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Cardiology in Mekelle, Ethiopia

Setting up a modern heart cath lab in a University Hospital in Ethiopia was a 5-year endeavour for retired cardiology interventionist Christian Leuner MD

In March 2013—having retired 4 months earlier—I received a call from the chairman of the German non-government relief organization (NGO) Etiopia-Witten Association*, asking if I could teach echocardiography in the cardiology unit of an Ethiopian University. Four months later, in July 2013, I found myself sitting in an aeroplane travelling to Ethiopia for a 6-week-stay. This was organized by the German NGO and financed by the German Senior Expert Service (SES), who sends retired specialists for voluntary teaching and consulting to developing countries.

This was the beginning of my co-operation as a member of Etiopia-Witten Association with the Ayder Referrals Hospital at the College of Health of the Mekelle University in Mekelle, Ethiopia.

Starting in 2009 at a very low level, it can now provide tertiary medical service. The major medical disciplines are installed and are technically well equipped, including a CT and a 3 T MRI machines. However, the number of available physicians is still low.

I was asked to mainly teach adult echocardiography with the new modern echo machine and on the use of the new computerized ECG, stress-ECG, 24-h Holter ECG, and the Pacemaker-Programme, financed by the Ethiopian government. Additionally, I was asked to lecture on basic cardiology for the large number of internal medicine residents.

The two, later three internists in the already existing cardiology unit are Assistant Professors with numerous extra responsibilities:

Main entrance Ayder Referral Hospital

Ayder Hospital rear with wards

Since then I have been visiting Mekelle about three times a year for 3 weeks.

My work there is only possible, because some German cardiologists have been willing to accompany me to Mekelle to teach and to set up new scientific programmes. Without the experience and the unrelenting support of the members of the German Ethiopia-Witten Association the whole project would not be possible.

In 2013, I met the Dean, the Medical Director and the Head of the Department of Internal Medicine for the first time. They were amazingly young physicians, only in their early thirties. They are still responsible for one of the most modern and the second largest hospital in Ethiopia with some 400 beds. The Ayder referral Hospital serves as a teaching hospital for the College of Medical Science.

Discussing selected cases in Echo lab

Organizing the department, providing university teaching, teaching rounds on the wards, and holding examinations. Therefore only a few hours remain free for them during the week for my cardiology teaching. Also, the regular working hours in the hospital have narrow limits, since there is a lunch break of 2.5 h and the end of the working day is at 4.30 p.m. The doctors then go to their private practice.

Following the first weeks of my stay, I was asked by the medical director to review and support the final planning, installation, setting up, and teaching the staff of a completely new and modern Turnkey cardiac catheterization laboratory that had just been ordered by the University of Mekelle.

After having read and discussed the two thick, letter-size books of bid documents with the responsible medical dean, I accepted to support this demanding project that has kept me busy until today. During my active time in Germany, I had been involved in the preparation of tenders and the installation of several cardiac cath labs and at the end of a hybrid cath lab.

The bid texts showed that the author of the tender document was inexperienced in the technology, the setting up, and equipping of a cath lab. Besides a very basic floor plan for the technical- and intervention room and a nearly illegible much too short time schedule, the books contained long, undifferentiated lists of complex heart catheter materials, and other consumables. The intention was to equip the cath lab with consumables for 5 years, not considering that the expiration date (usable time) for sterile materials expires 2 years after production. Included in this package was a fully digitalized X-ray system, a digital haemodynamic measurement and an interventional electrophysiology system, a very modern anaesthesia and a high-end echocardiography machine including 3D capabilities.

The entire order had been awarded to an Ethiopian medical equipment import company that had never installed and commissioned a cath lab before. However, this was well compensated by a great commitment of the company staff to this project.

Having found appropriate rooms for the cath lab, a true-to-scale floor plan with a 60 sq. m. intervention room, and all typical ancillary rooms was designed according to my proposals.

During my next visits in 2014, the construction of the rooms following this plan was partly done by local craftsmen. My presence on-site made it possible to intervene, if the necessary quality level was not reached.

