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Urologic Disease in a Resource-poor Country

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Abstract
Background Understanding the role that urologic disease plays within central Haiti could lead to the development of sustainable and regionally appropriate urologic care. We aim to document the prevalence of urologic surgical disease presenting for treatment in central Haiti.
Methods The present study is based on a retrospective review of surgical case logs at five Partners in Health and Zanmi Lasante hospitals in central Haiti. Data were collected from June 30, 2009, through July 29, 2010, and included patient demographics, disease processes, interventions required, surgeon name, and surgeon training (urologic trained versus non-urologic trained).
Results Urologic surgical disease comprised 498/5,539 (9.0 %) of all surgical cases in central Haiti from July 2009–July 2010. A total of 492 diagnoses and 498 urologic procedures on 469 patients were recorded. Most common diagnoses included hydrocele (33.3 %), phimosis (23.0 %), benign prostatic hyperplasia (10.8 %), and cryptorchidism (7.3 %). Hydrocelectomy was the most commonly performed procedure (160/498, 32.1 %), followed by circumcision (117/498, 23.4 %) and open prostatectomy (38/498, 7.6 %). Surgeon training (urologic versus non-urologic) was determined for 360/498 (72.3 %) of surgical cases. Urologic trained surgeons performed 55/360 (15.3 %) of all surgical procedures. Among patients who underwent prostatectomy, urology surgeons performed 14/31 (45.2 %) of open prostatectomies, and non-urology surgeons performed 17/31 (54.8 %). Urologists performed all transurethral resections of the prostate (9 vs. 0; $p = 0.0051$).
Conclusions Urologic surgical diseases comprise a substantial source of morbidity for patients in central Haiti. Understanding the scale and scope of urologic disease is important in developing health systems to adequately address the regional burden of surgical disease in limited-resource settings.

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Introduction

The majority of global health research and funding in low- and middle-income countries (LMIC) to date has focused on primary care and infectious disease. However, over the past decade, there has been an increased interest and awareness of the role of surgery as an important part of global public health efforts in resource-poor countries. Along with this interest, the body of literature from general surgeons has been slowly growing. Still, little is known about the true magnitude of the general surgical disease burden in these communities [1–7]. Even less has been documented about the scale or scope of subspecialist surgical care in resource-poor settings. Specific to urologic surgical disease in global health, the published data have

focused primarily on vesicovaginal fistulae and urinary stone disease [8–13].

The aim of the present study was to document the prevalence of urologic surgical disease in patients presenting for treatment in central Haiti. Establishing a baseline for understanding the role that urologic disease plays within this resource-poor community could lead to the development of sustainable and regionally appropriate urologic care.

Materials and methods

We conducted a retrospective review of operative logbooks at five Partners in Health (PIH)/Zanmi Lasante (ZL) hospitals in central Haiti (Belladère, Cange, Hinche, Petite-Rivière de l'Artibonite, and Saint-Marc). Data were collected on all consecutive surgical patients from June 30, 2009, through July 29, 2010. Patient demographics (age, gender, home location, treating hospital), date of surgery, primary diagnosis and procedure, secondary diagnosis and procedure (if applicable), name of treating surgeon, and length of procedure were examined. Operative cases were defined as those performed in the operating room. Data were unavailable for cases performed under local anesthesia or outside the operating room. Surgeon training was defined as urologic versus non-urologic; this information was gathered from each individual surgeon. Fisher's exact and McNemar's tests were used to determine significance between prostatectomy approach and surgeon training, and a significance level was set for $p \leq 0.05$. Statistical analyses were performed with SPSS version 19.1 (SPSS, Inc., Chicago, IL).

Table 1 Surgical specialty (primary and secondary diagnoses)

Total (%)	5,539
Ob/Gyn	2,031 (36.7)
General surgery	1,816 (32.8)
Urology	498 (9.0)
Non-traumatic orthopedics	307 (5.5)
ENT	133 (2.4)
Plastic surgery	22 (0.4)

Ob/Gyn obstetrics and gynecology, *ENT* ear, nose, throat

Table 2 Demographics

Total patients	469
Male	431 (91.9 %)
Mean age, years (SD)	33.1 (±24.1)
0–10 (%)	111 (24.6)
11–20	64 (14.2)
21–30	66 (14.6)
31–40	54 (11.9)
41–50	33 (7.3)
51–60	34 (7.5)
61–70	60 (13.3)
>71	30 (6.6)
Site (%)	
Cange	190 (40.5)
Hinche	122 (26.0)
Saint-Marc	92 (19.6)
Belladère	55 (11.7)
Petite-Rivière de l'Artibonite	10 (2.1)

Results

Urologic surgical disease comprised 498/5,539 (9.0 %) of all surgical cases in central Haiti from July 2009 to July 2010 (Table 1). A total of 469 patients underwent 498 urologic procedures for 492 separate urologic diagnoses. Table 2 illustrates the demographic characteristics of the study population. Most patients were men, 431/469 (91.9 %), and the average age was 33.1 years. The majority of surgical procedures were performed at Cange, which is the main PIH/ZL hospital within the Central Plateau.

