


Review

Global viewpoints: proposals for the development of endourology in resource-limited countries in Africa

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Modern Urology For Africa: A non-profit association registered in Morocco, dedicated to developing the practice of endourology and minimally invasive urological surgery in Africa.

Endourology plays an important role in modern urological practice. Compared to open surgery, it offers many advantages. In Africa, endourology is not widely practiced or non-existent in some referral centres. Several factors have been linked to this challenge. This article explores and proposes strategies to improve endourology practice in the African context. Recognising the unique challenges and opportunities in the region, the document discusses key initiatives and recommendations to promote the growth and development of endourological practices, including the identification of local needs, training, technological adaptation, etc. It aims to provide valuable information on the advancement of endourology in Africa.

Keywords

endourology, practice, development, Africa, Modern Urology For Africa

Introduction

The main urological pathologies that require surgery in most African hospitals are BPH, urinary calculi, urethral strictures, and bladder tumours [1–3]. In developed countries, these pathologies are treated mainly endoscopically, laparoscopically, or even robotically (in some centres). Where do we stand in Africa today?

In three recent publications [4–6] from two associations (Modern Urology For Africa and Surgery Interest Group of Africa) based in Africa, the practice of urology was evaluated by surveys or on the basis of the literature (scoping review).

Endourology occupies an important place in modern urological practice. However, in Africa, it is still little practiced or even non-existent in certain reference centres [4]. Regarding the treatment of stones of the upper urinary tract, a survey was carried out in 46 referral centres in Africa.

Open surgery was found to still be performed in 69.1% of the centres and 43.3% of the centres rarely perform endourological surgery [5]. In an exploratory review of surgical treatment for BPH in Africa, it was found that open prostatectomy was the main technique used. The authors of the review stated that while surgical treatment of BPH is moving towards minimally invasive procedures in developed countries, open prostatectomy remains very popular in Africa [6]. In the management of urethral stenosis, Mellouki et al. [7] reported in a pan-African survey that there are significant differences between international recommendations and reality in African practice. And that there is a need for support through practical training workshops and study grants.

The last four references cited above sufficiently demonstrate the current state and practice of endourology in Africa, mainly in the sub-Saharan region, south of the Sahara. Based

on this observation, the association Modern Urology For Africa will try to share some reflections. These reflections, which provide some evidence for launching the practice of endourology in resource-limited centres, are mainly addressed to decision makers and urologists.

Identification of Key Challenges

In a study evaluating urological practice in Ethiopia, the authors [8] concluded by identifying a few challenges that explain the underdevelopment of this specialty in their country. These are mainly due to a lack of equipment, a limited number of urologists, and a lack of qualified personnel with skills. One of the many challenges is the limited number of urologists in the population. Moore et al. [9] reported that the ratio of urologists to the 100 000 population in West African College of Surgeons countries and East Central and South African countries was 0.015 and 0.025, respectively. Senegal has the best ratio of urologists to population in Africa, 0.3125:100 000 [10]. This is much lower than the ratio in high-income countries like the UK and USA, where there are 2.13 and 3.99 per 100 000 population, respectively [11].

The distribution of urologists inside a country also has a wide disparity, with most of them working in big cities or urban areas. In Ethiopia, 18 out of 33 urologists in a survey are located in the capital city, Addis Ababa [8]. As most of the African population is located in rural areas, this disparity in distribution makes urological services even more difficult to access or inaccessible. The cancellation of procedures by patients due to financial constraints has already been reported in some sub-Saharan African countries. In a study published by Okeke et al. [12]. In 2015, the direct costs associated with surgical procedures were fully covered by patients and were the cause of cancellation in 47% of cases. In addition to the limited number, the unavailability of endourology equipment in most public hospitals and the skills gap have limited the scope of their practice. For administrative, financial, and logistical reasons, it is difficult for urologists in low-income countries to acquire technical skills in Europe or the USA [13]. It should be noted that in 2006, Olapade-Olaopa et al. [14] reported that ‘the challenges for urology in sub-Saharan Africa in 2006 are indeed many and varied’.

Despite this, urology practice and training can be significantly improved if the subcontinent’s overall political, economic, and health status improves.

Short Overview of the Main Endourological and Laparoscopic Procedures

Again on the basis of the available literature, we provide a brief overview of the current state of endourological practice

(prostate resection, ureteroscopy [URS], percutaneous nephrolithotomy [PCNL]) and laparoscopy in Africa.

