Chronic dehydration and symptomatic upper urinary tract stones in young adults in Ibadan, Nigeria.

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Summary

Introduction: **Upper urinary tract stones are relatively uncommon in Nigeria and they are most often seen in men in their 4th and 5th decades. There is however no recent report on this disease from our locality. This retrospective study was done to evaluate the pattern of presentation of upper tract urolithiasis in our institution.**

Patients and Methods: **We reviewed all cases of renal stones referred to a single Consultant in a Teaching Hospital in Southwestern Nigeria over a two year period.**

Results: **Twenty cases of renal calculi presented within the study period. All patients presented with sudden onset of loin or back pain, and the diagnosis was confirmed radiologically. The mean age of our patients was 27 years (age range 13-38 years), and the male to female ratio was 1.5: 1. Nineteen patients (95%) reported poor fluid intake (<1.5L/day), and 17/20 (85%) frequently total fasted totally (no water or food intake) for religious reasons. Serum calcium was normal in 15 of 16 patients (94%) and only marginally raised in the remaining patient. All patients were treated with a high fluid intake (3L/day) and analgesics, and 16 of the patients (80%) passed their stones spontaneously. The other four are currently pain free, one of whom is awaiting surgery.**

Conclusion: **This (uncommon) occurrence of upper tract urolithiasis in young adults in Ibadan may be related to chronic dehydration exacerbated by religious fasting. Further studies are required to explore this relationship,**

Keywords: ***Urolithiasis, Upper Urinary Tract, Young Adults, Nigeria, Dehydration, Religious fasting***

Résumé

Introduction: Pierre voie urinaire supérieur (upper urinary tract stones) sont assez peu courants au Nigeria et le plus souvent vus chez des hommes de quarantes et cinquantes ans. Toutefois, il n'y a aucun rapport récent sur cette maladie dans notre région. Cette étude rétrospective a été effectuée afin d'évaluer la tendance de présentation de la voie urolithiase dans notre institution.

Patients et Méthodes: Nous avons fait le bilan de tous les ca de pierres rénaux envoyés chez un seul specialise dans un centre hospitalier universitaire au sudouest du Nigeria au cours d'une période de deux ans.

Résultats: Vingt cas de calculi rénaux qui se sont présentés au cours de période d'étude. Tous les patients atteints de la premiére attaque subite des reins ou mal de dos et le diagnostic a été confirmé par la radiologie. L'âge moyen de no patients était 27 ans (groupe d'âge de 13 - 38 ans) et la proportion masculine féminine était 1:5:1. Dix neuf patients - soit 95% ont rapporté mauvaise consomation de liquids (<1,5L/jour) et 17/20 soit (85%) fréquent total ont tatalement, jeune (sans consomation ni l'eau ni nourriture). Pour des raisons religieuses sérum de calcium était normal chez 15 parmi 16 patients (94%) et seulement peu augmenté chez l'autre patient. Tous les patients ont été traité avec la consomation enorme de fluids (3L/jour) et analgesiques, et 16 parmi les patients (80%) ont fait sortir leur pierres spontanément. Les quatre d'autres sont à présent sans aucune douleur parmis lesquels nous expérons d'opérer un patient.

Conclusion: Le cas (peu commun) de voie urolithiase supérieure chez des jeûnes adultes à Ibadan pourrait être attributable à la déshydration chronique exacerbée par le jeûne réligieux. Des recherches approfondies sont requise afin de savoir ces rapports.

Introduction

Urinary calculi form when a crystallizable substance exceeds its solubility (product) in urine. These substances include calcium, oxalate, phosphates, uric acid, and cystine. Several epidemiological factors are known to predispose to urinary stone formation such as age, sex, race, infection, inherited disorders, nutritional status and diet[3] [5-8]. Reduced water intake and high environmental temperatures also tend to predispose to production of low-volume super-concentrated urine and the attendant increased risk of stone formation[5]. All these factors become even more significant when there is family history of urinary stones, suggesting a complex interplay of factors, which may differ in various localities[5 6]. The relevance of each of these factors have also been noted to change in the course of time[7 8].

