Case Report

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Giant bladder diverticulum: A rare cause of bladder outlet obstruction in children

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ABSTRACT

Giant bladder diverticula are rare causes of bladder outlet obstruction in children and have rarely been reported.[1] In this paper, we present three children with giant bladder diverticula who presented with bladder outlet obstruction within a year. Micturating cystourethrogram is important for investigating bladder outlet obstruction in children and was used to confirm the diagnosis in all the patients. The relationship between the diverticula and ureters varied, with the ureters running either through the wall of the diverticulum and opening directly into the bladder, or opening into the diverticulum. In one patient, there was a recurrence, which was excised successfully. Excision is important to reduce the risk of recurrence.

Key words: Bladder outlet obstruction, children, giant bladder diverticula

INTRODUCTION

Giant bladder diverticula have rarely been reported as a cause of bladder obstruction in children. Table 1 shows the cases reported. Bladder diverticula are more often secondary to bladder outlet obstruction, as a result of the high pressures generated in the bladder while passing urine.They may occur primarily in the absence of a predisposing outlet obstruction when congenital weakness in the bladder wall leads to protrusion of the wall in the presence of normal vesical pressures. They may be asymptomatic, present as recurrent infection, with micturition distrubances or very uncommonly with bladder outlet obstruction. In this paper, we present three patients who presented with bladder outlet obstruction due to bladder diverticula. This condition though rare must be considered when investigating bladder outlet obstruction in children.[1]

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CASE REPORTS

Case 1

A one year three-month-old male child who presented on 15 January 2008 with a one month history of straining at micturition, dribbling and excessive crying during micturition. On examination, all systems including the abdomen were essentially normal. A provisional diagnosis of bladder outlet obstruction due to Posterior Urethral Valves (PUV) was made. The child was put on continuous bladder drainage and investigations including abdominal ultra sound, urine routine examination, culture and sensitivity, blood urea and electrolytes, full blood count and micturating cystourethrogram (VCUG) were done. Ultrasound showed bilateral hydronephrosis, which was worse on the right, a thickened bladder wall and a suggestion of a posterior bladder diverticulum. Some of the laboratory results are shown in Table 2. The micturating cystourethrogram showed a dilated bladder with an irregular bladder wall, a dilated posterior urethra and bilateral vesico-ureteric reflux. Based on this, a provisional diagnosis of posterior urethral valves was made and the child had a vesicostomy done on 25th January 2008. On 29th July 2009, cystoscopy with fulguration of rather small valves was done. Seven months later the child presented again with straining at micturition and dysuria. A repeat ultrasound showed severe hydro-ureteronephrosis and a bladder diverticulum with a post-void residual urine of 110 millitres. A Micturating cystourethrogram showed a bladder diverticulum [Figures 1a and 1b]. An intravenous urogram (IVU) showed a non-functioning right kidney and a left ureter angulated to the right in the region of the fundus of the bladder [Figure 1c]. Surgery was done on 5th May 2010 through a pfannenstiel extraperitoneal approach. Findings were; the left ureter opened into a huge diverticulum, which extended from the left part of the bladder to the region of the bladder neck [Figure 1d]. The right ureter opened into a relatively smaller diverticulum. The left ureter was dissected off the diverticulum and a cohen re-implantation was done.

Table 1: Congenital bladder diverticulum causing bladder outlet obstruction

Article	Year	Authors	Number causing obstruction	Journal
Diverticulum of bladder in children	1978	Maria IB and Lebowitz RL	4	Pediatric Radiology
Bladder diverticulum: An uncommon cause of acute retention of urine	1979	Shah KJ	1	British Journal of Radiology
Acute retention of urine caused by vesical diverticula	1982	Epstein ES, Siegel MJ *et al*.	2	Urologic Radiology
Urinary retention secondary to congenital bladder diverticula in infants	1984	Verghese M, Belman AB	2	Journal of Urology
Bladder eiverticulum causing acute urinary retention	1992	Raj J, Singh H	1	Indian Journal of Pediatrics
Acute urinary retention in an infant: An unusual presentation of a paraureteral diverticulum	1993	Vates TS, Fleischer MH *et al*.	1	Pediatric Radiology
Congenital bladder diverticulum causing bladder outlet obstruction: Case report and review of the literature	1993	Sheldon CA, Essig KA	1	Paediatric Surgery International
Conjenital bladder diverticula in children	1999	Pieretti RV, Pieretti-Vanmarcke RV	2	Paediatric Surgery International
Acute urinary retention in a child caused by a congenital diverticulum	2002	Oge O, Gemalmaz H, *et al*.	1	Journal of Pediatric Surgery
Conjenital bladder diverticulum: Report of three cases	2003	Khemchandani S, Ranka P	3	Indian Journal of Urology
Giant bladder diverticula causing bladder outlet obstruction in children	2004	Shukla AR, Bellar RA *et al*.	4	Journal of Urology
A rare cause of acute urinary retention in a male infant	2008	Wickramasuriyaa NI, Muthucumarub M. *et al*.	1	Journal of Pediatric Urology
Lower urinary tract obstruction secondary to congenital bladder diverticula in children	2009	Singal KA, Chandrasekharam VV	7	Paediatric Surgery International
Diagnosis and management of congenital bladder diverticulum in infants and children: Experience of 9 cases in a tertiary health centre in a developing country	2009	Rawat J, Kumar AR *et al*.	2	Urology