The most commonly treated urologic surgical diagnoses are listed in Table 3. Hydrocele was most common (164/492, 33.3 %), followed by phimosis (113, 23.0 %), benign prostatic hyperplasia (BPH) (53, 10.8 %), and cryptorchidism (36, 7.3 %). Stone disease accounted for just eleven total urologic cases (7 for bladder stones and 4 for nephrolithiasis). In line with surgical diagnoses, hydrocelectomy and circumcision were the most commonly performed procedures (160/498 or 32.1 % and 117/498 or 23.4 %, respectively). Although other procedures were performed comparatively less frequently, the spectrum of urologic surgical care delivered at the PIH/ZL hospitals was diverse (Table 4).

We obtained surgeon training information (urologic trained versus non-urologic trained) for 360/498 surgical cases (72.3 %). Urologic trained surgeons performed 15.3 % (55/360) of all surgical procedures during this time period in central Haiti. In order to determine an association between urologic subspecialty training and prostatectomy approach, we examined a subset of patients who received either open prostatectomy or transurethral resection of the prostate (TURP) for BPH. Urologists performed 14/31 (45.2 %) of open prostatectomies while non-urologists performed 17/31 (54.8 %). However, urologic surgeons performed all TURPs (9 vs. 0). This was

Table 3 Urologic diagnoses

Diagnosis	Number (%)
Total	492
Hydrocele	164 (33.3)
Phimosis	113 (23.0)
Benign prostatic hyperplasia	53 (10.8)
Cryptorchidism	36 (7.3)
Urinary retention	15 (3.0)
Varicocele	12 (2.4)
Prostate cancer	11 (2.2)
Abscess	9 (1.8)
Bladder stone	7 (1.4)
Urethral stricture	6 (1.2)
Condyloma	5 (1.0)
Paraphimosis	5 (1.0)
Nephrolithiasis	4 (0.8)
Renal mass	3 (0.6)
Penile cancer	3(0.6)
Vesicovaginal fistula	3 (0.6)
Other	43 (8.7)

Table 4 Urologic procedures (1st and 2nd interventions)

Procedure	Number
Total cases	498
Hydrocelectomy	160 (32.1 %)
Circumcision	117 (23.4 %)
Prostatectomy	38 (7.6 %)
Orchiectomy	33 (6.6 %)
Orchiopexy	26 (5.2 %)
Cystotomy	15 (3 %)
Varicocelectomy	12 (2.4 %)
Incision and drainage	11 (2.8 %)
TURP	10 (2.0 %)
Cystolithotomy	9 (1.8 %)
Nephrectomy	7 (1.4 %)
Exploratory laparotomy	4 (0.8 %)
Penectomy	4 (0.8 %)
Urethral dilation	4 (0.8 %)
Dorsal incision	3 (0.6 %)
Urethroplasty	3 (0.6 %)
Pyelotomy	2 (0.4 %)
Cavernocavernosum shunt	1 (0.2 %)
Inguinal dissection	1 (0.2 %)
Other	38 (7.6 %)

TURP transurethral resections of the prostate

statistically significant ($p = 0.0051$). Surgeon training information was not available for 7 open prostatectomies and 1 TURP.

Discussion

Treatable surgical disease conditions contribute substantially to morbidity and mortality in resource-poor countries [14]. As attention to the delivery of essential surgical services increases globally, the awareness and need for subspecialist surgical care has become more important [1, 2]. In this study, we report on the scale and scope of urologic surgical disease in a resource-limited setting. As such, our investigation provides unique data for the potential role of the urologic specialist in global surgical development.

From July 2009 to July 2010, almost 500 urologic procedures were performed at the five PIH/ZL hospitals in Central Haiti, representing 9.0 % of all surgical procedures. Obstetrician/gynecologists and general surgeons performed the majority of procedures during this time period, 36.7 and 32.8 %, respectively. Hydrocelectomy, circumcision, and prostatectomy were the most commonly performed procedures, but a wide variety of urologic pathology was treated surgically in central Haiti, including renal masses, penile cancer, urethral stricture, and vesicovaginal fistulae.

The majority of patients in our study were men with an average age in their early thirties, reflective of the pathologies observed: hydrocele, phimosis, and benign prostatic hyperplasia. Hydroceles may be due to a variety of different pathologies including trauma, tumors, a patent processus vaginalis, or infection. They are associated with significant morbidity, causing a disruption in sexual ability and physical activity that can significantly affect one's quality of life as well as the ability to work and earn a living [15]. While still relatively common in the United States, hydroceles present an interesting source of urologic disease in low-resource settings. Lymphatic filariasis (LF) is the most common cause worldwide for the development of hydrocele, and LF is endemic in roughly 80 countries, including Haiti [16, 17]. There are an estimated 120 million cases worldwide, over 25 million of which result in hydrocele, most commonly caused by *Wuchereria bancrofti* [18]. While medical treatment may be appropriate for patients who do not yet have clinical manifestations, surgical therapy remains the mainstay of symptomatic disease [15]. Filarial hydroceles may be treated effectively in LF endemic countries with low rates of infection and recurrence. In a capacity-building study of 10 West African countries, trained urologists organized 16 workshops at which 214 surgeons performed 3,000 hydrocelectomies. A complication rate of 5–7 % was reported and included infection, hematoma, and/or delayed wound healing; rates of recurrence varied by country, ranging from 3 to 5 % [19].

