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Management of congenital bladder diverticulum in children: A report of seven cases

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ABSTRACT

Background: The purpose of the study is to present the author's experience with congenital bladder diverticula in seven pediatric patients at a developing world tertiary care center. **Materials and Methods:** Records of seven patients diagnosed and treated as congenital bladder diverticulum, from January 1998 to December 2009 were retrospectively reviewed for age, sex, clinical symptoms, investigative work-up, operative notes, and postoperative follow-up. **Results:** All patients were males. Age at presentation ranged from six months to six years (mean three years and six months). All were manifested postnatally by urinary tract infection in four cases, bladder retention in three cases and abdominal pain in two cases. Diagnosis was suggested by ultrasound and confirmed by voiding cystourethrography (VCUG) in all cases and urethrocystoscopy in three cases. Open surgical excision of diverticulum was done in all the patients associated with ureteral reimplantation in four patients with VCUG-documented high-grade vesicoureteral reflux (VUR). Average follow-up was four years; there is a resolution of symptoms and no diverticulum recurrence at the defined mean follow-up. **Conclusion:** Recurrent urinary tract infections and voiding dysfunction in pediatric population should always be evaluated for congenital bladder diverticulum. Investigations such as abdominal ultrasound, VCUG and nuclear renal scanning, form an important part of preoperative diagnostic work-up and postoperative follow up. Diverticulectomy with ureteral reimplantation in case of high-grade reflux, provides good results without recurrence.

Key words: Children, congenital bladder diverticulum, diverticulectomy, voiding cystourethrogram, voiding dysfunction

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INTRODUCTION

Rare disorder affecting the male child, congenital bladder diverticulum (CBD) is related to herniation of mucosa through a weakness of the bladder muscular wall. It is most often manifested by acute retention of urine, recurrent urinary tract infections, or a pelvic mass. Sometimes, the diagnosis is made incidentally. The diagnosis is suspected clinically and confirmed by radiologic explorations specially voiding uretrocystography. The treatment is surgical based on diverticulectomy by intra or extravesical way with ureterovesical reimplantation if a vesicoureteral reflux is present, and recurrences are rare. The purpose of this report is to present our 12-years cumulative experience in the management of large bladder diverticulum and to evaluate long-term outcome of these children.

MATERIALS AND METHODS

This is a retrospective study conducted in the department of Pediatric Surgery "B" at the children's hospital of Tunis over a period of 12 years, from January 1998 to December 2009. Are examined the epidemiological data (age, gender), the given clinics (functional and physical signs), means of diagnosis and therapeutic results.

In this study, only large diverticulums were considered. Their maximum diameter was equal to or greater than one-third of the bladder diameter on voiding cystourethrography (VCUG).

RESULTS

A total seven Patients have been collected, all male aged from six months to six years with an average of three years six months.

Clinically, the signs at presentation have been: urinary tract infection in four cases, bladder retention in three cases and abdominal pain in two cases.

At the clinical examination, there is bladder retention in three cases with a pelvic mass in two cases. Biologically, renal function was normal in all patients and the urinalysis was positive in four patients.

X-ray examinations were based on the abdominal ultrasound which showed a cystic formation adjacent and retro the bladder associated with thickening of the bladder wall in three cases suggesting the diagnosis in all cases. In four cases, there is ureteral dilatation and the renal parenchyma was retained [Figure 1].

The VUCG was performed in all cases and has the positive diagnosis in all patients, showing a single giant diverticulum in four cases, and associated with other diverticula of small size in three cases. There is an intra-diverticular lithiasis in a case, and a bilateral vesico-ureteric reflux in three cases [Figure 2].

The intravenous urography in four patients, showed a megaureter in four cases (obstructive in three cases and refluxing in 1 cas). The DMSA renal scan was performed in three patients and showed renal scars in all this cases [Figure 3].

All patients have been operated by classical surgery preceded by a primary endoscopic exploration in three cases which showed no urethral obstruction.

The surgical approach was a Pfannenstiel way in all cases. The intervention consisted on a diverticulectomy conducted by intravesical approach in six cases and by combined way in the remaining case. An ureterovesical reimplantation according to Cohen technique with modeling of the terminal portion of the ureter was conducted in four cases.

Anatomo-pathologic examination confirmed the diagnosis by showing that it is a protrusion of the bladder mucosa.

The evolution was favorable in all cases with disappearance of any functional symptoms in particular the absence of infectious recidivism or dysuria with an average decline of three years and a normal ultrasound. The renal scars were stable in DMSA renal scan.