Table 2: Laboratory results

	Case 1	Case 1	Case 2	Case 3
Date	25/1/2008	9/7/2010	14/9/2010	9/8/2010
Blood haemoglobin	10 gm/dl	8 gm/dl	8.3 gm/dl	6.3 gm/dl
Blood sickling	Negative		Negative	
Total white blood cell count	5×10^9/L	32×10^9/L	23.9×10^9/L	
Urine Pus Cells	6/HPF	13/HPF	>30/HPF	
Urine culture and sensitivity		No significant growth	No significant growth	
Blood urea	5.0 mmol/L	4.1 mmol/L	10.3 mmol/L	6.5 mmol/L
Blood creatintine	56 µmol/L	51 µmol/L	168 µmol/L	128 µmol/l
Blood Na	145 mmol/l	140 mmol/L	142 mmol/L	128 mmol/L
Blood K	4.2 mmol/l	5.7 mmol/L	4.1 mmol/L	4.2 mmol/L

The left diverticulum was dissected off the bladder wall but was left *in situ*. The right diverticulum that was smaller was simply narrowed.

The child did well postoperatively and was discharged. He presented again with urinary tract infection two months post operatively. Ultrasound showed hydronephrosis but in addition showed a suggestion of a bladder diverticulum. A repeat micturatingcystogram, showed a posterior bladder diverticulum. He had bladder

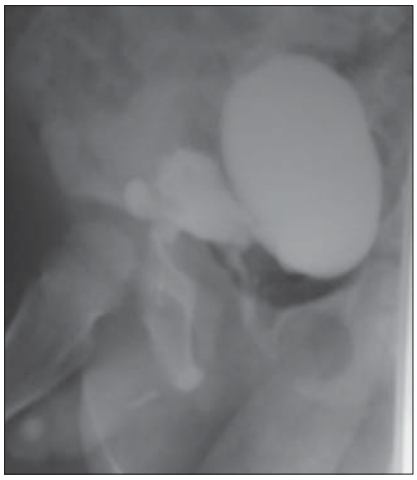


Figure 1a: Micturating cystogram large diverticulum left of bladder small diverticulum right

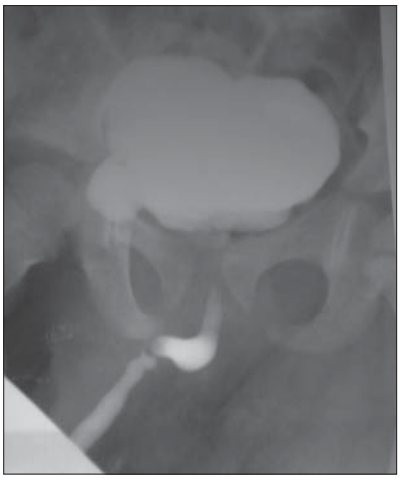


Figure 1b: Micturating cystogram left and right diverticula



Figure 1c: Intravenous urogram full bladder non-functioning right kidney left ureter angulated to the right

