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P. M. NGUGI, G. A. O. MAGOHA and D. KIPTOON

ABSTRACT

***Background*: Urolithiasis is an emerging problem in Kenya previously thought to be very rare and in which the use of modern methods of treatment has not been widely practiced**
***Objective:* To review the presentation and management of patients presenting with urolithiasis in Nairobi, Kenya**
***Design*: A retrospective study**
Setting: The Nairobi hospital and Upper Hill Medical Centre a day care facility next to the Nairobi hospital
***Subjects*: One hundred and twenty five males and fifty three females aged 9 to 75 years**
***Results*: One hundred and seventy eight patients were treated for urolithiasis over a five-and- half year period. Their mean age was 44.8 years, and the median was 45 years The 178 patients required 262 procedures to achieve stone clearance. One hundred and two patients had ESWL, with an overall stone clearance rate of 95%. Twenty-three patients had PCNL; 18 as the first procedure and 5 after failed ESWL. Fifty-one patients had ureteroscopic**
***Management*: Fourty seven had laser or pneumatic lithotripsy while four had stone removal by Dormia basket. Seven patients had bladder calculi managed by either cystolitholapaxy or forceps retrieval.**
***Conclusions:* This study demonstrates a higher annual incidence of urolithiasis in Nairobi than earlier literature. Study demonstrates that ESWL and ureteroscopic methods are highly effective in the treatment of renal and ureteral calculi as day care procedures.**

INTRODUCTION

Urolithiasis occurs worldwide and has a prevalence of 2-3% in the population. It is relatively rare in Native Americans, African Blacks and Israelis as compared to Whites and Asians (1). The prevalence is higher in mountainous, desert and tropical areas. The peak incidence occurs in the third and fourth decades of life and the male to female ratio is 3:1 (1).

The epidemiological profile of urolithiasis varies from one region of the world to another according to food habit and other, largely environmental, factors. Urolithiasis is a problem that is generally increasing in tropical African countries (2, 3). The epidemiological profiles of urinary stones in Egyptian and Tunisian patients have been reported to be intermediate between that of developing tropical countries where dietary causes predominate, and the developed industrialised countries where infectious and metabolic calculi are observed (4, 5).

Etiological factors include obstructive uropathy, urinary tract infection, prolonged catheterisation, hypercalcemia, foreign bodies in the urinary tract and hyperparathyroidism (6). Upper urinary tract calculi are usually strongly associated with rich industrialised and western countries of the world, due to high calcium and protein consumption (7). Lower urinary tract calculi within the bladder and

urethra have been reported to be traditionally found in poorer developing tropical countries with high-carbohydrate, low-protein diets (8).

MATERIALS AND METHODS

We retrospectively reviewed files of all patients treated for urolithiasis by one of the authors (PMN) in his practice in Nairobi, Kenya from January 2004 through June 2009. All patients treated during this study period were included in the study

All patients were managed in the Upper Hill Medical Centre with the ESWL being done as an outpatient procedure under sedation while ureteroscopies were performed as day surgery under general anaesthesia. The patients who had percutaneous nephrolithotomies (PCNL) were admitted for two to three days postoperatively.

All patients had radiologically confirmed stone disease; by plain radiography, intravenous urography or computerised tomography. Stone clearance was confirmed by intravenous urography.

ESWL was done under sedation using an Allenger's Urolith Lithotripter machine (Allengers Medical Systems, Chandigarh, India) under fluoroscopic guidance. The ureteroscopies and PCNLs were all performed by one of the authors (PMN). Ureteroscopy was done using a semirigid Karl Storz ureteroscope. Lithotripsy was achieved with either a Karl Storz laser lithotripter (Karl Storz Calculase®, Karl Storz GmBH & Co. Tuttlingen, Germany) or a pneumatic lithotripter (Karl Storz Calcusplit®, Karl Storz GmBH & Co. Tuttlingen, Germany).

Earlier literature indicates urolithiasis as rare in this locality with very low incidence being reported and no detailed epidemiological data (9, 10). The earlier studies also found that there were significant difficulties in accessing the new technologies in this region. However, more recent work would suggest that urolithiasis is a significant emerging problem in sub-Saharan Africa (11, 12).

The last thirty years has seen tremendous improvements and changes in the management of urinary stone disease with the introduction of Extracorporeal Shock Wave Lithotripsy (ESWL) and the development of refined endourology techniques (13, 14). This has resulted in the management of urolithiasis being mainly by minimally invasive endourological techniques and ESWL.

However, while these developments have been rapidly adopted in the western world, Africa has lagged behind, probably due to the initial cost implications of new technology. Earlier works reported difficulties with ESWL and other modalities of urolithiasis management in Nairobi (9, 10). This work seeks to appraise the current modalities of management of urolithiasis in this region.

