

Percutaneous Endopyelotomy in the Treatment of Ureteropelvic Junction Obstruction

Bannakij Lojanapiwat MD*,
Boonlert Lertsupphakul MD*

* Division of Urology, Department of Surgery, Faculty of Medicine, Chiangmai University

Introduction : Current advances in endourology, percutaneous endopyelotomy has now become the preferred treatment for ureteropelvic junction obstruction. Many advantages of endopyelotomy compared to open correction are decreasing postoperative pain, shorter operative time and short recovery time.

Patients and Method : Percutaneous endopyelotomy was performed in 15 patients. Nine patients had previous open kidney and upper ureteral surgery. 11 patients had associated renal calculi. The incised ureteropelvic junction was stented with an endopyelotomy stent size 14/7 F. The stent was removed 6 weeks postoperatively.

Results : 14 patients (93%) remain symptom-free and 11 (73%) had improvement of their symptoms and postoperative intravenous pyelogram or renogram after follow up at 12-38 months (over 18 months).

Conclusion : Percutaneous endopyelotomy is widely accepted as the first choice for correction of ureteropelvic junction obstruction due to less morbidity and with a high success rate.

Keywords : Ureteropelvic junction obstruction, Percutaneous endopyelotomy

J Med Assoc Thai 2004; 87(8): 947-50

Current advances in endourology designate percutaneous nephrolithotomy (PCNL) as the treatment of choice for renal and upper ureteric calculi; and when further indicated, percutaneous endopyelotomy has now become the preferred treatment for ureteropelvic junction obstruction. The endopyelotomy technique is based on the principle of Davis's intubation. There are many advantages to endopyelotomy compared to open correction, such as a decrease of postoperative pain, shorter operative time and a more rapid recovery period in hospital⁽¹⁻⁷⁾. Recently, there have been many reports of different kinds of endopyelotomy, such as antegrade endopyelotomy, retrograde endopyelotomy and cautery wire balloon incision^(1,2). The advantages of antegrade endopyelotomy are correction of the ureteropelvic junction and removal of renal calculi at the same time, with treatment using the same instruments as PCNL⁽²⁻⁴⁾ (except for the cutting device). The authors report antegrade endopyelotomy in the treatment of 15 patients with ureteropelvic junction obstruction.

Correspondence to : Lojanapiwat B, Division of Urology, Department of Surgery, Faculty of Medicine, Chiang Mai University, Chiang Mai 50200, Thailand.

Eleven of the patients had renal calculi and treatment included removal of the stones at the same time.

Patients and Method

Fifteen (15) patients, 4 men and 11 women, presented with symptomatic ureteropelvic junction obstruction. Ages ranged from 14 to 72 years old (mean age 45 years old), and left kidneys were involved in 8 cases (53%) and right kidneys in 7 cases (47%). Nine patients had previous open kidney and upper ureteral surgery. Clinical presentations included flank pain in all patients and infection in 7 patients. Plain KUB and intravenous pyelography were done in all patients. Eleven patients had associated renal calculi (8 lower caliceal stones, 3 middle caliceal stones). The ureteropelvic junction obstructions were diagnosed with intravenous pyelography (IVP) and retrograde pyelogram (RP) in all patients. Diuretic renography was done to confirm the diagnosis in equivocal assessments. The etiology of the ureteropelvic junction was primary in 4 patients (27%) and secondary in 11 patients (73%) (Table 1).

All antegrade endopyelotomies were performed with the patient under general anesthesia.

Table 1. Patients Profile

| | |
|-------------------------|------------|
| No of Patients | 15 |
| Age (year) | 45 (14-72) |
| Gender (M: F) | 4:11 |
| Side (R:L) | 7:8 |
| Previous renal surgery | 9 |
| Ass with renal calculi | 11 |
| Presentation | |
| Flank pain | 15 (100%) |
| Urinary tract infection | 7 (47%) |

The open-end 6 F ureteral catheter was inserted across the ureteropelvic junction under fluoroscopic guidance. Percutaneous access was created via the upper calix under fluoroscopic guidance after the patients were turned into the prone position. The access tract was dilated to 30 F. Nephroscopy was performed. Any stone present was removed percutaneously, and the ureteropelvic junction was bridged with 2 guide wires. An endopyelotome with a cold-hook knife (Karl Storz) was used to incise the ureteropelvic junction, and it was then advanced laterally alongside the guide wire down to the periureteral fat. The incision was extended caudally in the ureter until reaching a normal caliber ureter with healthy mucosa. The incised ureteropelvic junction was stented with an endopyelotomy stent (EP stent) size 14/7 F. A 20 F nephrostomy tube was placed via the access tract. Forty-eight hours postoperatively, antegrade nephrostomy was performed to evaluate adequate drainage and to make sure there was no extravasation at the incised site and no residual stones were found. The nephrostomy tube was then clamped and removed and the stent was removed 6 weeks postoperatively. Two patients could not tolerate clamping of the tubes due to flank pain, and they were left to drain. These patients' tubes were clamped 1 week postoperatively after hospital discharge, which they tolerated well. All patients were evaluated with symptoms and IVP at 3, 6 and 12 months postoperatively. Renal scans were again performed when clinically indicated.