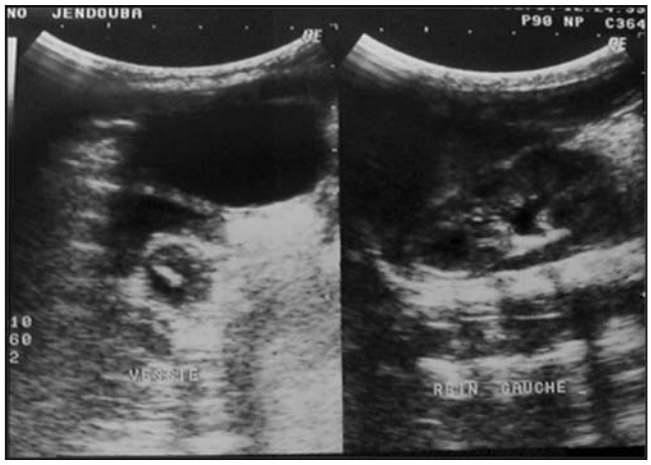


Figure 1: Ultrasound presence of a large bladder diverticulum and distention of left renal calices

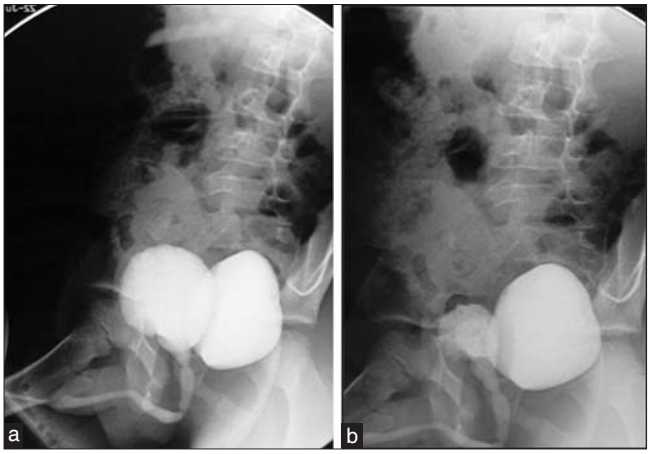


Figure 2: (a) Micturating cystogram: left diverticulum without ureterovesical reflux, (b) Micturating cystogram: Post voiding view left diverticulum and post voiding residue



Figure 3: Intravenous urography: distended left ureter and caliceal cavities

DISCUSSION

Bladder diverticulum is a rare urinary tract malformation characterized by a protrusion of the mucosa through a defect in the detrusor musculature. Kelalis in his

classic chapter defined it as a bladder protrusion with a diameter greater than 2 cm.[1] It may either be congenital, acquired or iatrogenic.[2-4]

The bladder diverticulum is more often secondary to bladder outlet obstruction, as a result of the high pressures generated in the bladder during urination. They may occur primarily in the absence of a predisposing outlet obstruction lesion when congenital weakness in the bladder wall leads to protrusion of the mucosa in the presence of normal vesical pressures.[2,3] This situation is often seen in children with connective tissue disorders, for example Ehlers–Danlos, Williams, Menkes', or "kinky hair" syndromes.[5]

Congenital bladder diverticulums (CBD) are not frequent in children and an incidence of 1.7% was reported in a series of symptomatic patients evaluated by cystography. Most of them are single, unilateral, and paraureteral/posterolateral in location, some of them have the ureteric orifice incorporated in it.[5]

CBD in childhood almost exclusively occur in the male. A possible embryologic explanation of this unique clinical feature is the theory of transient intrauterine bladder-outlet obstruction in the male. This has been put forward by some authors to explain bladder dysfunction occurring in male infants with gross VUR, and suggested to be due to urethral angulation during embryogenesis, a Cowper's gland cyst, or posterior urethral membranes.[6]

CBD may be asymptomatic, or present as recurrent infection, hematuria, with micturition disturbance.[3-5,7] Though rare, CBD are an important cause of bladder outlet obstruction and must be considered when investigating bladder outlet obstruction in children.

On ultra sounds, diverticula commonly appear as round or anechoic structures arising from the bladder base or near the ureteric orifice. They may be mistaken for other lesions depending upon the degree of bladder filling, demonstration of a communication with the bladder or altered echogenicity due to stasis of diverticula contents.[7] Maynor *et al.*, suggest a number of maneuvers to aid identification, including scanning from several perspectives, increasing bladder distension and Color Doppler imaging for urine flow.[8]

Micturating cystogram is essential in the investigation of children with problems associated with urination and is the most reliable method for detection of CBD due to the dynamic nature of both the study and the diverticulum. MCUG technique is important; voiding before the examination, oblique and lateral views, and fluoroscopic screening throughout, including during and after voiding, will give optimal results.[7]

Early and recent reports have demonstrated the association between chronic urine stasis within the diverticulum, stone formation, and benign inflammatory or malignant change of its urothelium. So, congenital bladder diverticulum must be removed to avoid such complications.[9]

Complete excision of the CBD 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.[3] Other authors believe it is necessary to treat even asymptomatic cases because of possible complications.[4] We agree with this recommendation and we have treated both symptomatic and asymptomatic cases.

Transvesical diverticulectomy is the recommended technique. Apart from excising the diverticulum and restoring the integrity of the bladder wall, it allows complete correction of accompanying pathology (ureteral reimplantation for reflux), with minimal complications and no morbidity regarding long-term bladder function. We have used this technique in almost all cases with good results (6/7 cases). There are, however, alternative techniques such as extravesical diverticulectomy that can be made laparoscopically and which can be combined with extravesical ureteral reimplantation.[4] In neonates, Bogdanos recommends a staged approach with primary cutaneous vesicostomy diversion followed by diverticulectomy and bladder closure after 1 year.[4]

CONCLUSION

Congenital bladder diverticulum is an uncommon pathology in otherwise normal children. It can still asymptomatic or cause urinary tract infection, dysuria or acute retention.

Its treatment is surgical and transvesical diverticulectomy combined with the management of associated surgical pathology is the treatment of choice.

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