INTRODUCTION

Paediatric urolithiasis is prevalent in some geographical regions popularly known as the stone belt. This belt runs from Philippines, Thailand, Myanmar in the Far East through Pakistan into Iran, Middle East and extends up-to Turkey. Many factors are responsible for this endemic nature, namely nutritional deficiencies in vitamin A, magnesium, phosphates and vitamin B6, low-protein and high-carbohydrate diet, dehydration, urinary tract infection etc. The pattern of urinary tract involvement is quite distinct. In developed countries, it is mostly the upper urinary tract where calculi are found while reverse is noted in children from developing countries where poverty prevails. A century ago, lower urinary tracts were also reported frequently from developed countries but as the socioeconomic conditions improved, change occurred in the pattern of stone disease.

Research in the field of stone disease identified many preventive measures so as to reduce burden of the disease. This is done to prevent renal loss due to obstruction and infection. There is also a parallel development of minimally invasive surgical techniques to deal with urinary tract calculi. The paediatric population is usually less fortunate as advancement in technology aims more at adults and as a trickle down effect children also receive benefit out of it. Though equipments are present at many centres for minimally invasive surgical approach for adults urolithiasis, but not for paediatric population.

Acute urinary retention due to impacted urethral calculus is not an uncommon condition. This is extremely painful situation and demands urgent relief. If remain unattended, can lead to disastrous consequences of urinary extravasation and infection. The diagnosis is usually clinical and simple measures can help in relieving emergency situation. There is paucity of data on urethral stones in paediatric age group.

This study aimed at determining the management of this condition so as to provide an algorithm to facilitate the children with acute retention of urine, due to impacted urethral stone.
METHODOLOGY

This case series was conducted from March 2009 to January 2010 at one of the two Surgical Units of Department of Paediatric Surgery, NICH, Karachi. The data of all the patients admitted with the diagnosis of acute retention of urine due to impacted urethral stone were analyzed. Patients aged less than 12 years were included. All those with retention of urine due to other causes like urethral injury, stricture, pelvic mass etc. were excluded.

Patients were admitted and detailed history and diligent clinical examination were done specially palpating penile urethra and also feeling for presence of any firm structure in the line of urethra through scrotum and at perineal region. All patients had complete blood count, blood urea, serum creatinine and electrolytes done. Urine analysis and culture of sample of urine obtained, were also performed. All patients had X-ray KUB and ultrasound for evaluation of urinary tract.

In cases where stone was clinically palpable, an urgent examination under anaesthesia was planned. Where urinary bladder was grossly palpable, size 16 cannula was passed supra-pubically for decompression of urine to relieve pain. The choice of further procedure was dictated by location of stone and its gentle manoeuvring (milking) through urethra distally, after instilling xylacaine jelly through urinary meatus facilitated by meatotomy. If the procedure was unsuccessful, surgical exploration (urethrolithotomy) was performed. In this procedure, after taking proximal control of stone by fixing it between index finger and thumb, an incision was made over the calculus and stone was retrieved. Closure of periurethral tissues was done over size 8 urethral tube with polyglycolic 5/0 sutures applied in interrupted fashion, taking care not to penetrate urethral mucosa. Urethral tube remained in place for 7 days. After passage of urine following removal of urethral tube, patients were discharged home, to be followed in outpatient department.

For stones located in bulbous and posterior urethra as revealed by X-ray, gentle push back was done using size 8 Fr. urethral tube and stone was removed supra-pubically by transvesical approach on elective list, usually within 48 hours. Minimally invasive surgery was not available in NICH. In cases where push back was not successful a supra-pubic size 16 French cannula was placed in palpable urinary bladder to drain urine and vesicolithotomy was then scheduled at the earliest. Bladder was drained for 48 hours after open procedure. All stones were sent for chemical analysis.

Data were entered on a proforma and analyzed with Statistical Package for Social Sciences (SPSS) version 16. Descriptive analysis was performed. Mean and standard deviation were calculated for variable like age. Frequency and percentages were calculated for parameters like gender, anatomical site, type of procedure and complications.

RESULTS

In a duration of 10 months, 19 patients presented with acute retention of urine due to impacted urethral stone (Figure 1). All were males. Age ranged from one year to 10 years with the mean age of 3.94 years ± 2.27 years. None of (63.1%) the patients had any anatomical lesion. In 12 patients (63.1%) stones were impacted in anterior urethra while 7 patients (36.9%) were located at posterior part. Stones impacted at external urethral meatus were removed in emergency in 3 patients (15.7%) by meatotomy. In 6 patients (31.5%) with stone impacted in penile shaft, initially supra-pubic catheterization was done to relieve the acute symptom of urinary retention. Urethrolithotomy was then performed under general anaesthesia. During surgery an attempt was made to milk the stone distally by instilling lubricant jelly. When procedure remained unsuccessful, urethrolithotomy was done.

