UNIVERSITY OF ILORIN

THE TWO HUNDRED AND SIXTEENTH (216TH) INAUGURAL LECTURE

"BATTLING TO KEEP OUR HEARTS: WHO WILL HEAL THE BLEEDING HEART?!"
Innovations in the Practice of Cardiothoracic Surgery

BY

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1.0 Preamble

I stand before you today the 10th of February 2022 in all humility and reference to Almighty God to deliver the **Two Hundred and Sixteenth (216th)** Inaugural Lecture of this great University; the first to be delivered by a Thoracic and Cardiovascular Surgeon, a specialty which is still fledgling in Nigeria. The title - **Battling to Keep Our Hearts: Who Will Heal the Bleeding Heart?! Innovations in the Practice of Cardiothoracic Surgery**; is aimed at providing some insight to the peculiarities of the specialty, enumerate the modest achievements despite several

constraints and motivate our concerted effort in growing the specialty to the benefit of all citizens. May I warn that some of the pictures presented in this lecture may be disturbing, viewer's discretion is therefore advised.

2.0 Introduction

2.1 Scope of Cardiothoracic Surgery (Figure 1): Cardiothoracic Surgery is the aspect of Surgery which involves performing operations on the chest and its contents. The Cardiac aspect involves operations on the heart and the great vessels, while the Thoracic aspect involves operations on the chest wall, the lungs, oesophagus, diaphragm, thymus and other structures or growth in or into the chest. While some countries separate the two components to have Cardiac Surgeons and Thoracic Surgeons some include operations on blood vessels to have Thoracic and Cardiovascular Surgeons. Due to the dearth of Cardiothoracic Surgeons in Nigeria we operate the all-inclusive format hence we practice as **Thoracic and Cardiovascular Surgeons**.

Cardiac Surgery is classified as Open or Closed. Open-Heart Surgery is one that requires incision into the heart thus exposing one or more of its chambers or one that requires the use of the Heart-Lung-Machine (HLM). Further classifications are into congenital versus acquired, and paediatric versus adult. Congenital Cardiac Surgeons operate on congenital defects be-it manifest in childhood or adulthood; similarly Acquired Cardiac Surgeons handle acquired diseases presenting in both age groups. Paediadtric Cardiac Surgeons operate on children irrespective of the condition being congenital or acquired, while Adult Cardiac surgeon operate on both disease entities when they present in adults.

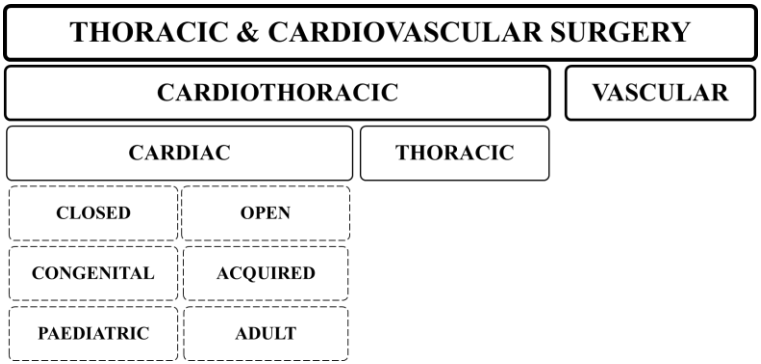


Figure 1: Scope of Cardiothoracic Surgery

2.2 History of Cardiothoracic Surgery

2.2.1 World history: In *Genesis 2:21*, it is written: "And the Lord God caused a deep sleep to fall upon Adam, and he slept: and he took one of his ribs, and closed up the flesh instead thereof" It sounds logical to conclude that God himself started Cardiothoracic Surgery.

Not surprising, early surgeons were extremely cautious and reluctant at 'playing God'. The German Physician, Geologist and Naturalist, Ernest Dieffenbach proclaimed that every Surgeon must stop at the pleura (the sheath covering the lungs)[1]. In 1882, H.M. Block from Poland defied this rule and performed thoracotomy (surgical opening into the chest) to remove the lung of a young female relative of his suspected of having bilateral pulmonary tuberculosis. She died during the operation and a public inquiry was set up on him. He committed suicide few days after the operation[1]. This led to reinforcement of Dieffenbach's declaration. But, nine years later (1891) the French surgeon Theodore Tuffier performed the first successful partial lung resection while the first successful total lung resection (pneumonectomy) was performed by Rudolf Nissen in 1932[1]. The first total oesophagectomy (removal of the entire oesophagus) was performed by Franz Torek in 1913[1].

Performing operation on the heart was even of a greater challenge. Theodore Billroth, another German, in 1881 said "Any surgeon who would attempt operation on the heart should lose the respect of his colleagues" while Sir Stephen Paget said "Surgery of the heart has probably reached the limits set by nature to all surgery; no new method, and no new discovery, can overcome the natural difficulties that attend a wound of the heart"[1,2,3]. In his distinguished guest address to the 88th Annual Meeting of the American Association for Thoracic Surgery (AATS) at San Diego, California in 2008, Marko Turina from University of Zurich, Switzerland said "… the birth of Cardiac Surgery depended on the emergence of courageous, creative pioneers who were willing to apply their experimentally acquired knowledge to clinical practice"[2]. His statement was absolutely true for it was share courage that made German Surgeon, Ludwig Rehn to venture into repairing a stab wound into the right ventricle successfully on the 9th of September 1896 despite such firm statements against it by great surgeons of the time[1,2]. Though some historians credit a black American surgeon, Dr. Daniel Hale Williams as having successfully performed similar operation 3 years earlier[3.4], the credit was awarded to Rehn. Hence, Rehn can be said to have 'bell the cat' in the "*battle to keep our hearts"*.

2.2.2 West Africa: In the West African sub-region, the first batch of Cardiothoracic Surgeons returned with great enthusiasm and vigor to confront the "*battle mitigating against keeping our hearts"* having been trained either in Europe or America. All of them performed general thoracic and closed cardiac surgical procedures. The "*major battle"* was in establishing open heart surgery.

The pioneering work of Dr. Charles Easmon at Korle-Bu Teaching Hospital, Ghana must be acknowledged. He performed two open heart surgeries under hypothermia in the early 60s though one of the patients died intra operatively[2,3].

Subsequently, Prof. K. Frimpong-Boateng established the National Cardiothoracic Center at Korle-Bu Teaching Hospital and performed the first Open-Heart Surgery, a mitral valve replacement on January 29, 1992[2,3]. The center has since become a training hub in the sub-region and accredited by the West African College of Surgeons (WACS).

Similar efforts were being implemented by the pioneers in Ivory Coast, Senegal, Cameroon, Mauritania and Guinea mainly through foreign support.

2.2.3 Nigeria: In Nigeria, the first batch of cardiothoracic Surgeons concentrated at University College Hospital (UCH), Ibadan being the only Teaching Hospital then, established in November 1952. Prof. Fabian Udekwu was joined by Prof. Isaac Grillo. The former moved to University of Nigeria Teaching Hospital (UNTH) Enugu, when it was established in 1970 where, in January 1974 the first Open-Heart Surgery in Nigeria was performed by his team assisted by Sir Magdi Yacoub from United Kingdom[3]. Meanwhile the UCH team kept working and with a lot of enthusiasm infused by arrival of Prof. Adebonojo; the first Open-Heart Surgery by a completely local team was performed on December 19, 1978[3]. However, these programs were not sustained. Frustrated, most of the surgeons returned to foreign countries and no new batch of surgeon were trained hence there was a huge gap. It seemed the "*battle to keep our hearts"* was being lost! With no Government scholarships and no structured training program, it took genuine interest to train in the specialty.

2.2.4 University of Ilorin/University of Ilorin Teaching Hospital (UITH): The Division started soon after the establishment of the UITH in 1978 and was pioneered by Prof. Ezekiel Odelowo and Dr. L.O. Giwa. Dr. Giwa relocated to the United States of America soon afterwards. Limited by unavailability of facilities and manpower, services were restricted mainly to thoracic surgery.

On completion of my training, I join the unit in July 2006 and Prof. Odelowo retired 3 months later. The lot to continue the "*battle at keeping our hearts"* therefore fell on me and I have to be at the warfront always battle ready. I had to leave for UI/UCH two years later as human nature is meant to explore and break new ground. But I returned by September 2011 and joined Dr. Ofoegbu in running of the unit until late in the year 2013 when he returned to South Africa leaving me to continue as a lone soldier again with several wars on multiple fronts in the "*battle to keep our heart"* safe and healthy. The Vice Chancellor sir, it was pertinent that I provided this historical background in order to:

1. Acknowledge the immense contribution and hard work of the pioneers at the various levels.
2. Underscore the huge task in establishing and sustaining Thoracic and Cardiovascular Surgical practice.
3. Identify that several Cardiothoracic Surgeons in the West African sub-region were frustrated out of the system and forced to return to foreign lands despite grossly inadequate numbers of specialists in the field.