As already reported in the introduction, a survey published in 2023 [5] sufficiently shows that the majority of centres still perform open surgery for the management of upper urinary tract calculi. In this survey, which included 21 referral centres in Africa, PCNL, flexible URS, and rigid URS were used in three (14.2%), nine (42.8%), and 11 (52.3%) centres, respectively. This finding is similar to that of another survey published by Nedjim et al. [5], where rigid URS was the main endourological technique used in the management of upper tract calculi in Africa. Centres with therapeutic instruments for upper tract stone comprising rigid URS, flexible URS, and PCNL are rare (seven of 30 [23.3%]).

For prostatic resection, Zubair et al. [6] recently published an exploratory review including 21 articles from eight African countries. They reported that of the 2999 patients included in the study, 2204 (73.49%) underwent surgery. Open prostatectomy was the main surgical technique used: 57.21%. Many reasons were given for this, including the availability of equipment, technical expertise in resection, and the cost of the procedure.

In the same 2023 survey, it was reported that urological laparoscopy was being performed in 19 centres. As a solution, a policy of purchasing inexpensive, durable equipment and a surgical support programme to acquire technical skills were proposed [4].

Targeted Training and Skills Enhancement

One of the major challenges to endourology practice in African countries is the lack of healthcare professionals with specialised training in endourology [15]. Lack of specialised training programmes and lack of opportunities for specific training programmes are a few of the explanations for this challenge [13]. Furthermore, there is a lack of exposure to advanced endourological techniques and technologies [16]. Resource constraints within urological training institutions, characterised by a lack of state-of-the-art simulation facilities, up-to-date teaching materials, and access to experienced mentors, create a suboptimal learning environment for aspiring urologists [17]. These challenges are compounded by difficulties in continuing medical education, including limited access to conferences, workshops, and on-line resources. Geographical disparities in training opportunities exacerbate these problems, leading to an uneven distribution of expertise across the continent, with some regions facing greater difficulties accessing educational resources and mentoring [14].

The gap in endourology training in Low- and middle-income countries (LMICs), as observed in some African countries, is imperative to suggest the creation of targeted training

programmes. These initiatives should be developed and implemented strategically at national and regional levels to ensure complete coverage. Collaboration between academic institutions, medical societies, and international organisations is crucial to harnessing collective expertise and resources [18]. By encouraging the formation of partnerships, these programmes can draw on diverse perspectives, helping to strengthen the learning environment. In the design of such programmes, particular attention should be paid to practical workshops, offering participants the opportunity to acquire concrete skills, and to mentoring programmes aimed at providing continuous advice and support [19]. The introduction of such programmes represents a proactive approach to the challenges of endourological training, fostering the emergence of a skilled and well-prepared workforce to improve urological care in resource-limited settings.

In the context of low-income African countries, it is imperative to introduce effective mechanisms for monitoring and evaluating the impact of endourology training programmes. This will make it possible to track the number of professionals who have undergone training and assess improvements in clinical outcomes resulting from the skills acquired [20]. The ability to demonstrate tangibly and positively the impact of such training initiatives is of crucial importance, not only to assess their effectiveness, but also to generate the necessary support and resources. Such evidence is particularly useful in securing the support of stakeholders to ensure sustained efforts and continuous improvements in practice to advance the field of endourology.

Creation of Centres of Excellence: Simple, Scalable Infrastructure

Urology training in sub-Saharan Africa has been led by organisations such as College of Surgeons of East, Central and Southern Africa (COSECSA), West African College of Surgeons (WACS), and some national universities. The Kilimanjaro Christian Medical Centre (KCMC) in Moshi, Tanzania, has been a pioneer in the East and Central African region, while the Hôpital Général de Grand Yoff (HOGGY) in Dakar, Senegal, is recognised as a reference in West Africa. Both institutions have provided urology training to professionals from many English and French speaking countries [21]. By laying the foundations for urology and urology training on the African continent, these centres have played a crucial role.

However, most of the trainers at these institutions are unable to specialise in a single subdiscipline, mainly due to their limited numbers, in addition to the heavy burden of urological conditions [22]. These centres have received support in terms of equipment and training from many institutions in developed countries, such as IVUmed

(formerly International Volunteers in Urology) and the Urolink charities.