Upper urinary tract stones are considered to be relatively uncommon in Nigeria[1]. The relative incidence of these calculi was calculated as 6.1-15.1 per 100,000 among Southeastern Nigerians as compared with 2 per 1,000 in Norway[2-4]. Urolithiasis is however more common in the

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upper tract than in the lower tract in Nigeria. Upper tract stones have not been previously reported to be of significance in adolescents/younger adults in Nigeria and are most often seen in the professionally active age group of 4th and 5th decades with a male to female (M:F) ratio of 2-4:1[23].

We now report on a two year retrospective review of cases of symptomatic upper tract urolithiasis referred to a single consultant in a large teaching hospital in Ibadan (Southwestern Nigeria).

Patients and methods

A retrospective review of all patients that presented to a single Consultant Urologist in a large teaching hospital with symptomatic upper tract urolithiasis over a 24-month period (January 2001 - December 2002) was done. The data extracted for analyses were social demographic characteristics, symptoms, site of stones, investigations done, and the course of the disease.

Results

Twenty cases of symptomatic upper urinary tract stones were seen within the 24-month period (Table 1). Twelve of the patients were males and 6 were females (M:F ratio 1.5:1). The mean age of the patients was 27 years (age range 13-38 years). All patients (100%) presented with loin or back pains, while 3 patients (15%) had episodes of febrile attacks associated with frequency, and 2 (10%) had episodic frank haematuria associated with the colic. Nineteen of the patients (95%) were first time presenters but one patient (5%) presented with recurrent stones having had his first episode 10 years earlier. Nineteen (95%) patients admitted to having a low daily fluid intake (<1.5L/day), whilst 1 patient had a fluid intake of 2-2.5L/day. This later patient was a building contractor who worked outside on sites all year round and therefore sweated a lot. Furthermore, 17 of 20 (85%) regularly abstained totally from water and food (total fasts) for varying periods for religious reasons. All patients had been treated with antibiotics at least twice prior to presentation to our hospital.

The presence of upper tract stones was confirmed with plain (KUB) X-Rays and renal ultrasonography in all patients. Twenty-six renal units were involved with 14 (70%) and 6 (30%) of the patients having unilateral and bilateral stone disease respectively. Fifteen of the patients (67%) had calyceal stones (including all patients with bilateral disease), whilst the remaining 5 (33%) had ureteric stones. Ultrasonography detected all calyceal calculi at diagnosis (Figure 1a), and the associated upper tract dilation in 4 patients (20%). Intravenous urography was done in 3 patients which showed a completely obstructed right upper tract in one case (Figure 1b), bilateral stones with non-functioning kidney on the left due to a tumor in another, and a dilated right renal system with a partially obstructing stone in the lower 1/3 in the third (Figure 2a). The mean size of stones (measured on KUB) was 2mm (range 0.1 – 1cm). There were records of serum calcium estimation in 16 of the patients. Fifteen (94%) were within normal limits while the remaining one (5%) was marginally raised. Urine cultures were negative at the time of presentation. All patients had normal renal function tests and full blood counts.

Interestingly, only 6 cases of symptomatic lower urinary tract stones presented during the study period. These were seen in men in their 6th and 7th decades (mean age 62 years, range 52-70 years), and were associated with lower urinary tract obstruction.

The patients were managed conservatively with high fluid intake (3-4L/day depending on the ambient temperature and physical activity) and analgesics as and when necessary. On this regime, 16 out of the 20 (80%) patients passed their stones spontaneously and this was confirmed by repeat x-rays showing absence of previously seen

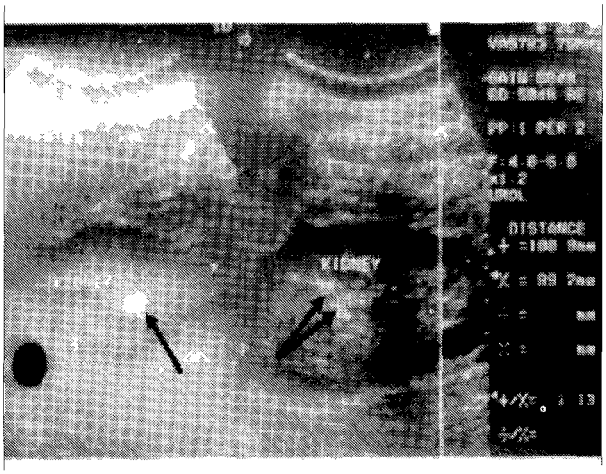

Fig. 1a *Ultrasound showing small calyceal stones appearing as hyperechoic shadows (arrowed).*