3.0 How it all began

My interest to study medicine was motivated by my late father Dr. Philip Oyeleke Adeoye, of blessed memory whilst I was a pupil at St. Joseph's Nursery and Primary School, Ilorin. His meticulousness and time consciousness in general coupled with gentleness in attending to his patients endeared me to the profession. My dear and extremely loving mother, Late Mrs. Comfort Jolade Adeoye, an accomplished and dedicated nurse, having seen her husband go through the stress of medical school was hesitant in supporting my interest.

All through my secondary school days at Government High School, Ilorin, I maintained that consciousness and it was all joy gaining admission into the School of Basic Studies

(SBS) of Ahmadu Bello University, Zaria in 1985 and subsequently into Faculty of Medicine a year later.

My interest in surgery as a specialty was spontaneous and started from my pre-clinical years. As much as I wished to have my elective positing as a final year medical student in a surgical department, the institution where I performed the posting, Hospital General Gregorio Marañon, Madrid, Spain marched me into Internal Medicine under the supervision of Dr. Juan Garay (currently working in Cuba for the WHO). However, because of my keen interest in Surgery, I spent my free periods in the operating theatre either observing or assisting in operations. My internship here at the UITH and National Youth Corp Service year were spent mostly studying for the Primary examination of the West African College of Surgeon (WACS) which I passed on first attempt as I was concluding the service year in 1993.

Within my first year of residency also here at UITH, my focus for sub-specialization changed swiftly from Neurosurgery to Cardiothoracic Surgery. On the advice of my mentors Prof. Ezekiel Odelowo, Prof. Oluwole Adebo (late) and Prof. Adeyemo (late), I had to complete my Fellowship in General Surgery (obtained in October 2001) before embarking on Cardiothoracic Surgery post-fellowship sub-specialization. My 4-year sojourn into Cardiothoracic Surgery took me through UCH – Ibadan, UNTH – Enugu and a 3-year period at the Christiaan Barnard Division of Cardiothoracic Surgery, Groote Schcuur Hospital, University of Cape Town, South Africa where the first successful human-to-human heart transplantation in the world was done and the division is named after the lead surgeon of the team that performed the procedure.

Therefore, in July 2006, I returned to my home base, UITH despite other offers because of four major reasons.

1. To honour my promise to return.

2. The desire to contribute to the development of the specialty in UITH and in Nigeria.
3. Commitment to apply my skills for the benefit of members of our community.
4. To encourage and train residents who wish to sub specialize in the field hoping they would not go through the difficult and tortuous route I experienced.

4.0 My contributions to Cardiothoracic Surgery

Mr. Vice Chancellor sir, on the backdrop of the history I presented above and particularly as it relates to University of Ilorin and UITH my contributions centered on jumpstarting an obviously essential specialty yet which was bereft of equipment and of manpower. "*The battle at keeping our hearts*" therefore fell squarely on my shoulders!

4.1 Thoracic surgery

4.1.1 Pioneering and subsequent routine conduct of Computerized Tomography (CT) scan guided Percutaneous Trans Thoracic lung biopsy (PTTLB): Various pathologic conditions may affect the lung ranging from inflammatory/infective process to neoplastic conditions either benign or malignant of which the later may be primarily from the lung or metastatic from other parts or organs of the body. A vital diagnostic investigation is to obtain tissue from the lung lesion for histologic examination in order to confirm which of the aetiological factors is responsible. The procedure of PTTLB is a minimal access technique which obviates the need for an open surgery. It can be quite tricky aiming at the lesion within the lung in view of presence of other vital structures in the chest and risk of causing air leak and bleeding from the lung substance. Performing the procedure under CT scan guidance permits the lesion to be targeted precisely while limiting the chances of complications mentioned. The first at the UCH, Ibadan (which happened to

be the first reported in Nigeria) was performed by me in 2011 on a 51-year-old lady which confirmed metastasis from a previously treated breast cancer[5]. In August 2012, the first of its kind at UITH was performed on a 75-year-old man which confirmed primary lung carcinoma. Thereafter, this procedure has become routine.

4.1.2 Novel air way management for lung resection in paediatric age group: A particularly strange occurrence of aspiration of a 4-inches nail by a 9-year-old boy which had occurred over a year before referral to me necessitated this innovation[6]. His parents were assured the nail had been extracted mystically by a traditional healer who attended to him when the incident occurred. Unfortunately, mere removal via bronchoscopy would not treat him as secondary infection and suppuration had damaged the entire right lung where the nail was lodged and pneumonectomy (removal of the entire lung) had to be performed[6]. An important advancement in anaesthetic technique for lung resection is the development of double lumen endotracheal tube which permits isolation and targeted ventilation of the good lung thus preventing it from soil-age while the diseased one is being removed. This tube is bigger than the usual single lumen tube used during other routine surgical procedures making it difficult to find appropriate size for use in children. Our innovation was to use a single lumen tube in the trachea to ventilate the normal lung while passing a nasogastric tube into the diseased lung which was placed under continuous suctioning throughout the procedure in order to prevent tracking of purulent material into the normal lung[6].

4.1.3 Ambulatory-home drainage management for patients with chronic pleural effusion (PE) and empyema: In 2008, our review of 217 cases of PE who had chest x-ray evaluation over a 6.5-year period revealed that chronic inflammation (32.5%), cardiac failure (18.1%) and pyogenic infection (15.1%) accounted for the top three causes[7].

Tuberculosis accounted for 94% of chronic inflammatory causes and 30.6% of all 217 cases reviewed. We revisited this condition in 2017 and the top three causes were tuberculosis (71%), malignancy (62%) and pneumonia (32%)[8]. Hence, while chronic inflammation and pyogenic infection maintained their rankings, malignancy had replaced cardiac failure which moved down to fifth position (1.4%). This may reflect increased prevalence or increase detection of malignant conditions in our society.

Ninety-two percent of the patients in the later study had Closed Thoracostomy Tube Drainage (CTTD) as part of their treatment. This is the most common treatment aimed at letting out the accumulated pleural fluid. Several of the patients may need to stay prolonged period on admission as long as fluid drainage persists thus putting significant pressure on hospital bed space. We therefore innovated a simple and cheap method for outpatient tube drainage system in 2009 using Foley's urethral catheter and a valved-type-urine bag[9]. Of the 8 patients enrolled on the pilot study, 4 (50%) were weaned off the drainage system between 3 and 15 weeks. Three of them died at 13, 16 and 32 weeks from underlying disease condition while one patient was 26 weeks on the system when the publication was made. This innovation is now routine and has freed bed spaces significantly in our hospital while permitting patient to return to gainful employment or at least be in their home environment.

4.1.4 Development of protocol for management of Thoracic Endometriosis Syndrome (TES): Endometriosis is primarily a gynaecological problem common to women in the child-bearing age in which endometrial tissue is present in other sites outside the uterus. They accounted for 1.3% of all gynaecological admissions and 0.6% of new cases presenting at the gynaecology clinic of UITH[10]. So, what has Cardiothoracic Surgery got to do with this condition?! We, in the endometriosis study group of UITH identified some

differences in our cohort of patients compared to reports in world literature[10,11].

i. Chest involvement was the most common extra-pelvic domain accounting for 72.7% as against gastrointestinal site reported to top at 32.3%. The presence of endometrial tissue in the chest, referred to as Thoracic Endometriosis Syndrome (TES) automatically called for my service.
ii. Relatively younger age group of those presenting with TES with mean of 28 years versus 35 years in the literature.
iii. Catamenial pleural effusion (CPE) was most common manifestation of TES (75%) as against Catamenial chest pain (80-90%) and pneumothorax (73%) reported in literature.

An important treatment policy deduced from this study was the high failure rate (40-60%) of chemical pleurodesis (process of obliteration of the pleural space) in patients with CPE[11]. Thus, we recommended surgical option of pleurectomy as first-line treatment option. This obtained reckoning amongst attendees at the 2017 South African Thoracic Society Conference at Cape Town where it was presented.

4.1.5 Reactivation and routine performance of Trans-Hiatal Oesophagectomy (THE) in UITH: In 1997, a 15-year-old boy had accidentally ingested an acid which burnt the lower two-thirds of his oesophagus. The resultant scarring occluded its lumen making it impossible for him to swallow. I assisted my mentor (Prof. Odelowo) in the surgery which involved removing his entire oesophagus (oesophagectomy) and reconstructing another food pipe using a portion of the colon (large intestine) which was transferred into his chest[12]. This procedure lasted over 10 hours and entailed a

thoracotomy (opening into the chest) as well as a laparotomy (opening into the abdominal cavity).