The Global Philanthropic Committee (GPC), which consists of multinational urology organisations, has supported different educational projects in Cameroon, Haiti, Nigeria, Sudan, Senegal, Mali, and Tanzania [23]. With the support of GPC, >11 intensive interactive training programmes have been held in KCMC, Moshi, Tanzania [24]. The programme has trained residents on different urological topics, including transurethral resections, urethra reconstructions, endoscopic stone management, URS, PCNL, paediatric reconstruction, uro-oncology, and neurogenic bladder dysfunction, by academically high-standing experts and experts on the specified subspecialty from high-income countries. This has enhanced the theoretical and practical knowledge, presentation, and surgical skills of residents. In addition to training the residents, the GPC has donated modern urology equipment to different African countries, including KCMC, Moshi, Tanzania, which has improved the service and the training for the residents.

The IVUmed is working to increase access to quality urology care in low-resource areas of the world, including sub-Saharan Africa, by providing onsite urological education [25]. IVUmed, with the motto ‘teach one and reach many’, partnered with big teaching institutions in Africa like HOGGY, Dakar, Senegal, where they assessed the need and engaged in training the local expertise according to the need by fellowship-trained paediatric urologists, reconstructive urologists, female urologists, and urological oncologists. From their experience, IVUmed has suggested two visits for assessing the feasibility and success of a programme and listed factors that will increase the success of a partnership, including a memorandum of understanding with the country’s ministry of health, commitment from local experts, addressing local needs, partnerships with regional surgical colleges, and the creation of regional partnerships [25].

Urolink is a Committee of the BAUS, which aims to encourage and support urological care and education in LMICs by collaboration based on principles of partnership not patronage, ownership not charity, and sustainability not short-term goals [26]. Urolink has partnered with African institutions in developing urological care, including Hawassa, Ethiopia; Kisiizi, Uganda; Moshi, Tanzania; Ndola and Lusaka, Zambia; and Lilongwe, Malawi. Experts from Urolink have conducted scoping on-site visits and need assessments before commencing support for the specific identified needs of the local urologists. In Hawassa, Urolink has donated endourology equipment and given training on TURP, direct vision urethrotomy, and urethroplasty, which were sustained and flourished well [27].

It is important to evaluate the system of its centres and seek to adapt them, or even transform them, with a view to

helping them develop different types of training. It should also enable its centres to award grants to young surgeons or trainers to acquire specific skills.

Subspecialty training in endourology and urogynaecology is provided in South Africa [28]. There are plans to launch a paediatric urology fellowship in Africa at the Obafemi Awolowo University Teaching Hospitals Complex in Ile-Ife, Nigeria, with the support of an open medical institute in Salzburg, Austria [29]. Recently, Urology Give, an American charity, launched a new initiative for an endourology fellowship in South Africa for 3 months [30]. It is important to create centres of excellence first in each African region and then at the national level. When setting up these centres, it is essential to take into account the structural aspects in terms of both infrastructure and equipment. Structures must be adaptable and meet local needs.

Access to and Adaptation of Equipment and Technology

Ensuring access to and adaptation to endourological equipment and technology in resource-limited countries is essential to the successful implementation of urological healthcare. This challenge is being met by initiatives such as equipment donation programmes, illustrated by successful collaborations between manufacturers and developing regions [31]. Furthermore, research highlights the importance of adapting technology to surgical procedures in resource-limited environments, as demonstrated by the work of Heo et al. [32]. Mobile health units equipped with basic endourological instruments have proven effective in reaching remote areas [33].

Public–private partnerships and capacity building for equipment maintenance help improve access to technology [34,35]. Other efforts focus on the research and development of affordable solutions [36].

Place of Simulation

The use of simulation in learning offers an advantage over the traditional ‘see one, assist one, and do one’ approach, as it creates a low-risk environment conducive to repetition and progression according to the individual’s pace on the learning curve [37]. In Africa, the adoption of simulation-based learning represents a unique opportunity to rapidly and measurably improve the skills of surgeons and residents [38]. Surgical simulation-based training is under-utilised in Africa. There are a variety of possible reasons, including lack of access and funding for initialisation and maintenance, space constraints, lack of awareness and limited availability of local simulation expertise, and lack of integration of simulation into the training curriculum [39].

Urology has benefited considerably from simulation-based teaching, as evidenced by post-training camp evaluations, which have revealed notable improvements in trainees’ knowledge, instrument handling, and confidence in their skills [40]. The Institut de Recherche contre les Cancers de l’Appareil Digestif (IRCAD) Africa, located in Kigali, Rwanda, has a fully equipped urology simulation centre, particularly for laparoscopic and endoscopic urology procedures [41]. The creation of this centre deserves encouragement and congratulations. Moore et al. [9] have defined the fundamental steps to be taken into account when opening such training centres. There needs to be a clear description of the planned intervention (‘what’, ‘why’, ‘who’, ‘how’, and ‘when’), inclusion of all stakeholders from the outset, acceptance of the diversity of the people involved in the implementation process, and so on. Inadequacy and need must be addressed through ongoing collaboration between expert centres and Africa-based urology training centres.