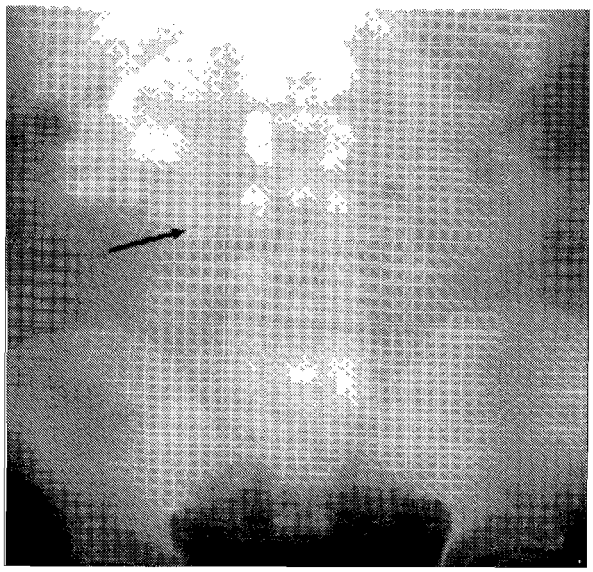

Fig. 1b *Intravenous urogram showing a completely obstructing radioluscent stone in the upper third of the right ureter (arrowed). This patient is awaiting surgery following failure of conservative therapy.*

Table 1 Summary of cases of Symptomatic Upper Tract Urolithiasis seen in the Urology Clinic between January 2001 to December 2002

S/N0	Age Yrs	Sex	Occupation	Site	Water drinking habit <1.5L/day	Religious Fasting	Passed Stone
1*	13	F	Student	Bilateral Kidney	Yes	No	Yes
2**	18	M	Student	Left Kidney	Yes	Yes	Yes
3*	20	F	Student	Lower 1/3 ureter	Yes	Yes	Yes
4*	21	F	Student	Bilateral Kidney	Yes	Yes	No
5*	24	M	Student	Right Kidney	Yes	Yes	Yes
6*	24	F	Student	Lower 1/3 ureter	Yes	No	Yes
7	25	M	Student	Left Kidney	Yes	Yes	Yes
8	25	M	Student	Right Kidney	Yes	Yes	No
9 *+	34/24	M	Medical practitioner	Recurrent Rt.Kidney	Yes	Yes	Yes
10*	31	F	Seamstress	Bilateral Kidney	Yes	Yes	Yes
11*	33	M	Manager	Bilateral Kidney	Yes	Yes	Yes
12	25	F	Student	Bilateral Kidney	Yes	No	Yes
13*	26	M	Student	Left Kidney	Yes	Yes	Yes
14	29	F	Trader	Lower 1/3 ureter	Yes	Yes	Yes
15*	38	F	Trader	Right Kidney	Yes	Yes	No
16*	23	M	Student	Right Kidney	Yes	Yes	Yes
17*	28	M	Builder	Left Kidney	No	No	Yes
18*	36	M	Priest	Left Kidney	Yes	Yes	Yes
19	32	M	Trader	Right Kidney	Yes	Yes	Yes
20*	32	M	Trader	Bilateral Kidney	Yes	Yes	No

Key: + *Patient with recurrent disease*
* *Patients with normal serum calcium*
** *Patient with marginally high serum calcium*

Fig. 2a ***A post-micturition intravenous urogram film of the bladder showing a (partially obstructing) stone in the lower 1/3 of the ureter proximal to the vesico-ureteric junction (arrowed).***

Fig. 2b ***Plain x-ray of the pelvis of the patient in figure 2a showing the absence of the opacity previously seen in the right lower ureter following 2 weeks of a high fluid intake (3-4L/day). The patient did not notice passage of the stones but was free of symptoms when this latter film was taken and has remained so until now.***

opacities in the region of the upper urinary tract (Figure 2b). Ultrasound scans were also done where necessary to confirm resolution of the urinary tract dilation. Six of these patients noticed either passage of gravel-like material (4) or had pain during a voiding act (2), but despite instructions in this regards, none of them were able to retrieve the stones for analysis. The other 10 patients did not know when the stones were passed probably due to the small sizes of the stones. Three of the four patients with stones in-situ are pain-free at the time of this report, and their calculi are non-obstructing as confirmed by non-dilated upper tracts on ultrasound scans. The last patient had a stone totally obstructing his right upper tact and was scheduled for surgical intervention but has defaulted