Alternatives to colonic interposition for replacement of resected oesophagus are the jejunum and the stomach and several techniques exists in conducting the resection. In the late 1990s, Orringer popularized Trans-Hiatal Esophagectomy (THE) and Cervical Esophago-Gastric Anastomosis (CEGA)[13]. In this procedure, the oesophagus is removed by opening the abdominal cavity and exploring the neck and insinuating the hand through the opening in the diaphragm. The advantages of this procedure include:

i. Avoiding a thoracotomy which carries higher morbidity.
ii. Only one anastomosis is required (that between the stomach and oesophageal stump) compared to three when colon or jejunum is used with each carrying a risk for leakage.
iii. Anastomosis is performed in the neck which makes any leak easily detectable and managed.
iv. Operating time is shorter especially when two sets of surgeons perform the procedure simultaneously.

The first of this in UITH was performed in the 70s by Dr. Giwa but was reactivated by me in 2006 on a middle-aged man with oesophageal cancer. Unfortunately, he died 2 days postoperative. Over a 9-year period between 2010 and 2019, we performed 22 oesophageal resections out of which THE + CEGA was utilized in 68.2%[14]. Most (77.3%) of the resections were for benign conditions with corrosive strictures accounting for 31.8% and end-stage achalasia for 22.7% being the highest aetiologies. Primary oesophageal tumour was seen in 18.2% of resected cases. By this, we reduced our operating time for oesophageal resection and replacement to 4

to 5 hours. Thirty-day mortality rate was 9.1% in 2 patients who had pulmonary complications[14].

4.1.6 Routine pulmonary resections: Inflammatory conditions especially those secondary to pulmonary tuberculosis are responsible for majority of lung resections performed in developing countries in contrast to the developed nations where primary lung cancer (PLC) is the predominant indication. Lung resection for inflammatory condition is usually more challenging than when performed for lung cancers. This is because inflammation causes a lot of adhesions between the lung and the chest wall and also distorts the anatomy of structures at the lung hilum (connection to the trachea). Thus, mobilizing the lung presents a horrendous challenge with attendant increase in blood loss and higher risk of injury to major blood vessels at the hilum, hence morbidity and mortality are higher.

The question is, why are we not performing lung resection for PLC?

i. The incidence of PLC is lower amongst native Africans.
ii. Most of our patients present their case very late, when the disease is already advanced and precludes surgical resection.

The 2018 estimates by GLOBOCAN indicate that PLC is the most frequent cancer worldwide accounting for 11.6% of 18.1 million new cases for the year[15]. As shown in Figure 2, the Age-Standardized Rate (ASR) by sex shows Africa and particularly West Africa as having the lowest incidence for PLC. In Nigeria, PLC stand at a distant 13th accounting for 1.2%[16]. Worldwide, the more common varieties are adenocarcinoma, squamous cell carcinoma, small cell lung cancer, and large cell lung cancer in that order. In our presentation from UCH to the American Society of Clinical Oncology (ASCO) annual meeting in 2010, we

reported 18 cases seen over one-year period and about 55% had squamous cell type[17]. In most African series, squamous cell carcinoma still predominates as it was in Europe and America prior to the 1990s. Adenocarcinoma is more prevalent among Caucasian but this variety is also on the increase amongst native Africans. The startling revelation from the cohort reviewed was that 79% were non-smokers; neither active nor passive[17]. Our recent publication from UITH on 71 cases of PLC managed between 2012 and 2020 confirmed the change in trend of histologic type towards western pattern with adenocarcinoma accounting for about 55% and squamous cell carcinoma about 32%[18]. We attributed this to increase in cigarette smoking and change in cigarette designs. A cigarette smoking prevalence of 42.3% amongst the patients, all being males emphasize the deleterious role of the habit. However, the high percentage of 58% in this study[18] and 79% in the earlier study[17] being non-smokers have thrown a challenge to us to investigate other possible etiologic factors for PLC in our environment outside the well documented risk factor of cigarette smoking. We should evaluate environmental carcinogens, occupational risks, dietary factors, genetic predisposition and role of diseases like chronic obstructive pulmonary disease (COPD). The UITH review showed that about 83% of PLC cases presented with advanced disease (Stages III and IV)[18].

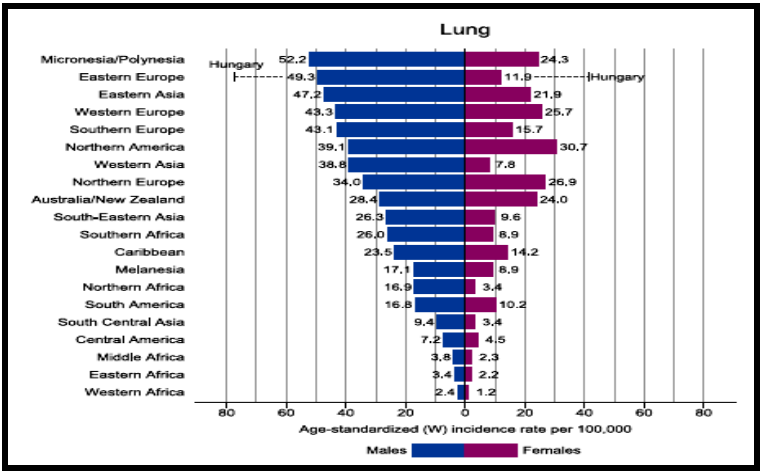


Figure 2: Bar chart of Region-Specific Incidence Age-Standardized Rate by Sex for Cancer of the Lung in 2018. Rate are shown in descending order of world (W) age-standardized rate among men, and the highest national rates among men and women are superimposed. Source: GLOBOCAN 2018.

4.1.7 Complex chest wall resection: We documented the first reported case of solitary osteochondroma of the scapula in Nigeria in an 8-year-old girl who was operated in 2006[19]. Ninety-percent of osteochondromas occur in long bones and often associated with hereditary multiple exostosis. Our presentation at the 2012 conference of the Nigerian Thoracic Society (NTS) on a 10-year review of rib resections indicated that the top three indications for rib resection were primary neoplastic disease, chronic osteomyelitis and rib harvest for ear or mandibular reconstruction[20]. However, just as mentioned above concerning other cancers, most patients with chest wall cancers also present late often after visiting and spending huge amounts of money at traditional and religious homes. At this time, little other than supportive care can be offered as the tumour has reached gargantuan dimensions.

Patient presented in Figures 3 through 5 succumbed some months after extensive chest wall resection and reconstruction performed in conjunction with Plastic and Reconstructive Surgeon due to tumor recurrence at other sites in his body. The histology confirmed malignant peripheral nerve sheath tumour.

Clinical picture of patient prior to operation.

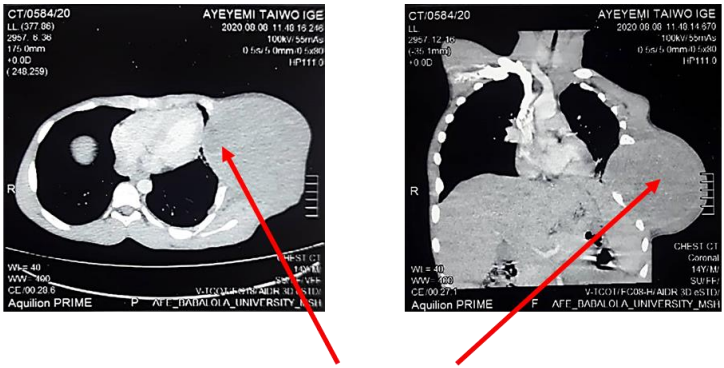


Figure 4: Axial and coronal section view of patient's computerized tomography scan of the chest.

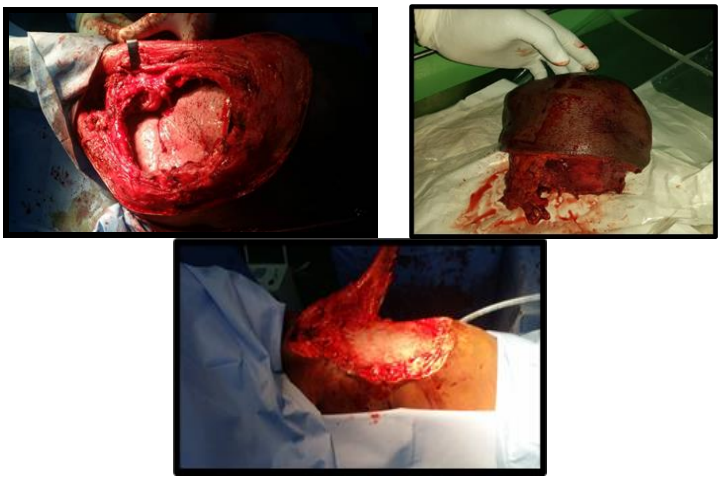


Figure 5: a) Chest wall defect following resection. b) The resected tumour c) Plastic reconstruction of chest wall defect.