Calculi in bulbous (n = 3) and posterior urethral locations (n = 7) were pushed back into the bladder. All patients

Figure 1: Stone impacted at external urinary meatus.
did well except for one who developed retention of urine after a week. This patient had urinary tract infection and antibiotics were given. None of the patients had difficulty in urination, urethrocystostomy fistula or development of urethral stricture at follow-up. The chemical analysis of stone showed all to be of calcium oxalate type. An algorithm for the management of impacted urethral stones based upon the results is shown in Figure 2.

DISCUSSION

The urinary tract calculi are prevalent in many regions of the world. Extensive literature is found on both adult and paediatric population, but surprisingly data on urethral calculi is sparse. Few studies are available on the subject from the stone belt region in children.9,10 Occasional case reports were also retrieved from internet search, but no study can be found with a large number of patients with any well-defined protocol for the management of stones impacted in urethra without any obstructive pathology.11,12 It thus becomes important to contribute the data related to this infrequently addressed condition which is extremely painful both for the children and their families. Pain due to inability to pass urine is described as one of the worst pain in humans. In this study, 19 patients were managed in a span of 10 months. This number is quite high when compared with overall frequency of stone disease in hospital based studies from western countries.13 Even from the regional countries like Turkey, Verit et al. reported only 8 patients with urethral stone in a 6 years period.14 In 8 studies on a large cohort of urinary tract calculi from pediatric urological department in Pakistan, not a single case of urethral calculus has been reported.15,16 The authors of those studies concluded that upper urinary tract stones are now increasingly reported in comparison with lower urinary tract stone in Pakistan. These observations thus may not be reflective of true picture from Pakistan. It may be possible that patients with lower urinary tract stones seek treatment in nearby facilities rather than tertiary care hospitals.

Urethral calculi are divided into two types namely primary (when formed within urethra due to some anatomical defect) or secondary when stones from upper urinary tract or bladder gets lodged into urethra. These are called migratory stones. In a study on urethral calculi from London in year 1930, 37 cases of secondary urethral calculi were reported in a span of 20 years.17 While reporting on urinary calculi not much stress is made on urethral calculi thus it is not clear as to the true incidence and age distribution of this type of calculus. In one study, it is reported that urethral calculi constitute 0.3% of all the urinary tract calculi.14

In the era of minimally invasive surgery, equipment has been developed for treating urinary calculi at various anatomical regions. For urethral calculi, use of Holmium laser lithotripsy is reported in paediatric age group with success.18 For those stones that can be pushed back into bladder, minimally invasive surgery is another option.19 The availability of the advanced equipment and expertise remains an issue. The children are referred from far flung areas and a more practical approach thus would be an open surgical procedure, that can be used by surgeons even at district level hospital. Simple push-back, meatoectomy and urethrolithotomy procedures suffice in this emergency situation. If surgical facilities are not available supra-pubic decompression of urinary bladder with large bore cannula is another option before referring the child to a nearby facility where operative procedure can be undertaken. Supra-pubic decompression can be performed with commercially available kit though it is difficult to obtain this even in an urban region. This technique can be used if surgeon has to buy time while waiting for availability of operation suite and anaesthesia facility. In this study, bladder decompression was employed as a bridging step by using cannula to relieve the child from the agonizing pain.

Urethrolithotomy needs attention to meticulous details of closure of urethrotomy. Use of fine suture material, urethral stent, and obtaining a water tight seal without compromising blood supply of urethra are mainstay of surgical approach. With observations of these surgical principles chances of stricture and urethrocystostomy fistula are negligible. In this series, no such complication occurred. Interrupted sutures are equally effective in achieving goals as noted in this study. In an oedematous tissue at the site of impaction of stone, continuous sutures may cut through easily. The chemical analysis of the calculi revealed calcium oxalate as a constituent in this series. Calcium oxalate stones are commonly reported as most common type of stones in many series though a change in pattern has been observed, where similarities are reported with developed countries both in terms of location and chemical composition of calculi.20-22 Oxalates rich food like dark green leafy vegetables should be avoided. Vitamin C is another source of oxalate.23 Increase fluid intake works in all types of stones. The data on role of calcium intake is also controversial but it must be remembered that calcium binds with oxalate in diet and prevents its absorption from gastrointestinal tract. A balanced diet is thus recommended with plenty of water intake for prevention of recurrence of stones.24

CONCLUSION

Urethral stone is an important cause of acute retention of urine in children. Anterior urethra is more frequent site of obstruction. Variety of procedures can be employed to relieve obstruction that does not require costly equipment and surgery can be undertaken at peripheral hospitals where operation theatre facility is available.
REFERENCES


