT

This paper deals with the problem of bypass surgery. It examines the basic mechanical and physiological problems of the heart and lung. The paper assumes that the cardio-pulmonary bypass a technique by which the pumping action of the heart and the gas exchange functions of the lung are temporarily replaced by a mechanical device, the pump oxygenator or attached to the vascular system of the patient. Studies have been carried out on over 250 patients on open heart operations and clinical perfusion of cardiopulmonary bypass. The contributions of this paper is based on the results obtained from successful patients operations models of preoperative and post operative procedures. The paper revealed that patients with angina pectoris senosis complications in heart attack and young individuals with heart diseases need CPB. The result indicates that the CPB is relatively safe in the sense that many patients got releif who suffered from the intracardiac and excruciating pain. The new trend is that the study identifies bypass surgery as one of the greatest contributions grouped in line with the discovery of antibiotics and insulin with regards to the health care system. The method is useful in the sense that it has prevented many early deaths and has helped innumerable patients to live normal lives. The limitation is that only certain persons can benefit from this procedure. Computer Subroutine Models and Video recorder were used.

Keywords: Cardiac Bypass Mechanical Heart and Lung apparatus approach

INTRODUCTION

This paper elucidates an approach suitably relevant to solving open heart operations and clinical perfusion for cardiac pulmonary bypass problems. Cardio-pulmonary bypass involves a technique or methodological procedures by which the pumping action of the heart, and the gas exchange functions of the lung are replaced temporarily by the pump-oxygenator, connected to the vascular system of the patient. CPB is a safe clinical tool for-risk patients having coronary artery bypass, grafting can be done with a hospital mortality of less than 1%. In serious illness patients, very young or old CPB contributes to morbidity and mortality. Damaging effect of CPB abound.

STRUCTURAL CONSTRAINTS

Congenital heart disease is one categorization. It is rampant among the rich and it is due to smoking and fast living typically of the west. Defect occur at upper and lower valves and is common in school children. Parents with defective genes, their offsprings can have it. Impure blood during circulation affects the lungs, left artery to right ventricle. Arterial defect, a hole in the heart, blood takes short track instead of proper channel, it escapes, oxygenated blood mixes with deoxygenated one. Defects occur in childhood arterial septic defect hence operation. Ventricular septic defect, blood forcing into the aorta is diverted, lung gets more blood. Several factors postulating this eg mixed marriages typically of South India. Blue baby is obstruction to one of the arteries. The baby can not strive cries, and is called Tetralogy of Fallot. Blood vessels are wrongly connected and oxygenated blood is not coming freely and this is called Transient Fallot. The child crawls hence abnormal progress. Endocardigraphic machine detects if a child has disease. Diagnosis is by surgery. For closed heart does not involve machine. It is done outside. Open heart involves machine function with advanced sophisticated equipments. The cost is 1 lakh including entire period of treatment. Funding organisation and Government defer the cost of importing disposable valves. Trivandrum is one centre. Valvular disease is done. Chinese valves are less costly. Rheumatic fever is in India, and gives sour throat caused by bacteria, reaction in body manifestation. Mitral valve is one way passage, block the lungs easily tackled by method of balloon either to repair or replace them by artificial heart valves [1].

CASE MODEL

The following cases were successfully performed. Mitral valve artery and cardiac stop noted at 30 units to 217 minutes aortic clamped. Valve variable was 0,6 repaired to 3.5 cm.

The candidate underwent coronary artery bypass surgery. Valve was opened and closed, the mitral valve repaired. In another case, the patient had mitral regurgitation (caged valve) 0.6 opened to 3.5 using Tubb. Mitral valve was leaking and narrowed. Mr Mathews aged 63 years had mitral valve grafting. It took 9am - 3pm coronary artery block bypass surgery. ECG was 80 per minute, BP 80-144 and at the intensive care the X ray was taken at the bed side.

Aortic Cardio Pulmonary Bypass was a case of aneurysm of abdominal aorta resection and grafting using Dador graft gelsad. Other operations that took place include myocarditis-myocardial involvement-inflammation of the myocardium, anginapectoris-occurrence of pain-cHEST, pericarditis-inflammation of the enveloping membrane of the heart-bacterial infection-rheumatic fever and congenital arterial defects.

POST OPERATIVE RX

(1) 0.2% dex with 90mg vite according to
Glucose 10/dex add Inj with Insoline 10 unit 30ml/hr, Inj K.CL lgm (iii) 5% with Injection Doparine 400mg/500 ml according to patient BP.(iv) NTC Nitrobcycline 25mg/500 ml or 50mg/500 ml (v) Blood transfusion according to HB report 3 or 4 point (of surg). Total 15 days in the hospital is allowed.CABG and Value replacement: Sug Pest of orders and (vi) injection Omnatax 1 gm 6 hrly (vii) Irij. Coutil 60mg 8hrly (viii) Inject Morphine 3mg SOS if chest drainage is more than 100 ml/hr, then we give Injection. Protamine 1 amp. (v) stat or 2 mg sat, If urinary output is low 60 ml/hr or 25 ml/hr then Inj. lasix to be given. We will keep the pH to CTS ICU at least 1 week after that we will transfer the Patient to CTS ward (General ward or put in the ward.

Figure 1 illustrates details observed in the intensive care. Enough concentrated serum albumin is added to the balanced salt solution in the volume to make it approximately colloidal iso osmotic especially in infants. Glucose concentration 350 mg per cent is deliberately raised to promote osmotic direnis during and for a few hours after operation and to provide energy source.

OPERATION RESULTS (A)

Name of patient Sirequiddin AorticR on 1.46pm
Weight 59kg Close cover operation
Height 170 cm 3.4m/
Operation AVR Aortic off 2.31pm
Anaest 11.00 am Card P 1.59pm/900mg
OD st 11.5am Urine at 100mg
Bypass on 1.45pm urine 600mm,- 500
Bypass off 2.31 pm Heparine tr 1.34 pm/180mg
urine dur 250mm-100 urine off 100mm Temp 38*C

CONCLUSION

Safe CPB is characterized by the absence of structural or functional damage after the perfusion. This is complete due to profound hypothermia. Thousands of patient have no apparent ill effects from CPB, Coroary Artery DiseasefCAD), CABG, and increasing number of patients are subjected to observation. Research and Development in cardiac assist devices under biomechanic Design is vital.

ACKNOWLEDGMENT

The auspicious opportunity to trainDrPaul was a pleasant and dutiful awe. I am grateful to Mr. Brown, ProfSAnand and Prof Dr Guha for support.