4.1.8 Other collaborative surgery: As surgeons, regular collaboration exists between specialties in order to ensure holistic management of patients. By this, our patients are provided the best circumstances for favourable outcome from surgical interventions. Some of my collaborations involved General Surgeons, Plastic and Reconstructive Surgeons, Otorhinolaryngologists and Gynaecologists. Land mark collaborations included:

1. First re-implantation of amputated hand in UITH performed in conjunction with Orthopaedic and Plastic and Reconstructive Surgeons[21].
2. On the 5th of January 2021 in an extensive multidisciplinary approach led by the Paediatric Surgeons, we performed the first successful separation of conjoined twins in UITH on a set joined at the chest and abdomen (Figure 6).


Figure 6: a) The conjoined twins b) Post separation carried by parents.

4.2 Vascular Surgery

4.2.1 Vascular trauma: Trauma accounted for 73.3% of surgical procedures performed on peripheral blood vessels at UITH between 2006 and 2008[22]. Modernization with increase in motor vehicular crashes and civil conflicts were obvious culprits. The primary aim of ensuring prompt and effective vascular repair is to prevent amputation of the limb and this is of great implication as majority (72.7%) of those with traumatic aetiology were males and within the active, working age group of 20 to 39 years. The duo constitutes the 'bread-winner' combination. Our limb salvage rate was 85.7% among all patients operated and 77.8% amongst trauma victims. Extensive crushing injury and delayed surgical intervention usually due to delayed presentation are common causes of failed revascularization. Our review of 60 cases of purely traumatic aetiology operated at UCH over an 8-year period (2003 – 2011) was in consonant with the study from UITH[23]. Eighty-five percent were males and 51.6% between 20-39 years of age. The limb salvage rate was 90%. Delayed presentation (beyond 4 hours) was seen in 58.3% of patients and most had presented initially at a peripheral hospital. Stabs and gunshot combined accounted for 66.7%, most occurring from armed robbery attack or civilian violence.

4.2.2 Degenerative vascular disease: True aneurysm tend to occur in older age group and the lower life expectancy in our society may account for fewer cases we see. It is however

worth the warning against misdiagnosis of such aneurysm for lesions like abscesses or tumours as an incision into it would cause horrendous bleeding which may be fatal. This caution was emphasized in one of the patients who had sequential bilateral femoral aneurysm. An attempt at biopsy of the right-side lesion mistaken for a tumour caused catastrophic bleeding. The lesion on the left was eventually repaired successfully years later with prosthetic (artificial) vascular graft utilized in re-establishing vascular continuity after excision of the aneurysm[24]. (Figures 7 and 8).

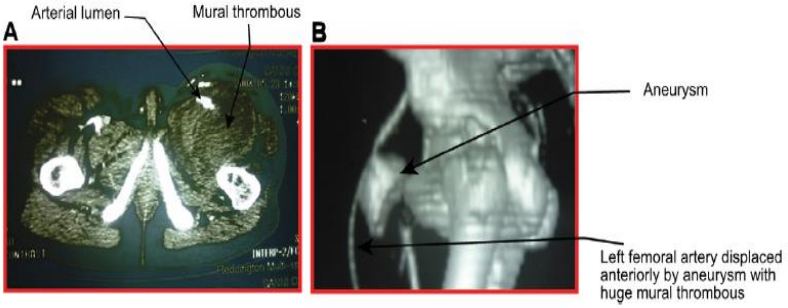


Figure 7: Computerized tomography scan of left femoral artery aneurysm. a) Axial cut. b) 3-D reconstruction.

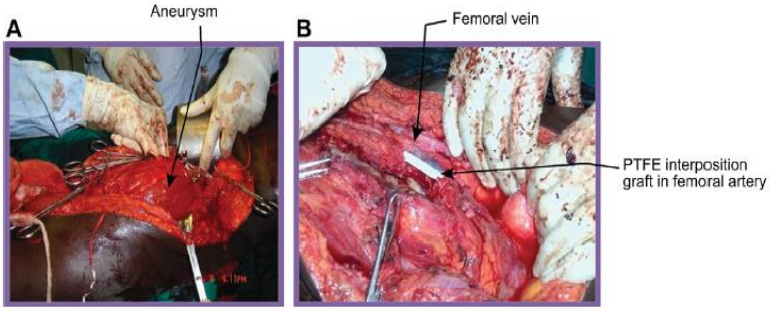


Figure 8: Intraoperative pictures of femoral artery aneurysmorrhaphy. a) Aneurysm mobilized. b) Aneurysm resected and artificial vascular graft interposed for repair and establishment of blood flow.

An important step when operating on vessels is to dislodge and remove blood clots that may have formed within its lumen (called embolectomy) otherwise, when blood flow is restored, the clots are pushed further peripherally where it occludes the lumen and cause a gangrene of the supplied limb or digit. Because the device used for this (the Forgathy embolectomy catheter) is not readily available, our innovation was to use small gauge (6 or 8Fr) Foley's catheter combined with irrigation of the lumen with dilute heparin solution (5,000 I.U. in 50mls of saline) through a size 5Fr feeding tube[22].

4.2.3 Vascular tumours: Tumours of blood vessels are rare. Those with congenital aetiology are found in younger age group like the cavernous haemagioma excised in the 12-year-old boy[22]. Acquired lesion like a chemodectoma presenting in the carotid artery (the artery which supplies the head and neck) of a 28-year-old lady which was successfully excised without any neurological deficit are rearer[25]. (Figure 9). The critical aspect in resecting this tumour is to be able to preserve blood supply to the brain. It may interest you to know that she attributed this lesion to a trauma to the neck.

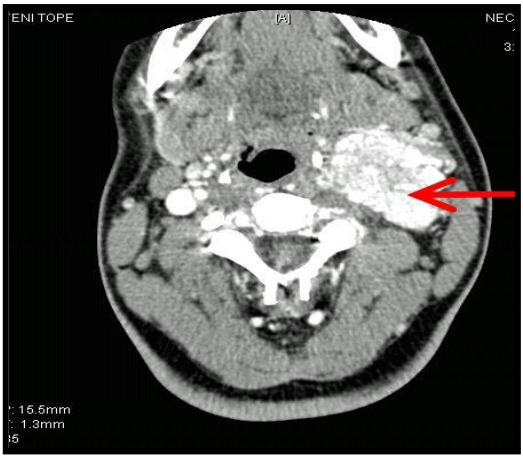


Figure 9: Axial cut of computerized tomography scan with angiography of head and neck demonstrating left carotid artery chemodectoma.

4.3 Cardiac Surgery

In order to assess the magnitude of cardiac conditions and possible need for cardiac surgery in UITH, my colleagues in cardiology (with whom I work intimately) and I audited the results of echocardiography between May 2004 and April 2007[26]. Echocardiography is a major non-invasive cardiac examination which provides morphologic and haemodynamic information and often provides a guide in the management of patients with cardiovascular diseases. Out of 913 patients scanned, 105 were normal studies. Figure 10 shows the percentage distribution of the remaining 808 patients. Though hypertensive heart disease (HHD) accounted for vast majority (66.5%), with congenital (CHD) and rheumatic (RHD) heart diseases accounting for distant second and third with 8.3% and 7.9% respectively, all diseases with potential need for surgical intervention accounted for a significant 20.9%. A critical appraisal of patients with CHD revealed that

ventricular septal defect (VSD) was the most common (27.6%) followed by atrial septal defect (ASD) – 21.1%, persistent ductus arteriosus (PDA) – 13.1% and tetralogy of Fallot (TOF) – 11.8%[27]; all of which would require cardiac surgical intervention. We also evaluated patients who presented with RHD being the most common acquired structural disease amongst our patients. Mitral valve disease occurred in 75% of patients while aortic, tricuspid and pulmonary valve diseases accounted for 40%, 4.6% and 4.6% respectively[28]. Only one of the patients was able to access definitive surgical treatment at that time. We therefore emphasized the urgent need to establish open heart surgical centers in Nigeria. Our recommendation was further strengthened by the finding of 12.5% in 291 children admitted with heart failure at the emergency paediatric unit of UITH between 2013 and 2015 being due to cardiac conditions (8.3% - congenital, 3.8% - acquired)[29]. When surgical correction is not conducted promptly, affected patients tend to have recurrent episodes of cardiac failure necessitating frequent hospital admissions and eventually death. Vice Chancellor sir, ladies and gentlemen, it was quite apparent to us that here lies the hottest in the warfront of the "*battle to keep our hearts"*.