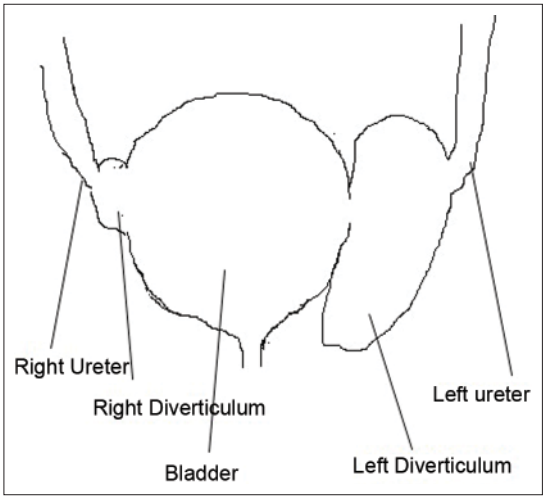


Figure 1d: Schematic diagram and surgical findings of Case 1

exploration through a pfannenstiealextraperitoneal approach. Findings were a posterior diverticulum with an orifice in the mid posterior wall of the bladder with a dilated right ureter running through the wall of the diverticulum. The diverticulum was inverted into the bladder and excised [Figure 1e]. A cohen re-implantation of the right ureter was done. The child has since been well.

Case 2

A nine-year-old male child who presented on 2nd August 2010 with an eight year history of recurrent straining at micturition, a five year history of recurrent abdominal distension and a four year history of recurrent lower abdominal pain. He had been treated for urinary tract infection several times at various hospitals and got better after each episode. Examination revealed a young boy who was relatively well with a palpable bladder. A diagnosis of bladder outlet obstruction possibly

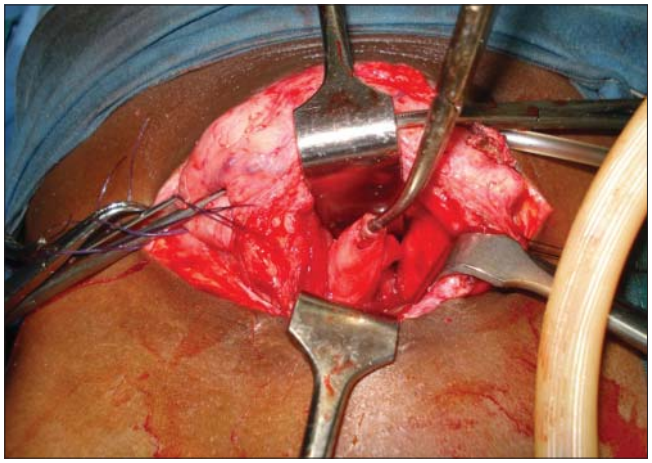


Figure 1e: Case 1 diverticulum inverted into bladder

secondary to posterior urethral valves was made and bladder drainage instituted per urethra. Investigations done included blood urea and electrolytes, full blood count and urine routine examination, culture and

sensitivity. Some of his laboratory results are shown in Table 2. Abdominal ultrasound showed bilateral hydronephrosis. Micturating cystourethrogram showed a left bladder diverticulum and a left vesico-ureteric reflux but the posterior urethra showed very mild dilatation [Figure 2a]. A diagnosis of bladder outlet obstruction secondary to bladder diverticulum was then entertained. The patient had exploration of the bladder through a pfannenstiel extraperitoneal incision and this revealed a diverticulum of the bladder on the left, bilateral hydronephrosis and a stenosed right vesicoureteric junction [Figure 2b]. The left ureter opened into the diverticulum. The diverticulum was excised and cohen re-implantation of both ureters done. The child did well and was discharged about 2 weeks postoperatively.

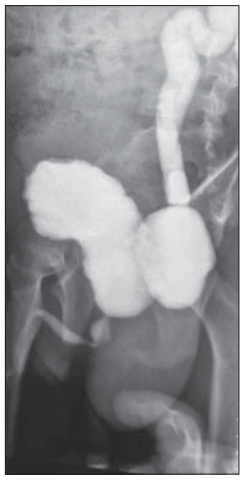


Figure 2a: Micturating cystogram left diverticulum left ureterovesical reflux

Case 3

A seven-month-old child who presented with a four day history of inability to pass urine and abdominal distension. Examination revealed a child who was well with a tender palpable bladder. A diagnosis of acute retention of urine was made secondary possibly to posterior urethral valves. Initial investigations done included full blood count, blood urea, electrolytes and creatinine, and abdominal ultrasound. Some of the laboratory results are shown in Table 2. Abdominal ultrasound showed left hydroureteronephrosis. A micturating cystourethrogram showed a non-dilated urethra and a huge bladder diverticulum on the left, which was confirmed with an IVU. The bladder was explored through a pfannenstiel extraperitoneal approach and findings were bilateral diverticula with the left one being rather large and extending to the bladder neck and a small right diverticulum [Figure 3]. The left ureter was running in the wall of the diverticulum but the ureteric orifice was not clearly identified. The right ureter runs through the wall of the smaller diverticulum. The left diverticulum was excised and cohen re-implantation of the left ureter done. The right ureter and diverticulum were left *in situ* since it was asymptomatic. Postoperatively, the child went into retention of urine associated with abdominal distension. Laparotomy revealed injury to the right ureter for which a cohen re-impantation was done using the injured part as the new orifice. The child did well and was discharged 20 days postoperatively.

