Status, Needs, and Perspectives on the Practice of Endourology in Africa: a Continental Survey of 21 Reference Centers

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Abstract

Endourology occupies an important place in modern urological practice. Compared with conventional surgery, it offers improved safety and patients experience less severe postoperative effects. Its use requires a certain level of equipment and technical skills. In many developed countries, it has been established for years and its practice has become routine. In Africa, it is still not very practical or even non-existent in certain reference centers. This survey conducted among the heads of urology departments or training coordinators in African referral centers defines the current practice of endourology. According to the needs and perspectives identified, it is important, if not essential, to create services or reference centers specializing in endourology. The role of these centers will be to take care of patients and train urologists in technical skills. The creation of a sub-regional and international network could contribute to the development of this practice. Multi-stakeholder cooperation (inter-state, with non-governmental organizations, companies or corporations) is also necessary.

Introduction

The global surgical effort invested in urology is minimal compared with other surgical specialties. Yet it is an essential and core component of surgery[1]. The global burden of urologic disease is enormous, and resources are inadequate to meet the need, particularly in some African countries[2]. This is compounded by a lack of qualified personnel and equipment[3]. In developed countries, endoscopy was used in urology for diagnostic purposes in the early 19th century[4], and for therapeutic purposes in the 1930s[5]. Today, in the age of robotic surgery, most

Key Words

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Competing Interests

None declared.

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Abbreviations

BOO Bladder outlet obstruction
CFS Clinical Frailty Scale
IDC Indwelling catheter
IPSS International Prostate Symptom Score
LUTS Lower urinary tract symptoms
PVR Post-void residual
TOV Trial of void
TURP Transurethral resection of prostate

operations are performed using open procedures in many African countries[6]. This results in long hospital stays, long recovery times, and associated high morbidity[7]. However, the practice of endourology depends on the availability of trainers to teach the technique, the availability of appropriate equipment and logistics, and most importantly, the sustainability of the practice[8]. Therefore, needs-based international collaborations have the potential to expand access to urology care in low-resource settings and improve subspecialty care in centers of excellence[9]. Organizations are working in a few African countries to promote the quality of urologic specialty care by training local urologists and equipping centers[10,11]. The success of this type of collaboration depends on the commitment of local stakeholders and the clarification of local needs[12]. In the African context, 3 main questions arise: (1) What are the magnitude and types of endourological needs? (2) How can international collaboration address these needs? (3) What form can this collaboration take to be effective and sustainable? To answer these questions, we conducted a survey of department heads and/or specialty coordinators in urology. This is the first survey focused on endourological practices to be conducted in Africa. Its objective is to define an inventory of the practice of endourology in reference centers in different African countries and determine local needs. The information gained from the survey will provide important background for developing through collaboration a strategy for future interventions

Methods

The survey consisted of a questionnaire sent by mail to the heads of urology departments and training coordinators practicing in the reference centers of several African countries. The questionnaire (**online Appendix 1**) included information on the centers, human resources, epidemiology of frequent pathologies and type of surgery performed, level of equipment and procedures performed, and needs. All authors completed the form, and adjustments were made to eliminate ambiguities and duplications. The answers were automatically collected and analyzed. The defined calculation was purely arithmetical, and the analyses were univariate. The collection period for the responses was November to mid-December 2022 (1.5 months). A second round of follow-up mailings was sent in early December to urologists who had not yet responded.

Endoscopic urological surgery was defined to included cystoscopic surgery of the lower urinary tract (basic) and ureteroscopic or percutaneous surgery of the upper urinary tract or laparoscopy (advanced).

The calculation was purely arithmetical, performed in Excel. **Table 1** shows the countries and referral centers that participated in the survey.

Results

A survey response rate of 58.3% was achieved, with 36 referral centers involved.

On average, there are 4.1 senior urologists per center. Of these, 2 are experienced in basic endourological procedures. Over the past 5 years, 15 centers have trained fewer than 10 urologists, 2 centers have trained between 10 and 20 urologists, and 5 centers have trained more than 20 urologists. At the time of the survey, the number of urologists in training was distributed as follows: less than 5 in 8 centers, between 5 and 10 in 6 centers, and more than 10 in 7 centers.

In 76.1%, 42.8%, and 23.8%, benign prostatic hypertrophy, lithiasis pathologies and urological cancers (mainly prostate cancer) represented the first, second, and third pathology encountered in the different centers, respectively.

Open surgery was used for the management of kidney stones in 57.1% of centers, regardless of the size and location of the stone. For the management of complicated benign prostatic hypertrophy, open surgery was used in 52.3%, regardless of the size of the prostate.