Back to Germany, the detailed lists of catheter materials to be ordered had to be reviewed and adjusted. A challenge was to guess what types, sizes, and quantities of different diagnostic catheters and interventional materials would be needed for the small and slim Ethiopian patients, as there has not been any experience in the country.

Foreign technicians installed the X-ray system and a large battery for an uninterruptible power supply (UPS) without special problems. The computer system for haemodynamic measurement and ECG control as well as the software for electrophysiology were installed and tested. Since the reporting software package had not been explicitly mentioned in the offer, it had not been delivered. As a substitute, I prepared a Microsoft-Word form for this purpose.

In the weeks that followed, much patience was needed to overcome numerous unforeseen obstacles and to put through necessary changes.

It was not known, that electronic cath lab equipment is very sensitive to disruptive surges by electrostatic charges that provoke severe technical failure. An electrical conductive floor is necessary to dissipate these charges from the body of staff members to the ground, before they have the chance to destroy the electronic equipment. Therefore, this floor had to be an extra import from the USA and placed on top of the previous one.

Control of temperature and air humidity, and ventilation with dust free and in the intervention room bacterial filtered air is an essential requirement. As I had expected, the newly installed simple and outdated air conditioning system turned out to be a complete failure. The necessary replacement by a modern system was tendered 2 years ago and should be purchased soon. The expected installation time, which will stop the activities in the cath lab, will take several months. Until then, the cath lab can only be used for only a few hours per day because of severe overheating of the technical equipment.

To equip the cath lab and radiation department staff with personal dosimeters remains an unsolved challenge, since the general awareness is low and only a rudimental radiation safety law has been published.

Installing ceiling of the intervention room

Construction of door to the cleaning room

Cath lab ready for use | First case in new cath lab, December 2015 | Happy staff after first case in cath lab

Long delays to purchase imported materials must always be considered, because the local currency is not freely convertible, and the poor country has insufficient foreign currencies compared to the requests. The customs clearance for all goods is complicated and very lengthy. Response times for foreign technical assistance to repair the cath lab equipment may be 2 months and more, because of very time-consuming visa and customs procedures for spare parts.

In December 2015, the newly certified Ethiopian cardiologist Dr Abraha Hailu and I performed the first heart catheterization procedures successfully. He had just returned from 1-year cath lab training in Italy. I was very pleased to see how well he performed the left heart catheterization from the radial artery. An accompanying still active cardiologist from southern Germany was giving support to the cath lab nurse doing the haemodynamic measurements and emergency backup.

Because of long transport and customs clearing times the chemicals needed for the newly purchased, fully automated modern blood gas analyser arrived after their short expiration date. It was therefore impossible to perform right heart catheterization with shunt measurements. They had to be postponed until an analyser adapted to local conditions, was introduced to Ayder Hospital in 2017.

In the following years, other cardiologists from Germany and from other foreign relief organizations came to the cath lab, teaching or performing different types of interventional cardiology procedures.

In spring of 2017 more, percutaneous cardiac interventions (PCI) became possible, especially for acute coronary syndromes on an emergency basis, when a second Internist from Ayder Hospital returned from 1-year cath lab training in an Indian heart centre.

As the number of patients who can afford diagnostic procedures is still low, procedures are not done every day. The authorities responsible for the Mekelle Health Campus agreed to my proposal to provide future heart catheterizations without charge for selected teaching-programs. This will benefit significantly more patients, and local cardiologists will be able to sustain and extend their practical experience in the cath lab.

My experience can be summarized as follows: it was a very stimulating time with numerous positive experiences and results, as well as many new friendly relationships to committed, humanistic thinking with talented, and highly educated Ethiopian men and women.

It requires much patience, ingenuity and insight into the unexpected difficult conditions in one of the poorest but emerging African countries. To improve the quality of local medical structures and the skills of the local professionals in Ethiopia as a western foreigner, it is most important to find the adequate combination of adaptation to the local habits and possibilities, and a strong will for change and progress. To be successful it needs personal presence on-site, a solid basis of theory and practical expert knowledge, politeness, respect, determination, endurance, and again a lot of patience.

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