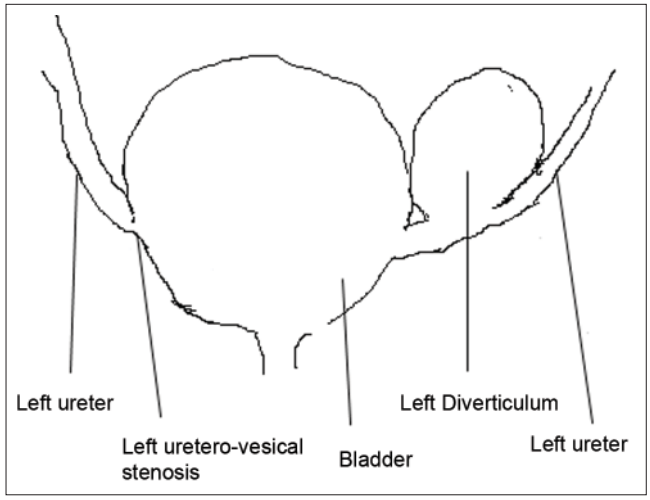


Figure 2b: Schematic diagram and surgical findings of Case 2

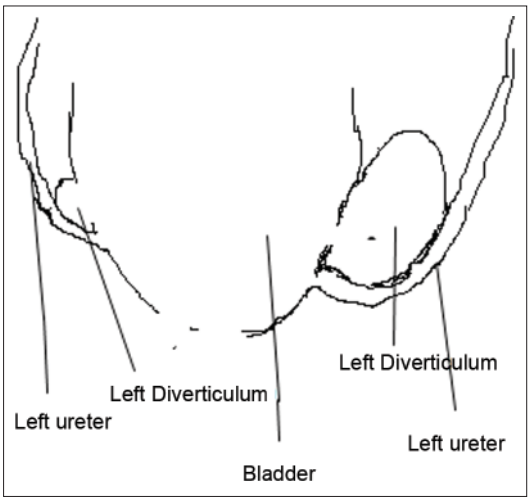


Figure 3: Surgical findings Case 3

DISCUSSION

Bladder diverticula may be congenital, acquired, iatrogenic or be part of a syndrome.[2] Congenital bladder diverticula are rare and are often asymptomatic but may present with infection, reflux, stone formation or incontinence but very rarely with obstruction.[1] Both male and female cases have been presented in the literature but males have been more common.[3] Though rare, we have presented three patients, all male, with bladder diverticula who presented within a year. In one of them, an initial diagnosis of posterior

urethral valves was made and was later shown to have a diverticulum, which was missed at the initial presentation. A high index of suspicion is necessary in order to avoid missing this diagnosis. Congenital diverticula are caused by a congenital weakness in the bladder wall, which leads to out-pouching of the bladder mucosa in the presence of normal vesical pressures.[4] When part of a syndrome, they may be associated with Ehlers Danlos Syndrome, which is a connective tissue disorder.[2] They may occasionally recur after excision as has been noted in some patients with Ehlers Danlos syndrome.[2,3] One of the patients had a recurrence and had surgery done again. It is difficult to say if this was a true recurrence or if it was missed at the initial operation. The diverticulum was associated closely with the right ureter, while the diverticulum previously dissected off the bladder at the initial procedure had been associated with the left ureter and was not completely excised. In two of the patients, the ureters opened into the diverticula while in one patient the associated ureter run in the wall of the diverticulum. In the literature, some of the diverticula have been para-ureteral, while some have had the ureteric orifice incorporated in it.[1,5] Complete excision has been suggested as the treatment of choice in all symptomatic cases though watchful waiting has been suggested for asymptomatic cases due to the possibility of recurrence.[1,2]

Congenital bladder diverticula though rare are an important cause of bladder outlet obstruction and must be considered when investigating bladder outlet obstruction in children. Micturating cystogramis essential in the investigation of children with problems associated with urination. Complete excision is important though the possibility of recurrence still remains.

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