The First Open Heart Surgery in Malta

DR.N. AZZOPARDI MD FFARCS DA
HEAD OF DEPARTMENT OF ANAESTHESIA - ST. LUKE'S HOSPITAL. LECTURER UNIFERSITY OF MALTA.
CHRISTOPHER ZERAFA
MEDICAL STUDENT

Introduction.

Although in 1947 Professor P.P. Debono courageously closed a patent ductus arteriosus in a young patient, with quite good results, the operation itself was really an extended thoracotomy. The first ever open heart surgery to be performed in Malta, on the 8th November 1983, is the one about to be described: Throughout the time the heart was stopped; for over an hour, its work was taken over by a heart lung machine operated by local and foreign technicians, the latter having come over with the surgeon Mr. A. Yates of Guy's Hospital, London, U.K. Besides the aortic valve replacement, the surgeon performed another cardiac operation, a mitral valvotomy on a young woman.

The Patient

A.D. was a 39 year old clerk who wieghed 67kg, was 1.5m tall and had a surface area of 1.8m^2. He was a moderate social drinker and used to smoke over 30 cigarettes daily. Until 20 years of age he felt quite fit but noticed increasing dyspnoea and palpitations expecially after exercise, as after a game of football. His gener practitioner noted the hear murmur but advised only rest and avoidance of heavy exertion. For 19 years the patient carried on his normal life activities but when the palpitations increased and were really troubling him he sought specialist advice, first in Malta and then abroad. A diagnosis of aortic valve stenosis and incompetence with left ventricular dilatation was established by ultrasonography. Before pulmonary hypertension could occur he was strongly advised to undergo operation. Although the patient consented at once, the decision to have the operation locally presented some difficulty as the patient was afraid to be the first one to inaugurate cardiac surgery in Malta. When the visiting surgical team assured the patient that all was prepared he gave his full consent.

The Machines

As open heart surgery was the first ever to be performed locally the Health Authorities had to provide a number of machines at a considerable cost.

A *SARNS Four Pump Heart Lung machine* along with its accompanying heating-cooling unit was procured just in time for the operation. This machine has four roller type external pumps and during the procedure one pump was used to drive blood into the aorta at a pressure of 300 mmHg while the other three were used as suction pumps. A *Spiraflow Oxygenator* was attached to the machine and oxygen at 5 l/min was passed over the blood during the bypass procedure.

Supporting machinery included a Fibrillator and Defibrillator with both Internal and External paddles and a Three Channel Monitor for ECG, and two pressure lines.

The Procedure

The night before the operation the patient received Nitrazepam but he slept poorly and was sedated in the morning with Papaveretum and Scopolamine. In the anaesthetic room he received a sleeping dose of Thiopentone, a medium acting relaxant Pancuronium and a full dose of Fentanyl. He was intubated and at once put on a Manley Ventilator.

An arterial line using a *Hewlitt Packard transducer* was set up in the left radial artery and a reading of 160/80 mmHg registered. Two big venous cannulae were inserted in both internal jugular veins. A temperature probe alongside an oesophageal tube and a Foley urinary catheter were introduced.

The heart lung machine was filled with 3 litres of Ringer Lactate Solution and was set running with the tubes clamped and the temperature adjusted to 38 C. After preparing the patient, a midline sternotomy incision was performed from the suprasternal notch down to the xiphisternum, and the sternum sawn through with a pneumatic oscillating saw. After a routine inspection the pericardium was opened, in such a manner that the operative field was seperated from the lungs.

Heparin in a dose of 18,000 units was now administered. Through a probe individual chamber pressures were taken and gave the following readings: right ventricle pressure 27/0, left ventricle pressure 160/65 and aortic pressure 110/60. An arterial blood sample was sent to the laboratory for blood gases estimation: pH 7.4, pCO_2 33mmHg and pO_2 139 mmHg. Silastic tubing was introduced through the

right atrium and through the aorta, care being taken to void out any remaining air in the tubes before clamping them. A purse string secured both tubes in place.

The paddles of the fibrillator were now applied and the heart was fibrillated. The silastic tubing was connected to the machine and pumping started. The aorta was clamped just below the tube site and slowly slit open to reveal the grossly diseased valve. One of the cusps was totally replaced by vegetations and hard calcified material giving a peculiar scraping sensation. The coronaries were flushed by a cardioplegic solution containing Magnesium, Potassium and Lignocaine (St. Thomas Formula) diluted in 1 Litre Ringer Lactate and this cold solution was poured slowly over the heart to lower the temperature and prevent any ischaemic damage during bypass time. Half a litre of blood was now withdrawn from the aortic cannula and stored for administration at the end of the procedure. This is done for postoperative administration of platelets and clotting factors.