Data were extracted and entered into a computer spreadsheet and then analysed using SPSS version 13 (SPSS Inc).

RESULTS

There were 178 patients treated for urolithiasis during the study period; 155 (87.1 %) as day cases, and 23 (12.9%) as in-patients. Their mean age was 44.8 years with a range of 9 to 75 years. The male: female ratio was 2.4: 1.

The annual and monthly distribution of urolithiasis is illustrated in Table 1 and Fig 1 respectively. The age distribution was shown in Figure 2

Table 1

Annual distribution of urolithiasis in Nairobi, Kenya

Year	No of patients	Percentage of the total
2004	14	7.86
2005	34	19.1
2006	34	19.10
2007	27	15.17
2008	34	19.10
2009	35	19.67
Total	178	100

N=178

Figure 1

Monthly distribution of urolithiasis in Nairobi, Kenya

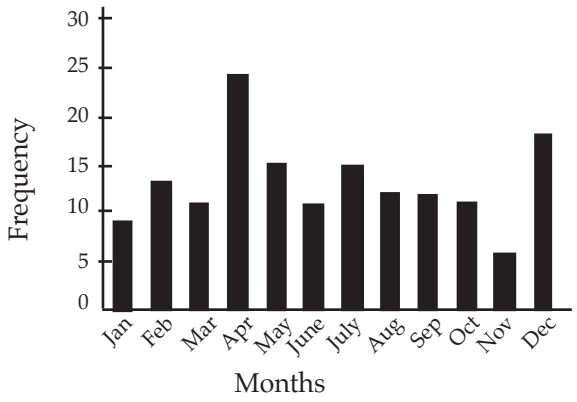
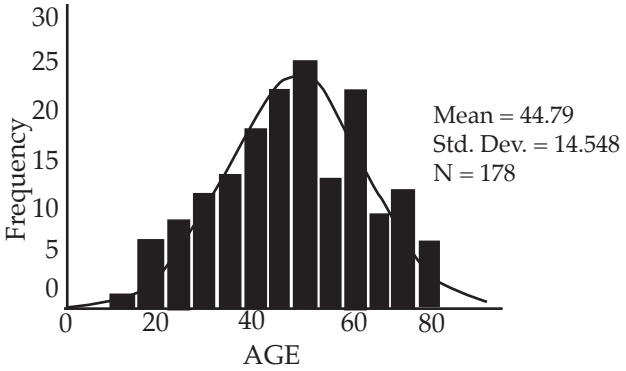


Figure 2

Age distribution for patients with urolithiasi



The Extra corporeal shock wave lithotripsy (ESWL) was done in one centre; and the ureteroscopies

and Percutaneous nephrolithotomy [PCNL] at the same centre when done as day cases and in one hospital (The Nairobi Hospital) when done as in-patient procedures. Twenty one patients were admitted while 157 were done as day care patients.

There were 99 (55.62%) patients with calculi in the renal pelvis, 72 (40.45%) patients with ureteric calculi and seven (3.93%) patients with bladder calculi Table 2.

A majority of the calculi were right sided with 58% of renal stones being right sided and 54% of ureteric calculi being right sided.

Table 2
Urolithiasis In Nairobi, Anatomical Site Of Lodgment

Anatomical site	Number	Percentage
Renal pelvis	99	55.62
Ureteral	7	40.45
Bladder	7	3.93
Urethra	0	0
Total	178	100

N=78

The treatment for the 178 patients entailed 267 procedures. One hundred and twenty four patients (69.66%, n=178) had calculi clearance after a single procedure. The rest required multiple procedures: 27 required two procedures, 24 required three procedures and three required four procedures. Five patients underwent PCNL following failed ESWL Table 3.

Table 3
Urolithiasis in Nairobi, Management

Procedure	Number	Percentage of the total
ESWL	97	54.49
ESWL followed by PCNL	5	2.81
PCNL	18	10.11
Ureteroscopy and laser lithotripsy	47	26.4
Ureteroscopy and dormia basket extraction	4	2.25
Cystoscopy and stone removal	4	2.25
Cystolitholopaxy	3	1.64
Total	178	100

N=78

Key: ESWL- Extracorporeal Shock Wave Lithotripsy
PCNL- Percutaneous Nephrolithotomy

Three of the patients with bladder calculi had cystolitholapaxy while the rest underwent forceps removal at cystoscopy.

Eighty one patients with calculi in the renal pelvis underwent extracorporeal shock wave lithotripsy as initial management; seventy six (77%, n=99) of them had stone clearance after extracorporeal shock wave lithotripsy (ESWL); and five (6%, n=99) required subsequent percutaneous nephrolithotomy.