In Haiti's Central Valley, male circumcision was the second most frequent urologic procedure preformed

(23.4 % of total urologic operations in our study). The procedure has a variety of indications, and it provides another unique insight into both the surgical treatment of urologic disease in developing countries, and into the potential interface between subspecialist surgery and global public health. Circumcision has been advocated for associated reductions in sexually transmitted diseases, and for decreases in penile cancer, urinary tract infections, paraphimosis, and inflammatory dermatoses [20]. Substantial evidence links the practice of circumcision to the prevention of transmission of HIV/AIDS. The data come from both developing nations and industrialized nations [21]. The foreskin not only contains a high density of HIV target cells but also is subject to micro-tears during intercourse that can facilitate HIV entry. Additionally, uncircumcised men are more susceptible to syphilis and other pathogens that can cause genital ulcer disease and increase the transmission of HIV/AIDS [22, 23].

Benign prostatic hyperplasia was the third most common diagnosis encountered in our data. In the United States, endoscopic transurethral procedures are routinely performed for symptomatic BPH refractory to medical therapy. As of 2005, 96 % of BPH surgeries in the United States were performed with a transurethral approach [24, 25]. In addition to minimally invasive options, open prostatectomy may be performed, with improvement in urinary obstructive symptoms (i.e., significantly improved urinary flow rate and post-void residual volume) [26]. Although this procedure is associated with a larger blood loss and longer hospital stay, open prostatectomy is preferred in patients with gland size greater than 80 ml, bladder stones, and bladder diverticula. The recommended approach is also dependent on the surgeon's experience [25].

In Haiti, specific data regarding indications for the procedures performed were not available. However, we were interested in determining whether a difference existed in the choice of therapy (TURP versus open prostatectomy) between urologic and non-urologic trained surgeons. In our cohort, all BPH patients treated by general surgeons underwent an open prostatectomy, and all of the TURP procedures were performed by surgeons with urologic specialty training. Data regarding prostate size and concomitant bladder pathology were not available, but it is possible that general surgeons performed only retropubic or suprapubic prostatectomy because of limitations in their comfort and proficiency with transurethral procedures. Outcomes from these procedures were not recorded, and it is unknown if there were differences in results or complications of procedures performed by general surgeons and urologists. Future work may address the benefit-cost ratio associated with training urologic surgeons in LMIC versus training general surgical practitioners to treat the most common urologic surgical diseases as indicated by the data from this study. This may be a direct way to use this information as a building block for horizontal health systems strengthening.

There are several limitations to our study. This assessment includes only those patients who sought care and were treated at one of the five PIH/ZL hospitals. The PIH/ZL hospital at Cange is an internationally supported health facility that may differ from other district hospitals in other countries. Therefore, our results may not be wholly representative of other hospitals in rural areas of LMIC. Additionally, there are individuals who suffer from urological disease, yet do not go to a health care facility to obtain treatment. These people represent an unmet burden of urologic disease that is not captured in our study. Furthermore, a large amount of urologic disease is treated nonoperatively or on an outpatient basis [27]. We included only procedures performed in the operating room, excluding those patients who underwent minor procedures outside the operating room or in the outpatient setting. Lastly, these data were collected over the six months preceding and the six months after the devastating earthquake of January 12, 2010. Health care delivery after the earthquake was focused on urgent needs and trauma management of the local population. Therefore, it is conceivable that treatment of some of the non-urgent urologic disease was postponed until resource availability shifted back to pre-earthquake levels [28]. For these reasons, our analysis clearly underestimates the total burden of urologic surgical disease within the community.

Through our documentation of the epidemiology of urologic surgical disease in central Haiti, we provide a necessary first step in establishing the importance of providing surgical subspecialty care in LMIC. Future studies should elaborate on the data with more comprehensive assessments of both the met and unmet burden of urologic disease in resource-poor settings. In coordination with advances in clinical outcomes data collection, this will provide key information from which to build sustainable surgical programs within the community.

Conclusions

Demonstrating the scale and scope of urological disease represents a first step in the strategic development of urologic specialist surgical programs in low-resource countries. We have demonstrated a substantial burden of urological disease in central Haiti, the majority of which is cared for by local general surgeons. Increased awareness and understanding of urologic surgical disease in resource-poor settings will help develop the role for sustained provision of urologic specialist care as an important part of health systems strengthening.

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