REVIEW ARTICLE

The history of cardiac surgery in Sudan: 1959 to 2001.

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Introduction:

The history of cardiac surgery in Sudan dates back to the year 1959 which witnessed the first cardiac surgical operations to be performed in the country. To highlight its milestones this history can be divided into four stages according to the operations being performed. Namely: the era of closed mitral valvotomy (CMV), the era of experimental cardiopulmonary bypass, the era of pioneer open heart surgery, and the era of continuous open cardiac surgical service.

The era of CMV:

In Sudan, rheumatic heart disease (RHD) was diagnosed by the first British doctors who came over. By 1926 it was taught and demonstrated at Khartoum Hospital. The first operations for RHD in Sudan were carried out by Mr. John Jacques, FRCSEd, at Khartoum Hospital between 1959 and 1962.[1] These included:

1. Twenty cases of CMV for mitral stenosis using finger dilatation in 14 and an aortic dilator in 6 cases.
2. One case of aortic dilatation using an aortic dilator under hypothermic circulatory arrest. The patient died 18 hours later.
3. One case of burse-string repair of mitral incompetence. The result was indifferent.

In 1962 John Jacques returned to Britain where he later died of subarachnoid haemorrhage.[1] There was then a period of quiescence up to the year 1964 which witnessed the return of Mr. Ahmed Abdel Aziz Yagoub (A.A. Yagoub) from England after having finished a 3-year training period in cardiothoracic surgery. He resumed doing CMVs, which he had actually started in 1959 with the help of Mr. Jacques, for whom he was a registrar, at first as part of the activities of his general surgical unit in Khartoum Hospital and then as part of the activities of a cardiothoracic unit at El-Shaab Teaching Hospital. His team included Mr. Mirghani Sanhouri who had trained in thoracic surgery in England but used to participate in doing valvotomy.

This continued till the year 1976 when A.A. Yagoub began to think of starting doing open heart operations under cardiopulmonary bypass (CPB). He decided to start with experimental work on animals, such that the team can master the technique before starting to operate on humans.[2]

The era of experimental CPB:

In 1976 A.A. Yagoub contacted Dr. Salah Imbabi, professor of veterinary surgery at the Faculty of Veterinary Medicine of the University of Khartoum, to arrange for the animal experiments. Goats were chosen to work on and the necessary equipment was prepared. Then in February 1977 a cardiac surgeon, Mr. Christopher Lincoln of the Brompton Chest and Heart Hospital in London, was invited to participate in the experiments. Eleven experimental CPBs on goats were done using Sarns pump oxygenator, the first by Mr. Lincoln and the rest by A.A. Yagoub and his team.

Anaesthesia was managed by professor Imbabi. The team then shifted to sheep because they are calmer than goats. Twenty-nine experiments on sheep were done to a total of 40 animal CPBs after which the team was ready to start open heart surgery in humans.[2]

The era of pioneer open heart surgery:

A.A. Yagoub was aiming at logging one hundred cases of open heart operations in humans without any mortality in order to gain the trust of patients and their doctors in the newly introduced technique. He decided to start with congenital heart problems because, in his opinion, they are not usually associated with severe myocardial damage that would increase operative mortality unlike RHD. The plan was to invite an experienced cardiac surgeon from England each winter in order to gain the necessary experience, keeping the unit for the rest of the year busy with CMVs and general thoracic operations.

The first visitor was Mr. Donald Ross (D. Ross) of the National Heart Hospital (NHH) accompanied by Dr Richard Emanuel, a cardiologist. Mr Ross visited the centre twice: The first in February 1980 and the second in January 1981. Nine cases, 5 by D. Ross and 4 by A.A. Yagoub, were done. These included atrial septal defects, pulmonary stenosis, and one case of transposition of the great vessels that was done by D. Ross.[2]

In February 1982 Mr. Magdi Yacoub (M. Yacoub) of the NHH and Harefield Hospital was invited. Ten cases were done including closure of atrial septal defects and pulmonary valvotomies for pulmonary stenosis.[2]

Meanwhile some of the surgeons who were sent to train in cardiac surgery abroad started to come back: Mr. Ibrahim Mustafa (I. Mustafa) in 1980 after 5 years of training in England and Mr. Mohammed Saed El-Fil (M.S. El-Fil) in 1981 after 3 years of training in Ireland. I. Mustafa did his first open heart operations in November 1980 in collaboration with A.A. Yagoub. They comprised atrial septal defect closure using a pericardial patch, and an open mitral valvotomy. He then participated in doing the operations during the second visit of D. Ross and the visit of M. Yacoub.