After dissecting out the diseased valve and measuring the space so opened, a Carpentier Edwards aortic biosynthetic valve size 27 was chosen and carefully sutured in place employing interrupted and continuous sutures. When the valve was well and evenly anchored in place the sutures were tightened and the stem of the prosthesis was broken off. The aortic incision was hermetically closed. Throughout this procedure the heart-lung machine had been pumping blood at 4.4 litres per minute calculated at 2.5 l/m^2 surface area/min at a pressure of 300mmHg and a temperature of 38 C.Gradually the cardioplegic solution was shut off, rewarming started, and the aortic clamp was released slowly. Suction from the left ventricle was gradually stopped, and the 500 ml blood removed before opening the heart was run in again.

Gradually a return to normal of the cardiac pressures was achieved by increasing the preload and at the same time decreasing the shunting of blood to the machine by slow clamping of the venous cannula. When the right atrial pressure had risen to 10mm Hg the tube was clamped and then removed, and the atrial defect oversown carefully. The aortic tube was now removed and the aortic slit carefully sutured. A second half litre of packed cells blood was now given to make up for the blood volume remaining in the machine.

Despit rewarming, massage, adrenaline (1:10000 solution) cardiac injections and repeated defibrillations at 15 Joules and even 35 Joules, the heart failed to establish sinus rhythm and the measured aortic pressure remained unsatisfactory. Verapamil 40 mg dose I.V. and a drip of Isoprenaline I.V. were without effect on the unstable heart and only Amiodarone 50 mg slowly I.V. achieved a satisfactory output pressure of 80 mmHg and a regular heart rate at 120 per minute.

Two wide bore drainage tubes were put in place one at the bottom of the pericardial sac and the other lying across the heart up to the level of the base of the aorta. The pericardium had to be left open in its upper 2/3 as any attempt at suturing and so tightening the heart was immediately accompanied by arrythmias. Continuous under water suction was applied through these tubes, utilising a *Roberts pump*. The left atrium was cannulated anew and the tube lead out of the chest wall and connected to a monitor for continuous recording. A sample of arterial blood withdrawn at this stage gave the following results: pH 7.4, pCO_2 36.7mmHg, pO_2 97 mmHg, Na+ 130 mEq/l and K+4.8 mEq/l.

Protamine sulphate was now given slowly I.V., the dose calculated at 200 mg/m^2 surface area- a total dose of 400 mg. The exact dose was, however, determined by withdrawing blood samples and estimating the activated clotting time using a Haemochron device till the previously doubled time returned to a control level of 140 seconds.

The sternum was closed using six wire sutures and subsequently both the subcutaneous tissues and the skin were closed seperately. The patient was constantly ventilated using 3 litres Oxygen flow and 6 litres Nitrous Oxide flow per minute. Ventilation was stopped and Oxygen reduced to a minimal flow of 2 litres per minute during the bypass procedure. During the transfer to the ITU the patient was aided to breathe by an Ambu-bag using only Oxygen at 5l/min but once in bed an Air/Oxygen mixture was used for ventilation until *weaning off* was started some hours later, the E.T. tube being removed after six hours in the ITU. No drugs were used for reversal of muscle relaxation.

The total urine output during the bypass was 150ml of dark urine but this increased during the stay in the ITU as thiazide diuretics were administered, cardiac output improved. The antibiotic used was Cephaloridine 1g, given at the end of the procedure. Pain was allayed by analgesics and as the prosthesis used was a biological one no anticoagulant therapy was used but antiagglutination drugs — Persantin and aspirin were administered. The patient was transfered to a general ward in 24 hours and was out of hospital a week later.

Conclusion

It is the authors' sincere hope that this operation and its successful outcome will encourage more Maltese cardiac patients to come forward and have their operation done at St. Luke's Hospital, at first by a visiting caridothoracic team but eventually by a Maltese cardiothoracic surgical team. This will not only justify the enormous expense incurred in procuring this costly apparatus but will instill a certain pride of achievement by the medical profession similar to that experienced by Professor P.P. Debono 36 years ago.