Advocacy, International Collaboration and Partnerships (Focus on Local Networks)

Political engagement is crucial for the advancement of endourological practices, especially in countries with limited resources. This involves active collaboration with political decision-makers at both local and international levels, enabling advocacy for the development of urological interventions within healthcare systems [42]. International collaborations, such as the GPC [43], are essential for fostering knowledge exchange, enhancing training programmes, and facilitating collaborative research projects. The positive impact of these collaborations on global endourological practices has been emphasised, underscoring the crucial role of shared expertise and resources in overcoming challenges. These efforts contribute to a holistic approach to care by integrating diverse perspectives and experiences [44]. With international collaboration and partnership, resource mobilisation can be extensive and relatively straightforward. To achieve successful implementation and sustainable development of endourology, a multifaceted investment is necessary, encompassing human, structural, and material resources. It is crucial to engage with local networks to advance endourology in specific regions. This local approach ensures the adaptation of initiatives to specific needs, promoting a sense of ownership and sustainability [45].

Affordability

In Africa, the system has not been rationalised on a continental scale. Care costs vary from city to city, country to country, and region to region [46]. Most health systems require direct payments for access to health services [47].

These out-of-pocket payments for healthcare services account for >40% of total expenditure, limiting access to healthcare [48].

In Nigeria for example, Alhasan et al. [49] reported that the average cost of TURP varies from \$300 to \$1300 USD, with an average of \$617 USD. This cost is borne directly by the patient. This led the authors to conclude that the cost of treatment (TURP) is quite high for the average Nigerian, because the gross domestic product (GDP) per capita is low. Based on the 2023 ranking of GDP in Africa, Nigeria far exceeds most African countries [50]. This may also give an idea of the rest of the African countries, which also have a low GDP per capita.

Compared to TURP, this cost can be considered largely high in endoscopic stone management, which requires more equipment and consumables, making affordability even more difficult. Improving the affordability of endourology care in Africa can be a challenge, but several measures can help overcome these obstacles: special financial care, a public–private partnership focused on resource utilisation, reducing the cost of medical devices, and seeking international funding.

Sterilisation and Reuse of Equipment/Consumables

Sterilisation and reuse of equipment and consumables in endourology is an important area that deserves particular attention due to the associated economic benefits. This is especially true in Africa and other developing countries where endourological practice is limited due to the significant capital required for installation and maintenance [51]. There are various sterilisation methods depending on the type and nature of the medical instruments in question [52]. Unfortunately, not all of these methods are readily available for use in healthcare facilities in Africa. It is also worth noting that most chemical agents allow for high-level disinfection rather than sterilisation [51].

Endourology should be encouraged in Africa despite our many challenges. One way to do this is through the reuse or reprocessing of equipment and devices whenever possible to reduce costs. This practice involves cleaning, disinfection, and sterilisation procedures [53]. Adopting this practice promotes the development of endourology in Africa more significantly than the ideal use of single-use devices. It is clear that some endourology facilities in Africa may already use this practice for their sustainability. The drawbacks of reused instruments or devices, such as the risk of cross-infection between patients and decreased functional efficiency of the instruments, among others, must be carefully evaluated against the risks for patients before adoption [54]. Therefore, it is necessary to examine our practices and develop protocols to ensure the

safety of reused endourology instruments in the African context [55].

Conclusion

To make progress in the implementation of endourology in Africa, it is essential to take into account the particular challenges facing the region, while seeking appropriate solutions. These avenues, combined with a strong commitment from governments, healthcare professionals, and international partners, can contribute to the positive evolution of endourology practice. For sustainability, it is important that all actions can be monitored to ensure greater buy-in at local level and with partners. This follow-up will enable us to assess needs and progress, and thus define the level of endourology practice in African centres.

Disclosure of Interests

The authors declare no conflicts of interest.

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Abbreviations: GDP, gross domestic product; GPC, Global Philanthropic Committee; HOGGY, Hôpital Général de Grand Yoff; KCMC, Kilimanjaro Christian Medical Centre; LMICs, low- and middle-income countries; PCNL, percutaneous nephrolithotomy; URS, ureteroscopy; USD, United States dollar.