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Percutaneous insertion of double-J ureteral stent in children with ureteral obstruction: Our experiences

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Abstract *Objective:* Ureteral obstruction (UO) is usually treated by surgical or endoscopic approaches. We investigated whether percutaneous anterograde treatment with insertion of double-J ureteral stent (DJ) is a feasible alternative technique for the management of UO in selected cases, where traditional approaches are not possible or too risky.
Patients and methods: The DJ was percutaneously inserted into 10 children (mean age 9 years) who suffered from UO. Three children had already been treated surgically for complex urotract congenital anomalies; six children had restenosis/reocclusion or stenosis of ureteropelvic junction; and one girl suffered migration of an intraoperatively placed DJ with stenosis of the distal ureter.
Results: Percutaneous insertion of the DJ was successful on the first attempt in 8 and on the second in 2 children. Adverse events after the procedure, all successfully treated, included one pyelonephritis and one migration of DJ, and 3 children had bacteriuria and 3 hematuria. Mean duration of insertion of the DJ was 6.4 months. After removal of the DJ, 7 children did not need any further interventions, but 2 children needed surgical correction and 1 reinsertion of the DJ.
Conclusion: In selected cases, percutanous insertion of a DJ should be considered as an alternative to surgery or endoscopic treatment in the management of children with UO.

Introduction

The double-J ureteral stent (DJ) provides internal urinary drainage from the renal pelvis to the bladder. The most common indications for the DJ are ureteral obstruction (UO) of different causes, upper urinary tract surgery, as a part of endourologic treatment, and as preparation for extracorporeal lithotripsy [1,2]. It can be inserted intraoperatively, endoscopically or percutaneously. Intraoperative insertion of DJ is a well-known and established

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procedure in adults and also in children, and is often used during different surgical procedures of the urinary tract to allow better postoperative drainage of urine [3,4]. Endoscopic retrograde insertion of DJ is also a well-known prophylactic procedure in maintaining ureteral patency after endourological surgery, before extracorporeal shock wave lithotripsy in patients with staghorn calculi [5], and as an initial approach in children with severe primary non-refluxing megaureter [6]. Percutaneous anterograde insertion of a DJ may provide a useful alternative in establishing continuity between the renal pelvis and the bladder in children when the endoscopic retrograde approach or operative treatment is not possible or too risky [7,8]. The small number of complications observed during interventional uroradiology proves percutaneous manipulation to be a safe medical procedure in adults and also in children [9].

We describe our experience of using percutaneous anterograde DJ stenting as an alternative to surgical or endoscopic treatment in a group of children with UO. The decision to perform the procedure was made in consensus with a urologist, nephrologist and radiologist on an individual case-by-case basis.

Patients and methods

The DJ was percutaneously inserted into 10 children aged from 1 to 17 years (mean 9 years), nine boys and one girl, who suffered from postoperative stenosis or occlusion of a different part of the ureter, from the ureteropelvic junction (UPJ) to ureterovesical junction (UVJ).

Children were classified into two groups according to the predominant site of UO (Table 1). Four children (Cases 1—4) were included in the group with predominant distal UO. Three of them were treated because of complex congenital anomalies of the urotract and all had undergone several surgical procedures. The fourth child suffered from migration of the intraoperatively placed DJ 2 weeks after the surgical correction of UPJ obstruction with additional stenosis of the distal part of the ureter.

In the group with predominant proximal UO (Cases 5—10), three children had a surgical correction (Anderson—Hynes) of congenital UPJ obstruction. One boy, aged 17, presented with acute obstruction of UPJ. He was an active sportsman and he wanted to postpone the surgical correction for a few months. Two boys had UPJ obstruction of a transplanted kidney 1 and 7 months after renal transplantation.

The access for percutaneous insertion of the DJ was established via existing nephrostomy in 6 children, or a new anterograde puncture was performed via the middle calyx in 3 children and via the upper pole calyx in 1. Contrast opacification of pelvicalyceal system and ureter with non-ionic iodine contrast medium was performed to determine the site of UO. This was followed by manipulating a hydrophilic guidewire (0.035 in) or, in some cases, by the microcatheter technique with a smaller guidewire (0.014 in) through the obstruction. The hydrophilic guidewire was exchanged with a stiff guidewire, which was more suitable for the introduction of the balloon catheter and insertion of the DJ. Conventional or high-pressure balloons (diameter between 4 and 8 mm) were used to dilate the stenotic part

Table 1 Summary of characteristics of 10 patients undergoing percutaneous DJ placement.

	Age (years)	Initial pathology	Reocclusion time post operation (months)	NFS	Indication	Time of fluoroscopy (min)	Complications	Duration of DJ (months)	Final outcome
1[a]	11 11.2	Bladder exstrophy	4	+	Urethral pathology	20.9 33.5	None	7	OK
2	1	Obstructive megaureter	2	+	Young for endoscopic approach	17	Pyelonephritis	7	OK
3	2	Obstructive megaureter	3	+	Post op condition	14.2	Bacteriuria	3	OK
4	6	PUS	0.5	—	Post op condition	31.2	Mild hematuria	1.5	OK
5[a]	4.5 4.6	PUS	30	+	Post op condition	51.2 33.1	None	8	Surgery[b]
6	8.4	PUS	0.5	+	Urethral pathology	21.2	DJ migration	6	OK
7	17	PUS	No previous surgery	+	Surgery refused	14.7	None	4	Surgery[c]
8	17.5	PUS solitary kidney	10.5	—	Failed endoscopic approach	70	Severe hematuria	9	DJ[d]
9	10	PUV	7	—	Urethral pathology	9.1	Bacteriuria	15	OK
10	11.8	PUV	1	—	Urethral pathology	10.4	Bacteriuria, mild hematuria	3.5	OK

1—4: Cases with predominant distal ureteral obstruction (UO), 5—10: cases with predominant proximal UO.
NFS — nephrostomy catheter before procedure. PUS — pyeloureteral stenosis, PUV— posterior urethral valve and bladder dystrophy.
OK — no other interventions were necessary.
[a] Case with two attempts of anterograde DJ insertion (first unsuccessful and second successful attempt).
[b] Reoperation of UPJ occlusion, followed by ureteroneoimplantation because of additional UVJ stenosis.
[c] Laparoscopic surgery of UPJ stenosis.
[d] Permanent DJ.