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Laparoscopic repair of congenital midureteric strictures in infants and children

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ABSTRACT

Purpose: Congenital midureteric strictures (CMUS) are an uncommon cause of obstructive uropathy. There are only a few case reports of laparoscopic management of CMUS. We present our experience with laparoscopic repair of CMUS in 7 children.

Patients and methods: The records of all children (n = 7, 5 infants) undergoing laparoscopic reconstruction for CMUS were reviewed. Preoperative imaging included ultrasound (US) and diuretic renography (DR) in all children. Intravenous urography or magnetic resonance urography was performed in 3 children when a dilated ureter was seen on the ultrasound. Retrograde pyelography was performed in 6 children before definitive surgery. All children underwent transperitoneal laparoscopic excision of the stricture with ureteroureterostomy. Follow-up included clinical examination and US in all children, with DR in 5 children.

Results: Over a 3-year period, 7 children underwent laparoscopic repair of CMUS. Six children had antenatally diagnosed hydronephrosis, while one child presented with infected hydronephrosis, underwent nephrostomy and was later referred to us. The diagnosis of CMUS was suspected preoperatively in 4 children; in 3 children, diagnosis of CMUS was confirmed on retrograde pyelography. Laparoscopic repair was successfully completed in all children; there were no significant intraoperative or postoperative complications. At a median follow-up of 18 months, all children are asymptomatic, with US (7) and DR (5) confirming significant reduction in the hydronephrosis and improved drainage. The cosmetic results have been excellent.

Conclusion: To our knowledge, this is the first report of laparoscopic repair of CMUS in children. Laparoscopic repair of CMUS can be safely and successfully performed even in small infants, with good results.

The majority of congenital obstructing lesions in the ureter are located at either the proximal or the distal end. However, congenital obstructions can occur between the 2 ends as well. It is estimated that about 4–5% of congenital ureteral obstructions are located between the two ends of the ureter [1,2]. Most congenital midureteric strictures (CMUS) are now diagnosed as antenatal hydronephrosis (HDN) [3–6]. Because of its rarity, there are no clear guidelines on the management of CMUS. Most authors consider CMUS as a distinct clinical entity and distinguish it from the more common ureteropelvic junction obstruction (UPJO) [3–8]. Pathologically, UPJO is considered to be a result of neurogenic and myogenic mechanisms resulting in both mechanical and functional obstruction [9,10]; however, CMUS is mostly a mechanical obstruction [3–5]. Compared to UPJO, CMUS might require a more aggressive approach, with most cases requiring surgery [3]. In a recent report of 28 congenital ureteric strictures, 20 were located in the midureter, and most of them (75%) required surgery [6]. Although laparoscopic pyeloplasty is well established in children, there are few reports of laparoscopic repair of CMUS. We hypothesized that laparoscopic repair of CMUS may be safe and effective in young children; in this paper, we present our experience with laparoscopic repair of congenital midureteric strictures (CMUS) in 7 children.

1. Patients and methods

Seven consecutive cases with CMUS (M:F 6:1, 5 under 1 year, median age at surgery 5 months) underwent laparoscopic repair between November 2010 and December 2013. There were no open operations for CMUS during this period. During this period, there were 156 laparoscopic pyeloplasties performed in our center. Thus, the ratio of UPJO to CMUS in our unit was 22.3:1. The medical records of CMUS cases were reviewed retrospectively with special attention to the mode of presentation, preoperative imaging, intraoperative findings, management and surgical result (Table 1). All children underwent ultrasound (US) and diuretic renography (DR) which confirmed unilateral obstructive HDN ($T_{½}$ >20 minutes after Lasix injection, with significant retention at 2 hours) and reduced differential renal function (DRF) <40%. For DR, our standard protocol is to use DTPA (diethylene triamine pentaacetic acid). The diagnosis of CMUS was made preoperatively in 4 children. In 3 of them, the US demonstrated the presence of ipsilateral ureteric dilatation (patients 3, 4 and 5) with a duplicated system in patient 3; these children either underwent magnetic resonance urography (MRU, Fig. 1) or intravenous pyelography (IVP), which revealed the

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Table 1
Patient details.

Patient	Age (months)	Sex	Side	presentation	Follow-up (months)	Preoperative diagnosis
1	3	M	L	AN	36	L PUJO
2	10	M	L	UTI	24	L Midureteric stricture
3	42	M	R	AN, UTI	24	R Duplex, midureteric stricture of lower moiety
4	28	F	R	AN	18	R Midureteric stricture
5	3	M	L	AN	12	L Midureteric stricture
6	5	M	R	AN	6	R PUJO
7	2	M	L	AN	6	L PUJO

AN: antenatal diagnosis, UTI: urinary tract infection.

preoperative diagnosis of congenital midureteric obstruction; in patient 3 with duplex right kidney, the lower moiety ureter had midureteric obstruction. The 4th patient with a preoperative diagnosis of CMUS was patient 2 who had a nephrostomy placed in the ipsilateral kidney at another center before referral; subsequent nephrostogram before definitive surgery revealed midureteric obstruction. The contralateral kidney was normal in 6 cases, while it had mild HDN in patient 5.