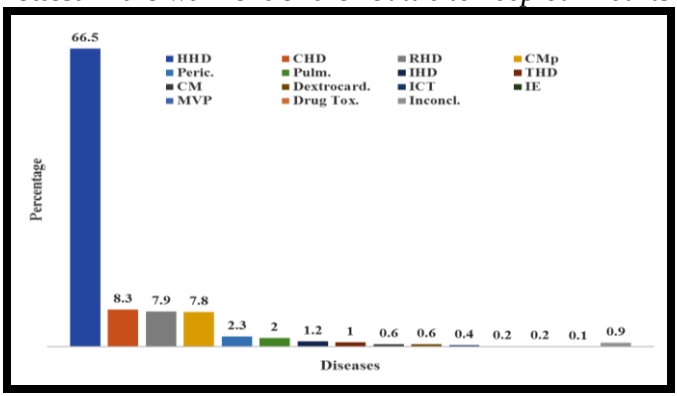


Figure 10: Echocardiographic diagnosis in 808 patients.

Key: HHD-Hypertensive Heart Disease, CHD-Congenital Heart Disease, RHD-Rheumatic Heart Disease, CMp-Cardiomyopathy, Peric.-Pericardial disease, Pul.-Pulmonary disease, IHD-Ischaemic Heart Disease, THD.-Thyrotoxic Heart Disease, CM-Cardiac masses, Dextrocard.-Dextrocardia, ICT-Intracardiac thrombus, IE-Infective endocarditis, MVP-Mitral valve prolapse, Drug Tox.-Drug toxicity, Inconcl.-Inconclusive study.

A multi-authored international collaborative study coordinated in Cape Town in which I participated assessed the global unmet needs in cardiac surgery based on epidemiological transition in cardiac conditions with socio-economic parameters of 16 countries including Nigeria[30]. They were categorized low income (LIC [1]), lower middle income (LMIC [4]) – in which Nigeria belonged with India, Morocco and Tunisia, upper middle income (UMIC [8]) and high income (HIC [3]) countries. The disease profile transition was from RHD in the LIC to degenerative and life-style diseases in the HIC. The MICs being in transitional phase of industrialization and urbanization still experience significant burden of RHD which manifests commonly in adolescents and adults while also encountering degenerative and lifestyle diseases of the elderly. Because the global burden of CHD is said to be constant this is inclusive in the mix of our burden. Our local studies above seem to correlate with this position.

4.3.1 Closed Cardiac Surgery

Surgery for Persistent Ductus Arteriosus (PDA): Ligation of PDA was performed last in UITH in the 70s. This procedure was reactivated by me in 2006 when it was performed on a 22-year-old lady[31]. Since then, the procedure has become routine. Though in advanced countries there is a trend towards transcatheter device closure or closure via Video Assisted Thoracoscopic Surgery (VATS), open ligation

via thoracotomy still suffices in our setting. Up till year 2020, a total of 26 cases were performed in UITH of which 65.4% were females and median age was 1year. Mean weight and intraoperative duct diameter were 7.8Kg (range 3.9 – 20), and 8.3mm±4.47SD respectively. We recorded 1 (3.8%) mortality[32]. When study period was divided into 3 phases, the trend showed progressive increase in number of cases operated with 19.2% (2006 – 2010), 34.6% (2011 – 2015) and 46.2% (2016 – 2020) as shown in Figure 11.

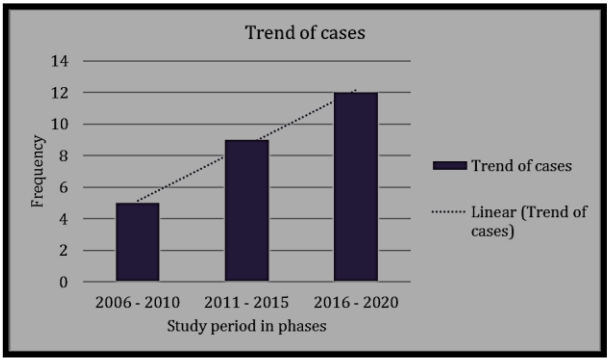


Figure 11: Trend of PDA ligations performed in UITH.

Surgery on the Pericardium: Pericardial (the sheath which covers the heart) diseases are quite frequent resulting from fluid accumulation in the pericardial cavity (pericardial effusion) due to various aetiologic factors and also thickening and stiffening of the pericardium (constrictive pericarditis). Tuberculosis is the commonest aetiologic factor in our environment and often results in petrification of the pericardium. The heart is therefore encaged resulting in impaired filling (prevents blood from returning into the heart from the body). Treatment for pericardial effusion is to drain it either surgically or by other means while striping of the pericardium is done for constrictive pericarditis. A special category of patients are those presenting concurrently with

effusion and constriction which is termed effusive-constrictive pericarditis. This presents a treatment challenge because mare drainage of the fluid does not relieve the impaired filling of the heart and striping the heart of the fibrinous exudate coating the visceral pericardium at this stage is almost impossible because a distinct epicardial peel layer is yet to form. Non pliable nature of the pericardium also means the two layers will not get apposed hence rapid re-accumulation of effusion occurs. This syndrome accounted for 11 out of 86 patients (13%) who had pericardial diseases over a 7-year period at UCH. We formulated a management algorithm to assist on deciding which patients should to be subjected to pericardiectomy after relieve of effusion and the appropriate timing for the surgery[33] (Figure 12). Figure 13a shows plain chest x-ray of globular cardiac enlargement indicating pericardial effusion. Figure 13b is chest x-ray of the same patient following drainage of the effusion showing calcification along pericardial lining indicating constrictive pericarditis. Figure 14a shows the huge pericardial cavity and thick fibrotic layer on visceral pericardium after opening the parietal layer. Figure 14b shows striping of the visceral pericardium in process.

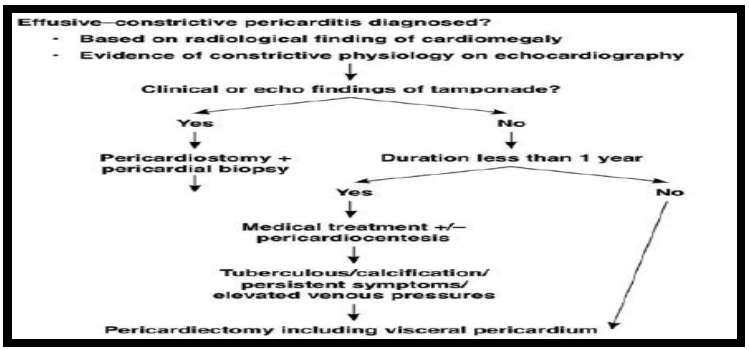


Figure 12: Management algorithm developed for management of effusive-constrictive pericarditis.

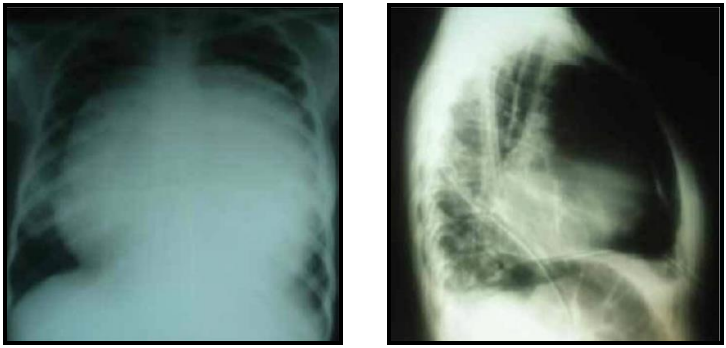


Figure 13: Plain chest radiograph of patient with effusive-constrictive pericarditis. a) Anteroposterior view showing globular enlargement of cardiac silhouette. b) Lateral view with pericardiostomy tube in-situ and calcification of anterior pericardium.

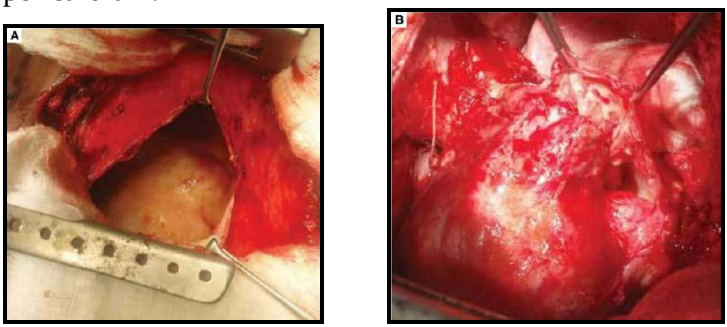


Figure 14: Intraoperative picture for pericardiectomy a) Parietal pericardium open and revealing large pericardial cavity. b) Parietal pericardium being stripped off.