Of the 21 centers, 15 had an operating room equipped with basic endourological equipment. Six centers were not equipped with endourological surgery equipment. Of all the centers equipped with endourology equipment[15], endoscopic urological surgery has been performed for less than 5 years in 4 centers, between 5 and 10 years in 4 centers, and more than 10 years in 7 centers. The brands used in the centers were distributed as follows: Storz in 11 centers, Olympus in 5 centers, Wolf in 2 centers, and Stryker, Pentax, and Gimmi in 1 center each. Seven centers are equipped with 2 brands of endoscopic equipment. The centers without fluoroscopy represented 61.9%.

Centers reported performing more basic than advanced endourological procedures. Three of 21 centers (14.2%) provide stone management with extracorporeal shock wave lithotripsy. **Table 2** summarizes all the procedures

TABLE 1.
Distribution of countries and centers that participated in the survey

Country	City	Center or Institution
Benin	Cotonou	Centre National Hospitalier Universitaire Hubert Koutougou MAGA de Cotonou
Burkina Faso	Ouagadougou	Centre Hospitalier Universitaire Yalgado Ouédraogo
Burundi	Bujumbura	Centre Hospitalier Universitaire de Kamenge
Cameroon	Douala	Hôpital Général de Douala
Congo	Brazzaville	Centre Hospitalier Universitaire de Brazzaville
Ivory Coast	Abidjan	Centre Hospitalier Universitaire de Treichville
Ethiopia	Addis Ababa	Saint Paul's Hospital Millennium Medical College
Guinea	Conakry	Hôpital National Ignace Deen
Madagascar	Antananarivo	Centre Hospitalier Universitaire Joseph Ravoahangy Andrianavalona
Mali	Bamako	Centre Hospitalier Universitaire du Point G
Morocco	Casablanca	Centre Hospitalier Universitaire Ibn Rochd
Niger	Niamey	Hôpital Amirou Boubacar Diallo
Nigeria	Sokoto	Usmanu Danfodiyo University and Teaching Hospital
Ethiopia	Wolaita Sodo	Wolaita Sodo university comprehensive Specialized hospital
Central African Republic (CAR)	Bangui	Centre Hospitalier Universitaire de l'Amitié Sino-Centrafricaine
Rwanda	Kigali	University Teaching Hospital of Kigali
Senegal	Dakar	Hôpital Aristide Le Dantec
South Africa	Cape Town	Groote Schuur Hospital
Chad	N'djamena	Centre hospitalo-universitaire la Référence Nationale
Togo	Sokodé	Centre Hospitalier Régional de Sokodé
Zambia	Lusaka	Levy Mwanawasa University Teaching hospital

performed in the centers.

Of the 21 centers, 9 have an operating room equipped with laparoscopy, 4 of which perform laparoscopic urological surgery. On average, 1.3 procedures are performed per week. The main procedures performed were total extended nephrectomy (4/4), cure of pyeloureteral junction syndrome (3/3), promontofixation (2/4), cystectomy and prostatectomy (1/4).

Regarding access to CT scans, it was easy in 13 centers and difficult in 6 centers. Two centers did not have a CT scan. Of the 21 centers, only 1 had a robot. Of all the urologists, 2 practiced urological robotic surgery (9.5%).

A total of 28.5% of centers have a surgical simulation unit, and 38.1% have a urological exploration unit.

To the question "Do you have difficulties to have consumables and endo-urological materials," 3/21 answered no, 6/21 answered "We do not practice endo-urology," and 12/21 answered "Yes." The need for training in endourology was expressed by 95.2% of centers.

Discussion

Survey participants reported that 2 out of 4 urologists surveyed had the basic skills needed to perform endourology procedures. This was due to the lack of local expertise in the field, which had a significant effect on ongoing education and training. This problem is primarily found in Africa, with the greatest prevalence in Sub-Saharan Africa. Many urological care providers in this region are general surgeons who have minimal training in urological procedures. PAUSA President Professor Olapade-Olaopa stated in March 2016 that only 130 urologists exist in all of Nigeria; the country has a

TABLE 2.

Procedures and Centers

Procedure	Centers	
	n/N	%
Endoscopic surgery of the upper urinary tract		
PCNL	3/21	14.2
Flexible ureteroscopy + laser	9/21	42.8
Rigid ureteroscopy + laser	11/21	52.3
Endoscopic surgery of the lower urinary tract		
Transurethral resection of the prostate	15/21	71.4
Transurethral bladder resection	15/21	71.4
Endoscopic internal urethrotomy	15/21	71.4
HoLEP	0/21	00

population of 170 million[13]. The creation of urologist training centers and the presence of local experts are necessary to address this issue.

Many centers report treating patients with benign prostatic hypertrophy, urinary stones, urinary tract health problems and urologic cancer. This is similar to previously published findings[14–16]. It is important for medical professionals to understand the local epidemiology of common urologic diseases so they can provide their patients with the best care possible. This serves as a foundation for the development and expansion of services, as well as for coordinating subspecializations. It also supports local and national governments and non-government aid agencies in defining their main focus[14].

