Diverticulocystoplasty with Bilateral Ureteric Reimplantation: Management in a Rare Case of Combined Congenital Large Paraureteric Diverticulum with Bilateral Obstructive Megaureter

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Received: 8 January 2012 / Accepted: 28 June 2012 / Published online: 12 July 2012
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Abstract A large congenital paraureteric diverticulum has not been reported earlier in combination with bilateral obstructed megaureter. We present one such case in an adolescent male with decreased bladder capacity and renal failure. A single sitting surgical procedure included diverticulocystoplasty with bilateral ureteric reimplantation. The left ureter was implanted into the diverticular wall, which was used as a patch to augment the bladder. Reimplantation into the wall of the diverticulum has also not been reported earlier.

Keywords Primary obstructive megaureter · Paraureteric bladder diverticulum · Diverticulocystoplasty · Augmentation

Case Report

A 14-year-old boy presented with pain in flanks, frequency (8–12 times/day), and pyuria for 1.5 years. There was no urgency, incontinence, straining, or thinning of stream of urine. There was no neurological disease or recurrent infections in childhood. Urinary routine and culture confirmed infection, while blood investigations showed renal failure (urea 54.2 mg%, creatinine 2.2 mg%). External genitalia and spine were normal. Ultrasonography showed a large bladder diverticulum with bilateral marked hydronephrosis. An indwelling urethral catheter was kept suspecting bladder outlet obstruction or vesicoureteric reflux with UTI and uremia. However, there was no improvement in serial blood urea/creatinine values and the catheter was subsequently

removed. Meanwhile after treating infection, further evaluation with voiding cystourethrogram (Fig. 1) showed a narrow-necked large primary bladder diverticulum (PBD). The bladder capacity was low (total infused volume 150 cc, inclusive of diverticulum). MR urography (Fig. 1) confirmed the findings and also suggested coexisting bilateral primary obstructive megaureter (POM). Diuretic renal nuclear scan showed differential function of 55 % (right) and 45 % (left). Total GFR was 25 ml/minute with body weight of 43 kg. Consent was taken for cystoscopy and surgical exploration under anesthesia.

Cystoscopy showed normal urethra and bladder, 160 cc total capacity, nonidentifiable ureteric orifices, and a narrow diverticulum opening at site of the left ureteric orifice. Diverticuloscopy was unremarkable. A midline infraumbilical extraperitoneal approach was used for exploration. PBD was identified and both ureters were dissected. The long rat-tailed end-of-left ureter was confirmed to be opening alongside the neck of PBD. The PBD had reasonable detrusor backing in its wall (Fig. 2). Decision was then made to use it for augmentation. Its neck was thus separated from the bladder while inferior and lateral attachments were left undisturbed to maintain blood supply. It was opened longitudinally extending both superiorly and inferiorly from its neck to form a patch. The bladder was also opened longitudinally extending upward in a curvilinear fashion starting from the site of opening of PBD. Bilateral excision/tailoring and reimplantation of ureters were done over 7 F feeding tubes. The left ureter was reimplanted into the diverticular patch. The diverticular patch was then used to augment the bladder (Fig. 2), which was closed over an 18 F urethral catheter.

Postoperative recovery was uneventful. Ureteric splints were removed sequentially after 1 week and the urethral catheter was removed at 3 weeks after a cystogram (Fig. 3). At 1 year, the patient remained asymptomatic with

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Fig. 1 (a) Cystogram showing large left congenital bladder diverticulum (labeled as D) with no vesico-ureteric reflux and no backpressure changes in bladder, (b) MR urography showing bilateral gross

hydroureteronephrosis with a bladder diverticulum, and (c) transverse section on MRI confirming bilateral typical rat-tailed appearance (arrows) of congenital obstructed megaureters

urea 45 mg%, creatinine 1.8 mg%, no obstruction on diuretic renal scan, and stable GFR of 25 ml/minute.