We also found that patients with HIV present with distinct characteristic of pericardial effusion when compared to non-HIV patients. Firstly, they presented at a younger age (mean = 30 years compared to 53 years in non-HIV patents) [p=0.05]. Secondly, they had higher tendency to accumulate large (>2cm on echocardiography) effusion (80% of patients, p=0.01) while non-HIV patients have higher tendency for

small (<2cm on echocardiography) effusion (61.5% of patients, p=0.05)[34].

Cardiac rhythm abnormalities: Cardiac rhythm abnormalities are common causes of cardiac arrest and are being diagnosed increasingly in Nigeria. The normal heart rate varies between 60 to 100 per minute. Of 50 patients with bradyarrhythmias (slow heart rate) we treated with permanent pace maker implantation at UCH, 78% were due to complete heart block (HB), 10% due to second degree HB, 8% due to sick sinus syndrome and 4% had trifasicular block[35]. Majority (60%) were 65 years and above which made us suspect myocardial sclerosis as the main aetiologic factor. Only one patient had definite aetiologic association to chronic chloroquine therapy. The most common symptomatology was syncopal attack (36.2%). Others were dyspnoea (34.5%), dizziness (15.5%), chest pain (6.9%), palpitation (5.2%) and cough (1.7%). The commonest associated co-morbidity was hypertension which was present alone in 30% of patients and in combination with diabetes mellitus in another 5%. We performed the contemporary transvenous approach of implantation in 84% of patients and epicardial approach in 16%. We recorded morbidity rate of 8% and mortality rate (due to co-morbidity not directly related to procedure) of 4%. I succeeded in performing the first of such procedure here at UITH in 2010 and thereafter it became a routine.

Cardiac trauma: The heart may also be involved in direct traumatic events and this could happen in two major ways; blunt or penetrating trauma, and common effects of trauma include myocardial rupture, contusion, laceration, arrhythmias and conduction abnormalities. I performed the first repair of a stab into the heart in UITH in 2014.

4.3.2 Open Cardiac Surgery

As indicated earlier, this is where the "*battle to keep our hearts*" has been toughest. Immediately I returned to

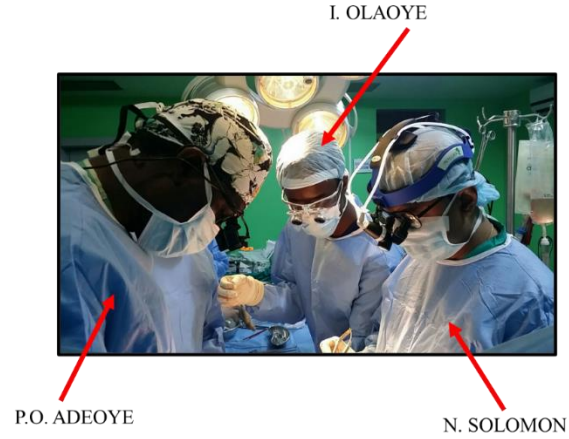
Nigeria in 2006, I activated the process in trying to commence open heart surgery in UITH and tried to secure a World Heart Federation sponsored "Twining Program" which would have twinned us with Groote Schuur Hospital to facilitate development of the program. The mandates were for manpower and facility development. Unfortunately, this did not materialize. Subsequently, I left for UI/UCH in 2008 where there was a need for re-activation of open-heart surgery. I immediately channeled my energy in that direction. About that time, Mr. Bode Falase (FRCS) from LASUTH, Dr. Uvie Onakpoya from OAUTHC and I, all with similar burden and focus decided to join forces in "*engaging the battle"* and formed the Association for Advancement of Cardiovascular Surgery and Medicine (AACVSM) with the objective of motivating and commencing open heart surgery and interventional cardiology in as many centers in Nigeria as possible. I was the first president of the association which metamorphosed to the Association of Cardiovascular and Thoracic Surgeon of Nigeria (ACTSON) in 2018 of which I am on the Board of Trustees.

We developed "*battle strategies"* to promote open heart surgeries at our various institutions which would permit adequate service for members of our communities to "*keep their hearts"* in optimal function even when it seems unattainable due to structural diseases. It gladdens my heart that our effort is yielding the desired impact in institutions like Babcock University Teaching Hospital, LASUTH, OAUTHC, First Cardiology Consultants in Lagos and of recent in UDUTH, Sokoto.

At UCH our efforts under leadership of Prof. V.O. Adegboye yielded positive results with the construction and equipping of a cardiac centre consisting a dedicated cardiac theatre, cardiac catheterization laboratory and 3-bedded ICU (all of international standard), and purchase of 64-slice CT scanner. These were commissioned in 2011 just before I got

employed by University of Ilorin and returned to UITH. Open heart surgery thus got reactivated at UCH in 2012.

I reengaged the "*battle*" in UITH and in 2013 a proposal to the then CMD, Prof. A.W.O. Olatinwo was approved and he set up a task force headed by Prof. O.T. Adedoyin. We established a collaboration with the Apollo Hospital, Chennai, India and in July 2015, we performed the first open heart surgery in UITH[36] (Figures 15 and 16). A total of 16 procedures have been performed in 9 patients since then with one perioperative mortality (Table 1 and Figure 17). VSD closure accounted for the highest (31.3%), ASD closure, pulmonary valvotomy, PDA closure and resection of right ventricular outflow tract (RVOT) accounted for 12.5% each while TOF repair, Patent Foramen Ovale (PFO) closure and pulmonary supra-annular patch accounted for 6.2% each. You will observe that all cases done were CHD, this is because surgery for CHD are relatively cheaper and more importantly it is the recommended pathway for local capacity building[30]. Unfortunately, the "*battle*" rages on as lack of funding and several other factors have stalled this achievement.




LEADERSHIP

NIGERIA'S MOST INFLUENTIAL NEWSPAPER

JUST IN RY COMMENTS NILS

UITH Performs Open Heart Surgery On 2 Patients

By Abdullahi Olenin, Ilorin

— Jul 30, 2015 2:06 pm | Leave a comment

The University of Ilorin Teaching Hospital (UITH) has recorded a major medical feat as its surgeons successfully conducted open heart surgery on two patients.

The UITH surgeons performed the heart surgery in collaboration with their counterparts from Apollo Children's Hospital, India.

The two patients are Ashat (Girl,15 and Kamalat Sulogun,7 who are said to be in stable condition after undergoing the surgery.

Another set of 5-10 patients will benefit from the programme in the next round of surgical operation fixed for October and November.

The Chief Medical Director of UITH, Prof. AbdulMaheed Olatinwo broke the cheering news during a news conference at the hospital's complex, Oke- Oyi yesterday.

The CMD stated that the hospital ventured into the "Open Heart Surgery Programme" because of its recognition of cardiovascular diseases as the number one cause of non-communicable disease death nationwide.

He added "specifically, common indications for Open Heart Surgery such as congenital heart disease are common in our environment occurring in about 1 in 100, 000 live births and when left untreated are a cause of early childhood death or disability. Many of the affected children are from poor families who cannot afford the huge cost of care outside the country.

"The hospital management decided to move the Hospital into this new realm

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Figure 15: a) Intraoperative picture of first open-heart surgery in UITH showing the surgeons. b) Media publications of the first set of open-heart surgeries in UITH. by Leadership newspaper.

Figure 16: Lecturer with babies operated successfully for congenital cardiac defects in 2016.

S.No.	INITIALS	AGE	SEX	DIAGNOSIS	OPERATION PERFORMED	OPERATION DATE	OUTCOME
1.	A.J.	15	F	ASD	Autologous pericardial patch closure	28/07/2015	Discharged
2.	K.B.	7	F	ASD + PS	Autologous pericardial patch closure + pulmonary valvotomy	29/07/2015	Discharged
3.	A.D.	5	M	VSD + RVOTO + PDA	PDA ligation + PTFE patch closure of VSD + RVOT resection	25/04/2016	Discharged
4.	S.M.	3	M	VSD, PFO	PTFE VSD patch closure + PFO closure	26/04/2016	Discharged
5.	M.A.	4	F	VSD	PTFE patch closure	27/04/2016	Discharged
6.	R.U.	4	F	VSD + PDA	PDA ligation + PTFE patch closure of VSD	08/08/2017	Died
7.	A.O.	3	M	Noonan Syndrome with supravalvar PS	Open pulmonary valvotomy + supravalvar patch	09/08/2017	Discharged
8.	A.M.	2	M	TOF	PTFE patch closure of VSD + RVOT resection	09/08/2017	Discharged
9.	M.K.	4	M	Down's syndrome with VSD	PTFE patch closure of VSD + RVOT resection	09/08/2017	Discharged

Table 1: Cases of open-heart surgery performed at UITH.
Key: VSD – Ventricular Septal Defect, ASD – Atrial Septal Defect, TOF – Tetralogy of Fallot, PDA – Persistent Ductus Arteriosus, RVOT – Right Ventricular Outflow Tract, PTFE – Poly-Tetra-Fluoro-Ethylene, PS – Pulmonary Stenosis.