The work then continued in 2 units with I. Mustafa in one and A.A. Yagoub and M.S. El-Fil in the other till the retirement of A.A. Yagoub from the Ministry of Health in 1983,[3] by which time the number of CMVs he had done reached about one thousand.[2]

The 1984 witnessed a visit which was to have important positive and negative impacts on the centre. That was the visit of a Saudi cardiac surgical team, led by Mr. Hassan Raffa, by a premium from King Fahad through the Saudi Heart Association. During this visit 34 open heart operations were done in one week, 18 by the Saudi team and 16 by I. Mustafa and M.S. El-Fil, including congenital heart operations, open mitral valvotomies, and most importantly valve replacements which were the first to be done in Sudan. These include 2 aortic and 4 mitral valve replacements all with tissue valves. There were three deaths: one intraoperative (aortic valve replacement) and 2 early postoperative (mitral valve replacement and a single atrium). On the negative side the centre lost a significant number of paramedics who were attracted to work in Saudi Arabia following this visit.[3]

Open heart surgery then continued at a slow rate due to the financial constraints. In 1987 a Chinese team was invited. They spent one year in the centre during which 13 open cardiac operations were done comprising pulmonary valvotomies, congenital heart operations, and mitral reconstructions.[3]

The year 1988 witnessed the tragic death of Professor Ibrahim Mustafa. Thereafter M.S. El-Fil continued till his retirement in 1993 mainly doing CMVs and vascular operations with only sporadic cases of open heart operations.[3] The centre collapsed thereafter, and no cardiac surgical services were available in the country till the establishment of Ahmed Gasim Cardiac Centre in 1998.

The era of continuous open cardiac surgical service:

1. Ahmed Gasim Cardiac Centre experience:

Ahmed Gasim Cardiac Centre (AGCC) was opened in January 1998, as the second cardiac centre in Sudan after El-Shaab. Cardiac surgery service was started by a Chinese team comprising surgeons, anaesthetist and perfusionists. The team leader was Dr Xie Jean, professor of cardiac surgery at Beijing University. The first operation to be done was ligation of a patent ductus arteriosus in January 27th 1998. The patient, a 16 years old girl, did well after the operation and was discharged from hospital.[4]

The first valve replacement in the centre, which was also the first mechanical valve replacement in Sudan, was an aortic valve replacement. The patient was a 20 years old man. Again he had an uneventful recovery and was discharged home. The first patient to receive a mechanical mitral valve replacement was a man in his thirties.[4] In 2001 his most recent follow up was 23 months after his operation and was doing very well.

The first Sudanese cardiac surgeon to participate was Mr. Mish'al Ghandour who was on holidays from his work in Saudi Arabia. He assisted Professor Xie in a number of operations.

In July 1998 Professor Xie and his team handed the work over to a Sudanese team lead by Mr. Yassir Hanafi (Y. Hanafi) who was joined a little later by Mr. Abdalla El-Amin (A. El-Amin). Both had finished 3 years of cardiovascular surgery training in Turkey. The first operation they did was a mitral valve replacement. It was done by Y. Hanafi assisted by Mr. Kamal Khogali (K. Khogali), a visiting Sudanese cardiac surgeon from the UK. The first double valve replacement was done by Mr. Abdalla Ashmeg, a visiting Sudanese cardiac surgeon from Saudi Arabia. The patient was a 24-year old man. He did well after his operation, and as of February 2001 was working as an office attendant at the same place where he was a patient one day.[4,5]

Thereafter more of these operations in addition to congenital heart operations were done, at the rate of 3 to 4 operations per week. The total number of operations done as of February 2001 was 303 operations including 127 valve replacements.[4] The cardiac catheterization laboratory was under construction at the time. The plan was that the centre will start performing coronary artery bypass grafting (CABG) once that starts functioning.

2. Sudan Heart Centre Experience:

Sudan Heart Centre was opened in February 2000 as a private cardiothoracic centre owned by the Medical Services of the Sudan Armed Forces in partnership with other investors.[6] The first operations were done by a British team in collaboration with Mr. Ahmed El-Sayed (A. El-Sayed) who was the resident cardiac surgeon bearing the work-load at the time. The centre is credited with being the first, and the only as of April 2001, cardiac centre in Sudan to perform CABG, the first of which was done on April 23rd 2000 by K. Khogali assisted by A. El-Sayed. Operations which were regularly performed in the centre included valve replacements and repairs, CABG,

congenital heart operations, and vascular and general thoracic operations.

In addition, diagnostic and therapeutic cardiac catheterizations were regularly performed. Once more this centre was the first in Sudan to perform percutaneous transluminal coronary angioplasty and percutaneous balloon commissurotomy.[6,7]

As of February 2001, 120 cardiac operations and 600 cardiac catheterizations had been performed in the centre.[6]

In addition to the resident team the centre regularly received visiting teams from other countries that participated in doing the operations and cardiac catheterizations, with the aim of exchanging experience.

Subsequent developments:

The subsequent years witnessed the re-establishment of cardiac surgery at El-Shaab Teaching Hospital and the de-novo establishment of Wad Medani Cardiac Centre in Wad Medani. These are important experiences the details of which need to be studied and documented.

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