

Dr. med. J. Kampen
Anaesthesiology
ForEritrea, Hamburg

Video Assisted Laryngoscopy for Eritrea

Use of State-of-the-Art Anesthesiology Equipment
(CMAC, Karl Storz Endoskope, Tuttlingen, Germany)
in Africa

In recent years, Video-Assisted Laryngoscopy (VAL) has become the method of choice in Europe and in the USA for the management of unexpected difficult airway scenarios and significantly improved patient safety in Anesthesia. Where out-of-hospital emergency medical treatment is performed by trained medical doctors, VAL could be shown to improve management of difficult airway situations which are known to be more frequent on-scene and due to logistic reasons can not be solved using Fiberoptics or other clinical routines.

VAL has become available in special designs for on-scene scenarios by various manufacturers and has been developed to a degree of robustness and reliability which withstands even heavy-duty exposure to transport, wheather extremes and rough handling.

Thus, VAL systems can even cover the demands of the comparably tough clinical use in so called developing countries, where problems of logistics and lack of training normally do not allow to rely on sophisticated anesthetic equipment.

With focus on clinical Anesthesiology in Asmara, the capital of Eritrea, this report may elucidate that implementation of a VAL system can be useful to improve patient safety and training of anesthesia personnel in the medical setting of an African country.

Eritrea is a state in the East of Africa at the exit of the Red Sea and gained its independence from Ethiopia in 1991 after 30 years of civil war. The country is inhabited by 7 million citizens who have an average income of around 1000 US-Dollar per annum, placing Eritrea among the poorest countries of the world.

The national health system is facing a general lack of doctors and particularly of trained medical specialists. There are only a few major hospitals which with regard to Anesthesiology and Intensive Care Medicine must be rated as sub-standard by any perspective. Only four medical doctors in the whole country are specialists in the field of Anesthesiology. As in most countries of Africa, nurses have to cover the anesthetic workload, mostly without any backup by doctors, especially in remote areas. The level of training is not uniform, as many nurse anesthetists received training-on-the-job, only, during military service at times of war.

A Bachelor/Master of Arts Curriculum has been established at the Asmara College of Health Sciences and is likely to improve the general standard of training, but will not have a sufficient output of trained anesthesia personnel to cover future needs for surgery.

As there is no functioning logistic service for medication with regard to anesthetics and inhalational agents, anesthesiology to a large extent relies on regional anesthesia or on drugs which are no longer in use or even obsolete in other parts of the world, as e.g. Halothane, which due to its known hepatotoxicity is of no clinical importance any more in Europe or the US. Opioids are rare and often replaced by the use of Ketamine, avoiding classical general anesthesia procedures with intubation of the trachea and controlled ventilation in favour of improvised regimes. In recent years, activities of the German "Eritreahilfswerk" led to a nationwide standard for anesthetic machines (Sulla 808 V, Draeger, Lubeck, Germany). However, even in the capital city of Asmara a reliable oxygen supply can not be guaranteed.

As a result, there is a general lack of training to safely perform general anesthesia with intubation of the trachea. In addition, options for training difficult airway management are extremely limited, as fiberoptical equipment is unavailable.

VAL offers the display of the laryngoscopic view on a monitor screen with threefold magnification and can be used to multiply training options for endotracheal tube (ETT) placement. The teacher can delegate intubation of the trachea to the trainee more easily, as full visual control allows for intervention at any point, even without the need to take-over the procedure itself. Safe placement of the ETT can be verified on screen which is not the case in a normal teaching situation without VAL.

The Company Karls Storz Endoskope, Tuttlingen, Germany, represented by the company owner family, granted a generous donation to the initiative "ForEritrea", Hamburg, making it possible to install a complete VAL system (Storz CMAC) at the College of Health Sciences in Asmara.

In March 2014 senior nurse anesthetists and masters working in the Asmara hospitals took part in introductory lectures to make them familiar with the CMAC and its handling. An anesthesia simulation unit (SimMan, Laerdal, Denmark) was used to generate scenarios of difficult intubation up to Cormack- Lehane grade IV, which in first attempt were addressed using conventional intubation equipment. As expected, intubation attempts failed in most of the cases, but were finally successful in all cases using the CMAC. Surprisingly, handling and positioning of the ETT "on-screen" was no major obstacle to most of the trainees. It was recognized that ETT placement could be performed with much less physical effort due to superior ergonomics using VAL. Supervision, support and advice by colleagues was very welcome as well. During the following week of clinical introduction of the CMAC at the Orotta Referral Surgical Hospital and at the Halibeth Hospital, patients from age of three days to 67 years received General Anesthesia with intubation of the trachea using VAL by local anesthesia personnel under supervision of experienced anesthesiologists.

The Storz CMAC is a sophisticated system with regard to handling it correctly and doing disinfection procedures after use. Electronic connectors have to be sealed and protected against fluids using O-ring plugs. The LED light source and the optical system must be cleaned by designated agents in order to prevent dysfunction or paleness. Thus, special introductory lectures were held concerning maintenance and cleaning.

The CMAC system is held available for all Asmara hospitals at the College of Health Sciences, which is the focus of Anesthesia education in Asmara. Therefore, its use is limited to expected difficult airway situations which have been assessed in advance. Emergency use would make it necessary to have one VAL system available at every hospital. Due to the multi-part and modular engineering of the Storz CMAC and its complexity, this seems to be inappropriate at the moment with respect to maintenance and availability.

The clinical advantages of the Storz CMAC system are beyond discussion. However, with regard to handling, maintenance and technical availability for long-term-use, a certain amount of doubt seems to be justified. In 2013 "ForEritrea" introduced a Storz laparoscopy system to gynecological surgery. This system has even more complex demands for maintenance and logistics, but could be held in full functioning order, since.

In conclusion: If it is possible to identify reliable and responsible personnel, who may be honoured by receiving remuneration for their engagement in taking care for highly sophisticated medical equipment, its use even in the setting of a developing country is definitely possible and makes sense. There will be an evaluation of the CMAC system after six months of clinical use in September 2014. With clinical experience gained until then, it is likely possible to start prospective studies regarding the clinical use of the Storz CMAC system in the setting of a developing country as well as evaluating its use for teaching and training purposes.

Dr. med. Jörg Kampen
Consultant Anesthesiologist
Intensive Care Medicine, Emergency Medicine
kampenjoerg@aol.com
49-174-4586007
Auf der Wurth 34
24159 Kiel-Schilksee
Germany