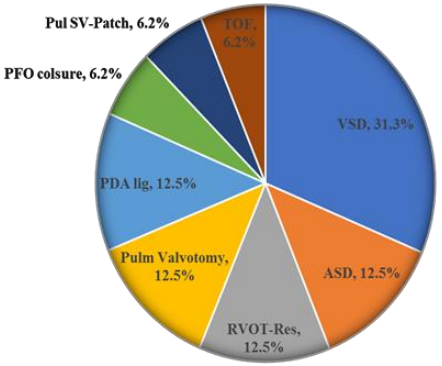


Figure 17: Percentage distribution of 16 open-heart procedures perform in 9 patients.
Key: SV – Supravalvar, PFO – Patent Foramen Ovale, TOF – Tetralogy of Fallot, VSD – Ventricular Septal Defect, ASD – Atrial Septal Defect, PDA – Persistent Ductus Arteriosus, RVOT – Right Ventricular Outflow Tract, Pul/Pulm – Pulmonary.

5.0 My contribution to training

5.1 Undergraduate training: I was involved in development of Cardiothoracic Surgery curriculum for under graduate teaching in medicine both at the College of Medicine, University of Ibadan and here in University of Ilorin. I made a conscious effort to simplify the topics for ease of understanding of students. I also utilize the clinical skill laboratory to enhance student's skills.

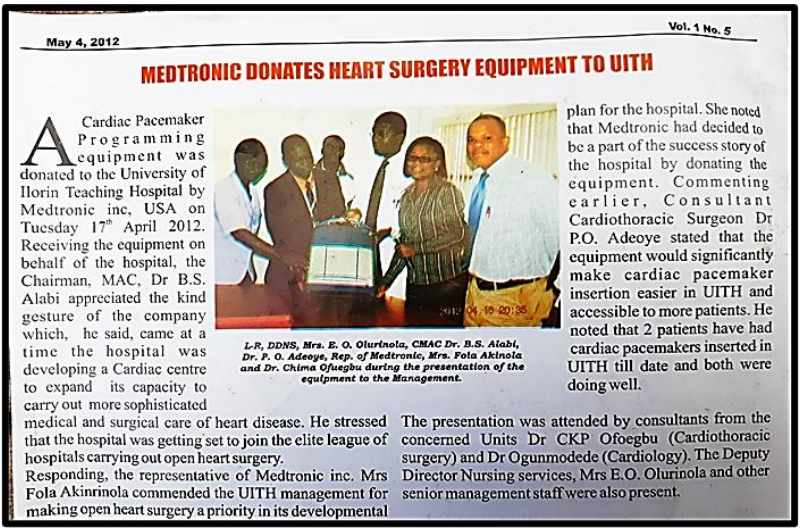
5.2 Postgraduate training: I have been involved in training and mentoring of six Cardiothoracic Surgeons (Dr. E. Kesieme, Prof. M.B. Aminu, Prof. U. Abubakar, Dr. K. Okonta, Dr. N. Anumechi and Dr. I. Olaoye) plying their trade in various parts of Nigeria, of which two are professors and one is a reader already. Dr. Ifedolapo

Olaoye is the first to be trained under me from UITH and Dr. O. R. Akanbi should complete his program next year. Innumerable Registrars have rotated under me prior to seating their Part I (Membership) examination of both the West Africa and/or National postgraduate colleges.

5.3 Books: In order to contribute to repository of knowledge in the field, outside my journal publications, I have authored or co-authored chapters in several books[37-43].

6.0 Institutional funding and collaboration

I attracted the donation of cardiac pacemaker programmer from Medtronic Inc. to UITH. The machine was presented to the management on the 4th of May 2012. (Figure 18). Estimated cost of the equipment then was about ₦1.3 million. I also attracted sponsorship from Texan Nigeria Limited for the training of our Cardiovascular Perfusionist at the Philippines Heart Centre, Manilla in 2013. With assistance of Dr. M.A.N. Adeboye, we established collaboration with Apollo Hospitals, Chennai, India for manpower development in open heart surgery. Three Nurses, our Cardiovascular Perfusionist, two Resident Doctors, an Adult Cardiologist and a Paediatric Cardiologist benefitted from the program which spanned between 2014 and 2017. I have also maintained research collaboration with the University of Cape Town.



May 4, 2012 Vol. 1 No. 5

MEDTRONIC DONATES HEART SURGERY EQUIPMENT TO UITH

A Cardiac Pacemaker Programming equipment was donated to the University of Ilorin Teaching Hospital by Medtronic inc, USA on Tuesday 17th April 2012. Receiving the equipment on behalf of the hospital, the Chairman, MAC, Dr B.S. Alabi appreciated the kind gesture of the company which, he said, came at a time the hospital was developing a Cardiac centre to expand its capacity to carry out more sophisticated medical and surgical care of heart disease. He stressed that the hospital was getting set to join the elite league of hospitals carrying out open heart surgery.

Responding, the representative of Medtronic inc. Mrs Fola Akinrinola commended the UITH management for making open heart surgery a priority in its developmental plan for the hospital. She noted that Medtronic had decided to be a part of the success story of the hospital by donating the equipment. Commenting earlier, Consultant Cardiothoracic Surgeon Dr P.O. Adeoye stated that the equipment would significantly make cardiac pacemaker insertion easier in UITH and accessible to more patients. He noted that 2 patients have had cardiac pacemakers inserted in UITH till date and both were doing well.

L-R, DDNS, Mrs. E. O. Olurinola, CMAC Dr. B.S. Alabi, Dr. P. O. Adeoye, Rep. of Medtronic, Mrs. Fola Akinola and Dr. Chima Ofuegbu during the presentation of the equipment to the Management.

The presentation was attended by consultants from the concerned Units Dr CKP Ofoegbu (Cardiothoracic surgery) and Dr Ogunmodede (Cardiology). The Deputy Director Nursing services, Mrs E.O. Olurinola and other senior management staff were also present.

Figure 18: Pacemaker programmer being presented to UITH by the Medtronic representative.

7.0 Other service to the University Community

In August 2020, I was appointed Director, Technical and Entrepreneurship Centre. I believe I have consolidated on the gains of those who served in the helm of affairs of the Centre with some modest achievements and I appreciate the Vice Chancellor for having faith in me by assigning the responsibility to me.

8.0 Awards and membership of professional bodies

As medical officer in Oyo State during National Youth Service between 1992 and 1993, I obtained a state award for meritorious service for grass root health care program I masterminded and implemented for Afijio L.G.A. Also, I received the outstanding resident's award during my residency training from the UITH management.

I am member of and served/serving in various positions of responsibilities of Nigerian Medical Association (NMA), National Association of Resident Doctors (NARD), Medical and Dental Consultants Association of Nigeria (MDCAN), Nigerian Cardiac Society (NCS), Nigerian Thoracic Society (NTS), Association for Advancement of Cardiovascular Surgery and Medicine (AACVSM), and Association of Cardiovascular and Thoracic Surgeons of Nigeria (ACTSON). I was elected into the membership of the Board of Faculty of Surgery of the West African College of Surgeons in June 2021.

9.0 New frontiers for Cardiothoracic Surgery in Nigeria

Mr. Vice Chancellor sir, Cardiothoracic Surgery is a technology driven field. The global trend has been towards minimally invasive surgery, trans-catheter techniques, tele-manipulative instrumentation and robotic surgery (Figure 19).