Table 2 Comparison of Studies on the Epidemiology of Urinary Stones in Nigeria

	Length of Study (Years)	Total No of Patients	Upper tract stones (%)	Peak incidence (%)	<30 year age group	M:F ratio (Upper tract stones)	Idiopathic Stones (%)
Esho (1978)	NR	85*	60	21-50* 61-70*	31*	-	41*
Mbonu (1984)	5	81*	57	20-49*	37*	4: 1	15*
Ekwerre (1995)	5	96*	79	21-50*	31*	2: 1	32.5*
This study	2	26*	77	20-29*	50*	1.5:1	73*

Key: ** Figures for both upper and lower tracts urolithiasis.*

Table 3 Aetiological factors in patients with upper and lower tract urolithiasis in Nigeria

Aetiological Factor	Esho (1978) (%)	Mbonu (1984) (%)	Ekwere (1995) (%)	This study (%)
Idiopathic	41	14	33	73+ (5++)
Obstructive Uropathy	11	49	29	23
Infection	23	34	30	0
Metabolic disorder	11	6	9	6
Foreign body in Bladder	11	6**	13***	NR
Abnormal bladder +++ Poor fluid Intake + Regular	NR	NR	8	0
Total Fasting	NR	NR	NR	62/85*

Note
* *Figure for upper tract stones only*
** *Includes schistosomiasis*
*** *Includes prolonged catheterization*
\+ *Includes patients with poor fluid intake*
\++ *Excluding patients with poor fluid intake*
\+++ *Noted only in this study*

from follow-up.

Discussion

Previous papers on urolithiasis in Nigeria (Table 2) have concluded that upper tract calculi are rare in Nigeria[1-3]. These stones have been widely reported to present more commonly between 30-50 years with a higher incidence in males (M:F ratio = 2-4: 1)[2 3 9 10]. Thus notable findings in our study were that majority of our patients were below 30 years (mean age 23 years, age range 13-29 years), and the lower male to female ratio (M : F = 1.5:1). Furthermore, in the earlier reports from Nigeria a series of predisposing factors such as infection, obstructive uropathy and metabolic disorders (see table 3) were implicated in 78% and 83% of their patients with urinary calculi, whilst 15-33% were recorded as being idiopathic[2 3]. This was significantly different from our series where these predisposing factors could be implicated in only 7/26 (27%) of our (combined upper and lower tract stones) patients whilst 73% were 'idiopathic' [X^2 test, p = <0.0001].

Our findings indicate that certain factors may predispose young adults of both sexes to upper urolithiasis. Aside from those listed in table 2, other factors that may predispose to the disease include low fluid intake, high dietary intake of animal protein, oxalate [7,8,9]. Others are low dietary fibre intake, high calcium–rich diet, and strenuous physical exercise. Of these, the only factor common to all our patients was an inadequate fluid intake, and this was accompanied by regular periods of total fasting for religious reasons in the majority (92%). This suggests that, the combination of chronic dehydration and regular periods of total fasting may increase the risk of stone formation in at an earlier age than previously recorded.

In contrast to the 45% surgical intervention rate by Ekwere[3], only one patient (5%) is scheduled for surgical intervention in our series (the patient with the completely obstructed system). This difference is most likely due to the significantly smaller mean size of stones in our series

(2mm [this study] vs 17.7mm [Ekwere]. This suggests that our patients may have presented earlier in the natural history of the disease. The current routine use of ultrasonography in investigating abdominal pains may play a significant role in this observation as the procedure detects smaller upper tract calculi than plain KUB x-ray or IVU.

Conclusion

We believe this is the first report on upper tract urolithiasis that indicates a preponderance in young adults who are in their 2nd and 3rd decades in the absence of the more commonly known aetiological factors in Ibadan. We found that the single factor common to our patients was poor fluid intake exacerbated by periods of total fasting usually for religious reasons. A high fluid intake regime was therapeutic in most of the patients with spontaneous passage of the stones.

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