

Minimally Invasive Methods in Treatment of Pyeloureteral Stenosis

Nado Vodopija

Department of Urology, General Hospital »Slovenj Gradec«, Slovenj Gradec, Slovenia

ABSTRACT

The aim of this study was to present our experience of using four minimally invasive methods in treatment of pyeloureteral stenosis by percutaneous access. Fifty patients underwent different percutaneous operative procedures: the Korth's method, endopyeloureterotomy, the Fenger's plastic, and laparoscopic dismembered pyeloplasty. We classified results into 3 groups (outcome good, outcome intermediate, and outcome poor), depending on clinical improvement and the ultrasonography and diuretic renography findings six months after the operation. In 30 patients operated on by the method according to Korth, 23 patients (76.6%) had a good outcome, relative improvement was achieved in 4 patients (13.3%), and in 3 patients (10%) the result was poor. In 2 patients the transpelvic endopyelotomy was performed, and results were good in both cases. In 11 patients operated on by the percutaneous retroperitoneal pyeloplasty according to Fenger, the results were good in 72.7% of patients. Two patients were operated on by the dismembered pyeloplasty, another 2 by the ligature of crossing vessels, and finally the 3 patients operated on by the retrograde Laser incision on pyeloureteral junction, all showed good results. Minimal invasion operative methods in the treatment of pyeloureteral stenosis are safe for the patient and have a good final result.

Key words: *pyeloureteral stenosis, minimal invasive methods, pyeloplasty.*

Introduction

The etiological factors of the pyeloureteral segment stenosis divide into external causes (the high position of the ureter, a crossing vessel, an obstructive scar, etc.), and internal – caused by neuromuscular changes in pyeloureteral segment (longitudinal and spiral muscle fibers disorders, muscle tissue cicatricial

transformation). Some of the secondary causes of the pyeloureteral stenosis include infections, calculous obstruction, previous operations, etc.¹⁻⁵.

It is necessary to mention that it takes 6 weeks to heal to a longitudinal incision on the pyeloureteral segment with 90% of

the muscular layer⁶. It was also reported that an intensive regeneration of muscular fibers, but together with increasing quantity of collagen tissue⁷.

The significance of the crossing or aberrant vessel in the etiology of pyeloureteral obstruction is unclear. Wolf found the crossing vessel as the cause of hydronephrosis in 79% of the patients, by means of spiral computerized tomography^{8,13}. On the contrary, Bagley, using intraluminal ultrasound, found it in only 8% of his patients⁹.

Another discussion is still under way, on where the optimal position for making the incision is. Wickham, using the percutaneous procedure, suggested the incision to be performed in posterolateral direction¹⁰. On the contrary, Sampaio suggests lateral incision, since he found the crossing vessels in 20% of cases on posterolateral position, and 6.5% on the posterior position¹¹.

Van Cangh established that the results of endopyelotomy are good in case of moderate degree of hydronephrosis; the existence of crossing vessel, according to his opinion, is a contraindication for this operation, because of poor final results and eventual intraoperative complications¹². In order to eliminate the presence of a crossing vessel, Quillin uses spiral-computerized tomography¹³.

Our aim in this paper is to report our own experiences with the four minimally invasive techniques we performed on 50 patients with pyeloureteral stenosis in the 1987–2001 period.

Patients and Methods

Prior to operation, all patients underwent the routine laboratory and bacteriological tests; the ultrasound and Doppler examination of the kidney; the resistance index was measured, and only in the last

two years of the trial a diuretic renography was performed on all patients.

Procedures

In the method according to Korth, performed on 30 patients, the ureteral catheter is placed retrogradely into the ureter. When possible, a guide wire is also introduced. The narrowed pyeloureteral segment is cut with a cold knife in posterolateral direction. After that, the Korth's catheter is placed and left in for 6 weeks.

On 2 patients the percutaneous endopyeloureterotomy was done. In these cases, the DJ catheter was placed for 4 weeks. In 2 patients from this group, the stenosis was retrogradely incised with Laser.

The stenosis was in 20 patients corrected using the retroperitoneoscopic approach. In 11, the pyeloplasty was accomplished by using the Fenger's method; in 7 patients we did the standard pyeloplasty with renal pelvis reduction; finally, in 2 patients we performed only the resection of the crossing vessel.

In the retroperitoneal approach, the patient was in the side supine position, the same as in the standard open operative procedure. Three to 4 entries are placed in the retroperitoneal space. Through a small incision above the iliac crest, the muscles are taken apart using operator's fingers. In such a way, a retroperitoneal space is reached. The same was immediately dilated by means of a balloon trocar. At the same time, a 10 mm primary trocar is placed for telescope. The operative space is maintained by insufflations of CO₂ under standard pressure of 12 mm. The 5 mm trocar is placed under the costal margin in posterior axillary line, as well as the 10 mm trocar in anterior axillary line. If necessary, the 5 mm port is also performed forth. The trocars are placed with help of video insight on TV monitor on places where the instrument manipulation is the easiest.

The operation starts with preparation of the ureter, from where the mobilization of renal pelvis follows. The choice between the Fenger's procedure and the dismembered pyeloplasty depends on the degree of hydronephrosis. As we already mentioned, in 2 cases we did the resection of the crossing vessel only, because there was a mild degree of pelvic dilatation with good peristaltic (Table 1).

In our opinion, the retroperitoneal approach is more appropriate because it avoids postoperative adhesions.

Results

We had no intraoperative complications using any of the methods. In one patient there was a bleeding through the nephrostomy catheter, caused by a vessel injury during a dilatation of the operative canal. It ceased spontaneously.