A contemporary analysis has shown that in Europe, open surgery typically accounts for only 1%–5% of surgical treatment of upper urinary tract stones[17]. In Africa, open surgery still occupies an important place in stone management[18]. In the present survey, 57.1% of centers reported still performing open surgery for stone management, regardless of stone size and location. A 2020 systematic review by Cassel et al.[19] found that in 9 African countries, the rate of open surgery for the treatment of upper tract urinary lithiasis was approximately 69.5%. Comparing the 2 techniques (open and endoscopic surgery), Kane et al.[20] in Senegal noted that endoscopic surgery offered a short hospital stay with fewer complications. Its cost was 3 times higher than that of open surgery. Additional barriers include the limited number of centers equipped with endourological equipment, the insignificant number of urologists trained in endoscopy, and also the health system that does not provide social security, thus imposing a direct financial contribution from patients before any treatment.

Regarding the management of prostate hypertrophy, 52.3% of centers perform open surgery. In an exploratory study conducted in 8 African countries (Nigeria, Kenya, Togo, Ethiopia, Egypt, South Africa, Ghana, and Congo), open surgery was by far the most common method used in the management of benign prostatic hypertrophy, 73.8%[21]. The reasons for this finding may be similar to those made in the management of calculus. The equipment of the centers and the training of urologists could help to reduce the practice of open surgery.

Among the 15 equipped centers, 53.4% had begun endourology less than 10 years earlier. The implementation of urological endoscopic surgery is still recent in some African countries: in 2009, with the support of Urolink in Hawassa, Ethiopia[22], 2014 in N'djamena, Chad[23], and 2021 in Kara, Togo[24].

In developed centers, the practice of minimally invasive surgery is now the rule. Compared with open surgery, minimally invasive techniques offer particular advantages: less postoperative pain, shorter hospital stay, low rate of postoperative infections, rapid resumption of transit, short convalescence, allowing a quicker resumption of activities, and better aesthetic results[25,26]. Major expenses, such as the purchase and maintenance of equipment, stand in the way of laparoscopic operations becoming mainstream in low- and middle-income countries. Only 19% of surveyed centers perform laparoscopic urological surgery. This can be increased through work with government and medical equipment suppliers to create reference centers in each country[27].

Laparoscopic skills evolve with repetition and are often associated with slow learning curves[28]. According to the study published by Biyani et al.[29], a minimum of 22 procedures is required to master the laparoscopic nephrectomy technique. This learning curve is about 10 times higher for laparoscopic radical prostatectomy[30]. For Farrow et al.[31], in resource-limited countries, a sustainable, low-cost laparoscopic system combined with a laparoscopic surgical training program should be considered as a potential solution to current barriers.

Simulation training presents an excellent modality to increase and improve both the volume and access to high-quality surgical skills training[32]. In this survey, 28.5% of centers are equipped with at least one urology simulator. Campain et al.[32] previously reported on the impact and potential of simulation for technical skills training in Sub-Saharan Africa. There is a wide variety of

technical skills simulators available, ranging from basic box trainers to robotic systems[33]. In our context, the low-cost, real-world technical simulator developed by Ooi et al.[34] can be used. Dedication to finding solutions and cooperation with non-governmental organizations is crucial for any charity working to provide resources to patients. This is because health care centers need to match the economic development levels of the countries in which they are located. Additionally, many health care nonprofits struggle with materials and consumables due to a lack of economic development in their area.

To address these challenges, it is important to work with local health authorities and collaborate with NGOs. A partnership can be defined that focuses on facilitating the procurement of materials and consumables. In order to solve the problem of lack of some consumables, the center can develop cold sterilization. It is also important to determine follow-up regimens to reduce the risk of infectious complications.

The need for training expressed by the centers is enormous. This is due to the lack of local urologists with expertise in endourology and limited training capacity[35].

International collaboration among urologists based on local needs has the potential to expand access to urologic care in low-resource settings and to refine subspecialty care in centers of excellence. It is important to identify the context-specific needs of international partners, and interventions may need to extend beyond training support[9]. Thus, understanding the core operational capacity in these countries is paramount before embarking on an improvement effort[36].

Conclusion

In some African countries, the endoscopic urological surgery is either in its infancy or not yet performed. Governments must place special emphasis on surgery as a specialty in its own right. The creation of urologic care referral centers by country and sub-region can improve patient management and resident training, as can the ability of young urologists to acquire technical and targeted skills. Inter-state cooperation and cooperation with non-governmental organizations, as well as workshops conducted by international urologists through volunteer organizations, can develop local expertise. This cooperation must be focused on local needs while clearly identifying blocking and sustaining factors. In sum, the establishment of a clear project for each country is essential to develop the practice of modern urology in Africa.

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