Eighteen (18%, n=99) of the patients with calculi in the renal pelvis had percutaneous nephrolithotomy (PCNL) as the first procedure while another five patients had PCNL after failed ESWL.

Twenty one (29.16%, n=72) of the 72 patients with ureteric calculi were managed by ESWL and 51 (70.83%, n=72) had ureteroscopic management for calculi. Forty three of the patients (84.31 %, n=51) who underwent ureteroscopy had laser lithotripsy, while four (7.84%, n=51) had Calcusplit® pneumatic lithotripsy and another four (7.84%, n=51) had calculi removed by Dormia basket (Table 3). All patients who had ureteroscopy had ureteral stent placement.

There were no perforations or conversions,thus 102 patients had ESWL as their first treatment (81 for renal calculi and 21 for ureteric calculi). In this group of patients 97 (95%) had stone clearance; 47 (48.45%) after a single ESWL session, 26 (26.80%) after two sessions, 21 (21.65%) after three sessions, and three patients (3.09%) required four ESWL sessions. Five patients with calculi in the renal pelvis had failed ESWL and subsequently underwent PCNL.

DISCUSSION

The management of urinary calculus disease in Kenya is still in its infancy with all the modern facilities concentrated within the Nairobi metropolis. Thus all patients who require endoscopic management or ESWL for urinary tract stones have to be referred to the few centres available.

The findings in this study of 178 patients with urinary calculus disease in Nairobi over a 5.5 year period indicate that the incidence of urinary calculus disease in Africa is on the increase as previously reported by Ekwere at the University of Calabar Teaching Hospital in South Eastern Nigeria (6). The findings are in contrast to previous reports indicating the rarity of the disease among Africans. Esho at the Lagos University Teaching Hospital carried out an epidemiological survey of the disease in large medical centres through out Nigeria. He reported the disease as rare in Nigerians despite high temperature and mainly carbohydrate diet and attributed these findings to possible low calcium in Nigerian waters and low consumption of dairy products among other factors (15). Mbonu *et al* at the University of Nigeria

Teaching Hospital, Enugu and other researchers from the University of Nairobi had reported similar findings (9,10, 16, 17).

The technological advancement over the past three decades has dramatically changed the modalities of treatment for urinary calculi. The introduction of extracorporeal shock wave lithotripsy (ESWL) revolutionised urinary calculi management and made traditional open surgery options of treatment for urolithiasis unnecessary in most instances (18). The non - invasiveness, low potential for complications and acceptable efficacy has made ESWL the preferred treatment option for urinary calculi in the renal pelvis and proximal ureter (14, 19). Furthermore the ability of anaesthesia free treatment and easy patient and equipment handling has made ESWL treatment an outpatient procedure of choice with success rates of 85 - 93% (19, 20). Other authors have however reported varying degrees of success with newer ESWL machine generations, but generally the stone free rates remain high and encouraging after treatment (21, 22).

The majority of patients in this study (97; 54.49%) were successfully treated with extracorporeal shock wave lithotripsy (ESWL). These patients had upper urinary tract calculi 78.35% renal pelvic and 21.65% proximal ureteric and 48% achieved stone clearance after one ESWL session while the rest required multiple sessions. The need for repeated treatment in a substantial fraction of patients undergoing ESWL is the only significant drawback and has been reported previously (17). Our 95% stone-free rate following ESWL compares favorably to 91.7% reported in Egypt (23).

Although our patient numbers for PCNL is small, our success rates compare favourably with that reported in the literature (24). In the earlier reported series in Nairobi PCNL had been reported as not being feasible (10).

Fifty one patients with lower ureteric calculi had successful ureteroscopic management by laser or pneumatic lithotripsy, and Dormia basket removal. This represents 100% stone clearance for ureteroscopy in our resource poor setting and compares well with contemporary literature (14, 22). The majority (157) of our patients were treated as day care patients demonstrating that inpatient care is mostly unnecessary when patients are operated using modern technologies, a saving in resources in this poor resource setting.

A major drawback of this retrospective study was that there was no stone analysis data that could be obtained because no stone analysis had been done. Stone analysis would have helped us characterise the stones better. We plan to do a prospective study in which stone analysis will be done

In conclusion, more stone disease is reported in this series than had been previously (9,10,17). This could be an indicator of increasing urinary tract stone burden. These results show a marked improvement from ten years ago when Oliech *et al* (10) reported operational problems in Nairobi with both ESWL and PCNL procedures. This study also shows that ESWL and ureteroscopy are effective treatment methods for upper urinary tract stones and are feasible when done as day care procedures in a resource poor setting. For large stones not amenable to ESWL treatment, percutaneous nephrolithotomy is effective.

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