TABLE 1
THE OPERATIVE METHODS TREATING PU
STENOSIS

Incision according to Kort method	30
Transpelvic endopyelotomy	2
Ureterorenoscopy and laser incision	1
Retroperitonscopic incision (Fenger)	11
Dismembered pyeloplasty	4
Retroperitonscopic ligature of crossing vessel	2

Seven patients had a high postoperative temperature, which was successfully treated with antibiotics. In 3 patients, it was necessary to correct the position of the nephrostomy catheter because of the inadequate drainage (Table 2).

The postoperative hospitalizations ranged between 3 and 5 days, but independently of the operative method. The only exception was the already mentioned case with postoperative bleeding, whose hospitalization prolonged on 7 days.

Six months after the operation, each patient was examined by ultrasonography and diuretic renography. The results were estimated as good in case of hydronephrotic dilatation reduction and the kidney function improvement; as relative improvement we assessed results where the kidney drainage was better, but the degree of hydronephrotic dilatation remained unchanged; finally, the results were considered poor when there was no improvement, or even with change for the worse.

The data on the operated patients were collected for approximately 4.1 years. In some cases, the ultrasound control was repeated at later controls.

Discussion

Undoubtedly, the dismembered pyeloplasty (according to Hynes-Anderson) gave the best results in pyeloureteral stenosis

TABLE 2
THE RESULTS OF PERCUTANEOUS PROCEDURES

	Outcome		
	Good	Intermediate	Poor
Endopyelouretrothomy	23 (76.6%)	4 (13.3%)	3 (10%)
Transpelvic endopyelotomy	2 (100%)	–	–
Fenger	9 (81.8%)	2 (11.7%)	1 (5.8%)
Dismembered pyeloplasty	4 (100%)	–	–
Ligature of crossing vessel	28 (100%)	–	–

treatment. According to our experience, in case of moderate degree hydronephrosis the minimal invasive methods are also appropriate and safe. These methods are more pleasant for the patient and the results are as good.

In cases of secondary pyeloureteral stenosis, the method of choice is the percutaneous or retrograde approach with a cold knife, Laser, or acucise. In such cases, the retroperitoneal access performed by the operator experienced in laparoscopic surgery, gives the best results.

In case of the primary pyeloureteral stenosis, the retroperitoneal approach is in our opinion completely appropriate, safe, and the easiest on the patient. As we emphasized before, we had no postoperative complications after using this method.

Because of the short postoperative hospital stay (range, 3–4 days), as well as because of the prompt patient's return to their usual everyday activities, the summarized cost of this procedure is lower (although the endoscopic operation itself is a bit more expensive).

Our results, on the relatively small number of patients, are good. They can be compared to experiences of other authors^{14,15}. In cases where the Fenger's method was applied, the results are slightly less successful. Otherwise, the procedure itself is very simple, and the operative time is comparable to the standard open procedure (75 minutes on average).

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In cases of pyeloplasty using the pyeloureteral resection, the operative time is longer (115 minutes), but still much shorter than in the majority of results reported in the recent publications^{16–18}. The explanation for this difference is our great experience in laparoscopic surgery: during the last 10 years, we performed more than 3,000 laparoscopic procedures.

Laparoscopic pyeloplasty is a safe method, but the operator has to be very experienced in the laparoscopic operative technique, and especially experienced in the laparoscopic sewing technique. To justify the choice of the percutaneous anterograde method, the presence of the crossing vessels should be eliminated. We perform the resection of the crossing vessel only in cases after previous unsuccessful operation.

Conclusion

The minimal invasive methods in pyeloureteral stenosis treatment are safe and more pleasant for the patient than the open procedure. Postoperative hospitalization is shorter, easier, and needs lower doses of analgesics. The patient leaves bed the same day the operation was performed, or at least the day after. The consummation of liquid food is possible only a few hours after the operation, and the normal nourishment begins the following day. The postoperative scar is cosmetically much more satisfactory in percutaneous methods than the open surgery.

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N. Vodopija

Department of Urology, General Hospital »Slovenj Gradec«, Slovenj Gradec, Slovenia

MINIMALNO INVAZIVNE METODE U LIJEČENJU PIELOURETERALNE STENOZE

S A Ž E T A K

Cilj ove studije bio je prikazati iskustvo u korištenju minimalno invazivnih metoda u liječenju pijeloureteralne stenozе. 50 bolesnika liječeno je različitim minimalno invazivnim operativnim procedurama: Korthovom metodom, endopijelouretotomijom, Fengerovom plastikom i laparaskopskom pijeloplastikom. Rezultati su klasificirani u 3 grupe po ishodu: dobar, srednji, loš – ovisno o kliničkom poboljšanju te nalazima ultrazvučnog pregleda i diuretske renografije 6 mjeseci nakon operativnog zahvata. U 30 bolesnika koji su operirani prema Korthovoj metodi, 23 bolesnika (76,6%) imalo je dobar ishod, srednje dobar ishod postignut je u 4 (13,3%) bolesnika, dok je u 3 bolesnika (10%) ishod bio loš. U dva bolesnika napravljena je transpelvična endopijelotomija, i u oba slučaja rezultati su bili dobri. U 11 bolesnika operiranih perkutanom retroperitonealnom pijeloplastikom prema Fengeru, rezultati su bili dobri u 72,7% bolesnika. Dva bolesnika operirana su laparaskopskom pijeloplastikom, druga dvojica podvezivanjem križnih žila, te 3 bolesnika operirani su retrogradnom laserskom incizijom pijeloureteralnog spoja, a svi navedeni zahvati rezultirali su dobrim ishodom. Minimalne invazivne operativne metode u liječenju pijeloureteralne stenozе pokazale su se sigurnima za bolesnika i rezultirale su povoljnim krajnjim ishodima.