Six patients underwent retrograde pyelography (RPG, with 3 Fr soft ureteral catheter) at the time of surgery, which confirmed the diagnosis of midureteric obstruction with variable length of the narrow segment and a normal distal ureter. In 3 children in whom the preoperative US did not pick up a dilated proximal ureter, the diagnosis of CMUS was made on the RPG only (Fig. 2). In 3 of 4 cases with a preoperative diagnosis of CMUS, RPG was done to evaluate the status of the distal ureter which was not clear from the imaging studies. Patient 2 had a nephrostogram which clearly defined the anatomy of midureteric stricture with a normal distal ureter; hence RPG was skipped in this child.

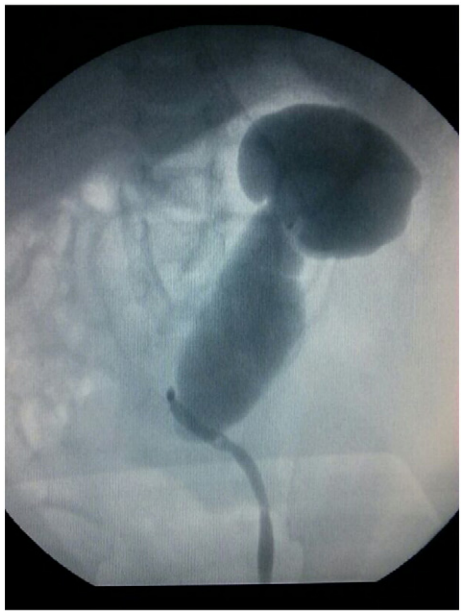

Fig. 2. RPG in patient 7 showing CMUS. The preoperative diagnosis was PUJ obstruction.

All children underwent laparoscopic excision of the CMUS with ureteroureterostomy by transperitoneal approach using 3 ports (one 5 mm and two 3 mm ports). The stricture was typically located at or just above the level of pelvic brim in all cases. The proximal ureter

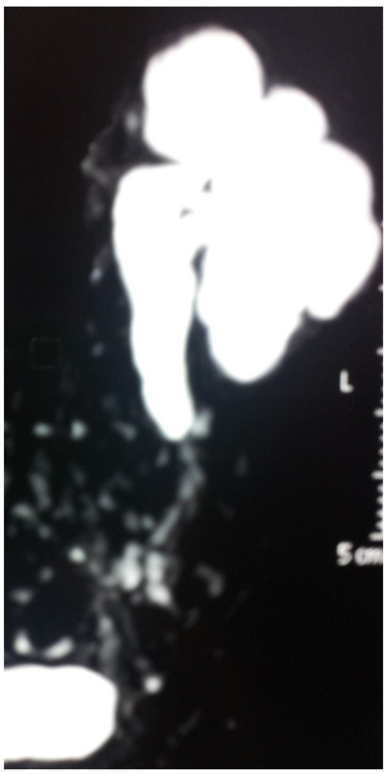

Fig. 1. MRU of patient 5 clearly demonstrating midureteric obstruction on left side.

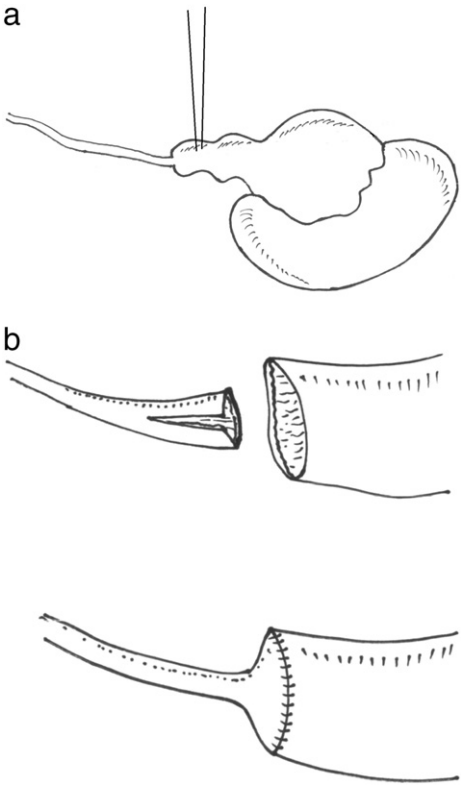

Fig. 3. Schematic diagram showing steps of excision of CMUS with ureteroureterostomy. **a.** After isolating the CMUS, stay suture placed on anterior wall of proximal ureter to stabilize it. **b.** Proximal ureter is transected transversely, the stricture is excised and distal ureter is spatulated on its anterior wall. A wide diamond-shaped anastomosis is performed.