Discussion

POM is a relatively common congenital anomaly of the distal ureter occurring at 1 in 10,000 people. Bilateral disease may occur in 15–20 % cases. Reported associated abnormalities include contralateral renal agenesis (9–15 %), contralateral ureteroceles, renal dysplasia, ureteral duplication, and microcystis in bilateral lesions [1, 2].

PBD is another relatively uncommon anomaly. It occurs in an otherwise normal bladder and tends to be solitary, located at the junction of the trigone and detrusor. Associated abnormalities include bifid pelvicaliceal system and vesicoureteric reflux, proposedly under a genetic relationship [3]. Combination of POM with PBD, as seen in this case, has never been reported to our knowledge. This seems to be a chance occurrence. PBD is considered to occur due to herniation of bladder mucosa through the detrusor fibers while aperistaltic juxtavesical ureteral segment in POM is proposed to result from arrested development of musculature, since morphogenetically this is the last portion of the ureter to develop. Although we did not take any biopsy from

the diverticulum to compare the lack of muscular development or collagen deposition in its wall with similar finding on the distal ureteric biopsy, the obvious thick muscular backing found in the diverticular wall tends to discount any common etiological theory of these two anomalies in this case.

A bladder diverticulum can itself cause ureteral obstruction by compression of the ipsilateral extravascular ureter against the detrusor by the full, tense diverticulum; fibrosis resulting from peridiverticulitis; or primary hypomuscularity of the ureterovesical junction and distal ureter [4].

Besides a previously unknown combination of bilateral POM with a PBD, this case was also unique because of use of a large diverticulum for autocystoplasty and reimplantation of the left ureter into the diverticular patch. Use of a bladder diverticulum for augmentation has rarely been reported in literature [5–7]. Relatively low bladder capacity in our case is reminiscent of relative disuse causing microcystis and compression related to massively dilated ureters and a large diverticulum occupying the pelvis. Availability of a diverticulum to augment the bladder was a blessing in this case, considering the element of renal failure which would have precluded the use of other bowel segments without entailing the associated complications. The type of epithelial lining in the diverticulum wall can be conclusively

Fig. 2 Intraoperative photographs showing (a) typical rat-tailed appearance with a thin jet of urine passing through the narrow opening on pressing the dilated ureter and (b) opened up left-sided large paraureteric diverticulum (labeled as D), which had muscular wall as thick as the native bladder, used as a patch to augment the bladder. Bilateral ureters were reimplanted (arrows)

Fig. 3 Postoperative cystogram showing no leak of contrast. Grade 1 reflux is seen in the left ureter

known only on histopathological examination, but surely it is expected to result in less metabolic complications than expected with use of an intestinal patch to augment the bladder in presence of renal failure. Similarly, the diverticular wall beyond the mucosa can be conclusively assessed to have normal morphology only by histopathological examination and not on visual inspection alone. Also, its functional capacity can be assessed only on video urodynamic assessment. Therefore, such cases need to be followed up carefully with periodic urodynamic assessment over a long duration to confirm for any need to intervene for disturbed bladder dynamics. Whether one could have done without augmenting the bladder and leaving the bladder to gain its own volume later, is a presumption which cannot always be relied upon. Also by avoiding inferior and lateral dissection on the lateral pelvic wall (associated with excision of such a diverticulum) one would tend to reduce the damage to the pelvic nerves and therefore reduce chances of subsequent complications such as erectile or voiding dysfunction which are important considerations in young males. Ready availability of the diverticulum in this adolescent male thus made our decision easier in favor of diverticulocystoplasty. Other options for augmentation in such cases include myomectomy and autoaugmentation to iatrogenically create a large-capacity wide-mouthed effectively draining diverticulum, at a later stage, if the bladder does not regain good volume. The left ureter was reimplanted into the diverticular patch considering its good muscular backing. Similar such approach has been reported by Bogdanos et al. [8]. Awaiting longer follow-up in our case, diverticulocystoplasty seems

to provide a logical surgical alternative for such cases with satisfactory results. The size, site, and thickness of the muscular wall of the diverticulum are important considerations to be made for such an approach.

Acknowledgement NIL

Conflicting Interest NIL

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