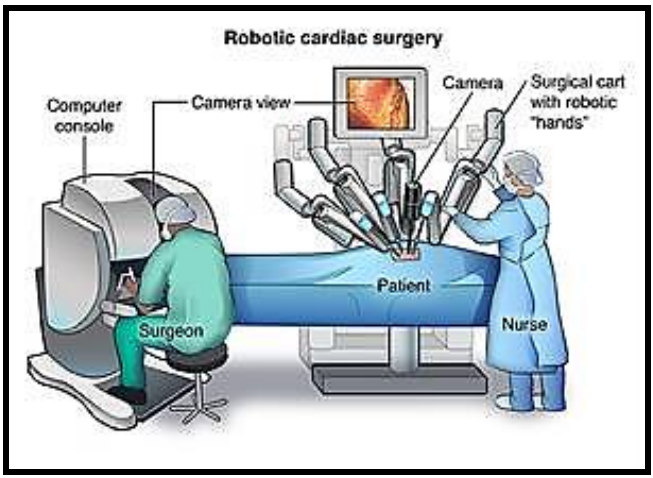


Figure 19: Diagrammatic representation of robotic heart surgery setup. Source: https://www.hopkinsmedicine.org/health/treatment-tests-and-therapies/robotic-cardiac-surgery

While Cardiothoracic Surgery specialty can be said to be in its adolescent stage of development, these contemporary techniques are in infancy with only few VATS and trans-catheter techniques being practiced. Unfortunately, we cannot neglect conventional cardiothoracic surgery in pursuit of current advancement. We must develop both aspects concurrently as they are not mutually exclusive but complementary. When procedures being performed under technologically driven techniques get complicated, there may be the need to revert to conventional approach. Also, some procedures may need to be performed in hybrid fashion.

10.0 Conclusion

Mr. Vice Chancellor sir, distinguished ladies and gentlemen, I have enumerated the wide scope contained in the field of Cardiothoracic Surgery with ample historical background to give credit to heroes who started the "*battle to keep our hearts safe*". I have also exposed to you my humble beginning, my trigger for a career path in medicine and my convoluted journey in specializing as a Cardiothoracic Surgeon. My modest contributions as one of the "*foot soldiers*" have been enumerated with several innovations adapted in order to surmount challenges encountered especially as a result of peculiarities in our environment. Whilst a lot of ground has been covered, much more needs to be done in order to secure victory in this "*battle to keep our hearts*". In order to secure haemostasis from the "*bleeding heart*" all hands most press firmly on the "*gash*" for an effective coordinated repair to be instituted. I need not emphasize that once the heart stops, life is extinguished!!

11.0 Recommendations

The Vice Chancellor sir, I shall focus my recommendations on two major areas emanating from this presentation. Permit me to emphasize that achieving the recommendations will require an intricate and coordinated partnership between the University of Ilorin and University of Ilorin Teaching Hospital.

11.1 Cancer management

1. Establishment of Radiotherapy and Nuclear Medicine Center at UITH. The basic tripod on which cancer treatment stands are Surgical resection, Chemotherapy and Radiotherapy. For meaningful outcome, there must be a well-planned regimen encompassing the three modalities. A situation where a patient is operated here and has to wait for appointment at Ibadan, Abuja, Lagos, Zaria or Sokoto all with long waiting lists will never give the desired outcome. It is therefore of paramount important and a matter of urgency to have Radiotherapy and Nuclear medicine established in our institution. Cancer registry will be better stored and monitored.
2. Improved facilities and sub-specialization in Histopathology: Our histopathologists at present read all and every disease conditions. Sub-specialization will improve promptness and accuracy in identifying disease conditions especially the cancers.
3. Improved funding of cancer research. Many cancers still have grey areas and yet to be identified aetiologic factors particularly in our environment. Example as it relates to lung cancers was stated earlier in this lecture.

11.2 Cardiac Surgery

Figures 20 and 21 shows how abysmally low Nigeria stands in the conduct of open-heart surgery despite significant incidence of patients with cardiac conditions needing

intervention. We perform 0.5/millions of population/year of open heart surgery and have 0.9 cardiac surgeon/millions of our population!

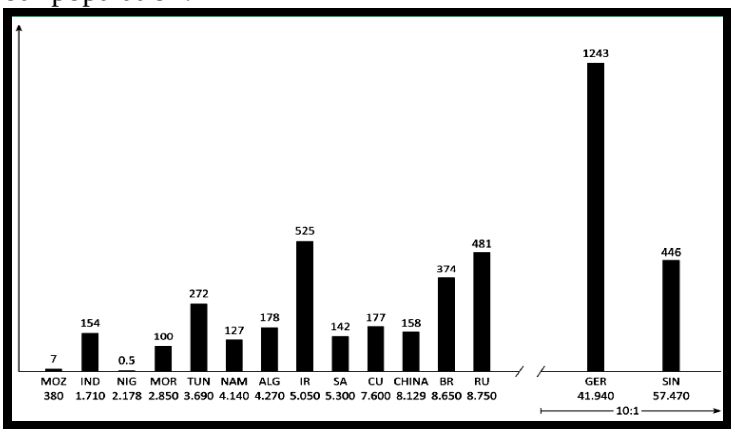


Figure 20: Number of open-heart surgeries per million of population per year related to per capita gross domestic product of each country[30].

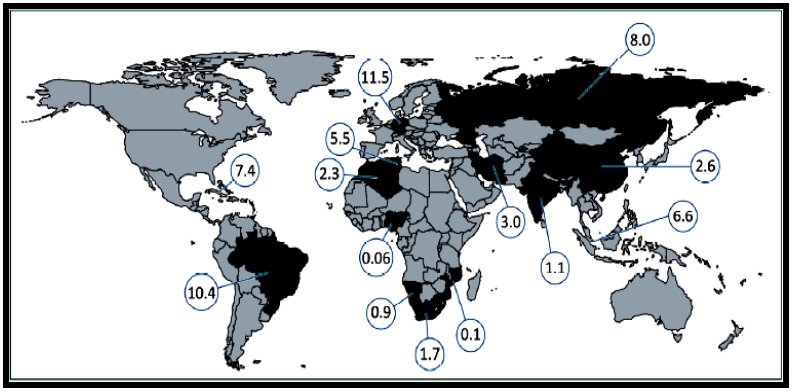


Figure 21: World map highlighting contributing countries. In circle, the number of cardiac surgeons per million population are depicted for each country[30].

During my training in South Africa, precisely on the 1st of October 2003, I was grouped into the donor-heart harvest team that flew 2 hours from Cape Town in Western Cape to Mthatha in Eastern Cape to retrieve a heart used in transplanting the heart of a patient with end-stage cardiac failure, also flown 2 hours from Johannesburg in Gauteng Province to Cape Town. The excellently coordinated adventure happened on my dear country's Independence Day and it made my "*heart to bleed"*. I was part of several heart transplantation procedures thereafter. The question that kept running through my mind which remains pertinent even now was "when will my country achieve this level of advancement?" Mr. Vice Chancellor sir, we cannot be parsimonious at committing financial, material and human resources towards achieving an efficient and sustainable cardiac surgery program. This situation needs to be addressed in an intentionally coordinated and focused manner, with urgent needs for the following:

1. Increase funding: There must be increased funding for cardiac surgery with participation from Government/NHIS, Private sector and Philanthropic organizations.
2. Infrastructural and facility development including dedicated theatres, Intensive Care Units and Cardiac Catheterization Laboratory. A holistic cardiac surgical service is impossible without a cardiac catheterization laboratory. Contemporary practice now builds hybrid theatres which functions for catheterization as well as for surgery.
3. Manpower development and team building. Thoracic & Cardiovascular Surgeons, Cardiac Perioperative and Ward Care Nurses, Intensivists and Intensive Care Nurses, Cardiac Anaesthesiologist, Cardiovascular Perfusionist, Chest/Cardiac Physiotherapist must be groomed and maintained as a team.

4. Coordinated approach to 2 and 3 above. When manpower is trained and equipment for trained staff to work with is not available, attrition occurs and this occurs really rapidly when it comes to cardiac surgery. Twisted the other way, facilities would dilapidate and rot away when acquired without the trained staff.

12.0 Acknowledgements

Adoration and all glory to the Almighty God who has kept me by His mercies, directed my path and made this day a reality.

I thank the University authority for the honour bestowed upon me in appointing me as a Professor and the University of Ilorin Teaching Hospital for providing the environment for me to exhibit my expertise.

My parents, Late Dr. Philip Oyeleke Adeoye and Late Madam Comfort Jolade Adeoye were my pillars. I appreciate them for the sacrificial love and care they gave in ensuring I was molded in rectitude. I had to perform cardiopulmonary resuscitation on my dad in his last moments and also had to insert the central line for haemodialysis in my mum during her critical period. I wish I could do more to keep them around much longer. To my siblings, Mrs. Adeyoola Adefila, Mrs. Adenike Idowu and Mrs. Folashade Ogundare, we certainly came a long way together and I appreciate your love and constant support. I am most grateful to my parent in-laws Rev. Joseph and Mrs. Lydia Oyedepo for your love and prayers and for trusting me with the jewel you gave me. I thank you for your immense support to my family particularly those times I was away.

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