Results

Success was identified with the resolution of pain, no further infectious symptoms and improvement on an intravenous pyelogram, as evidenced by a smaller pelvis, decreased caliceal clubbing, prompt visualization of contrast media from the renal pelvis to the upper ureter. Of the 15 patients, 14 (93%) remain symptom-free (subjective success) and 11 (73%) had improvement of their symptoms and post-

Table 2. Results

| | |
|---|-------------|
| Follow up time (month) | 18 (12-38) |
| Operative time (hour) | 2.1 (1.8-3) |
| Hospital stay (day) | 5.9 (4-8) |
| Success rate - Clinical | 14 (93%) |
| - Radiographic | 11 (73%) |
| Complication - Hemorrhage (Blood transfusion) | 1 (7%) |
| - Prolong fever | 1 (7%) |
| - DJ symptom | 3 (20%) |

operative intravenous pyelogram or renogram after follow up 12-38 months (average 18 months) later (objective success) (Table 2). Of the eleven patients who underwent percutaneous nephrolithotomy with ultrasonic lithotripsy at the same time as endopyelotomy, 9 were rendered stone-free, and only 2 patients had residual stone fragments less than 4 mm. There was no increase in morbidity associated with the combination therapy.

Discussion

Endopyelotomy has developed from advances of endourology and has become the first choice of treatment for ureteropelvic junction obstruction and offers an alternative to the standard pyeloplasty. Even though the success rate of open correction for ureteropelvic junction obstruction, such as flap operation and dismembered pyeloplasty, is very high, there remain several disadvantages when compared to the endopyelotomy treatment, such as an increase in the length of hospitalization, longer anesthetic time, more blood loss and an extended recovery period with analgesic requirement⁽¹⁻⁷⁾. The principle of endopyelotomy, as modified by Davis, calls for incising the ureter, stenting and allowing smooth muscle regeneration to enlarge the ureteral caliber. Hamm et al conducted studies in dogs that have shown smooth muscle completely regenerates and regains its peristaltic activity at 6 to 8 weeks, so the stent must be retained for at least 6 weeks⁽¹⁾.

There are 3 approaches for the treatment of ureteropelvic junction obstruction by endourologic technique, namely, antegrade, retrograde and cautery wire balloon incision. The advantages of the antegrade approach are the correction of the renal calculi while performing endopyelotomy, and the same instrument is used in percutaneous nephrolithotomy, except the cold-hook knife, and also makes easier the orientation of the incision easier^(2,4,7).

There are primary and secondary causes of ureteropelvic junction obstruction. Primary causes are dysfunctional tissues and dysplastic segments while secondary causes are post-pyelolithotomy, failure of pyeloplasty correction or after percutaneous stone extraction. The success rate ranges from 72 to 89%^(3,4,6). The success rate in the treatment of secondary causes is slightly better than primary causes, and failures commonly occur in the first year postoperatively. Cold incision is the method of choice, because electrocautery incision creates scarring due to thermal injury. In recent years, laser has been used for cutting, resulting in less bleeding.

The failure of endopyelotomy depends on several factors such as massive hydronephrosis, poor renal function, redundant pelvis and long upper ureteral strictures. The failure rate is found in patients with high grade hydronephrosis compared to the low grade hydronephrosis (62%:94%). Another factor is poor renal function (43%:10%) and the preference to perform nephrectomy when the kidney function is less than 10%⁽⁷⁾. The reason for the failure in patients with redundant renal pelvis is impaired pelvic decompression, but some reports believe that redundancy often is self-correcting if adequate drainage is provided, and they consider endopyelotomy to be the treatment of choice for the ureteropelvic junction obstruction with a redundant renal pelvis^(3,4,6,8).

If the diagnosis of ureteropelvic junction in the presence of stones, obstruction may be caused by edema or scarring of the ureteropelvic junction due to the irritation of the stone, especially if the stone is in the renal pelvis. The presented patients had stones in the calix, and therefore the authors think stones are not the cause of the ureteropelvic junction obstruction and the obstruction can be corrected at the same time the stones are removed.

The initial reports use the large stent following endopyelotomy (14/7 Fr stents). Recent reports show the same result with treatment using the smaller 7 Fr stent compared to the larger stent. Use of the small caliber stent shows 78 to 95% satisfactory results^(3,5,9).

The endopyelotomy is also used for the treatment of ureteropelvic junction obstruction in horseshoe kidneys and ectopic kidneys with good results. Posteromedial percutaneous puncture was done in a horseshoe kidney and a retrograde percutaneous access tract was created under laparoscopic guidance in pelvic kidneys^(13,14).

The complication of antegrade endopyelotomy is 1-26% of cases and most of it is minor, for example, urinoma and bleeding and complications related to the DJ stent and failure of the desired results^(2,3,5,9,10). There is a report of arteriovenous fistula followed endopyelotomy and successful management with interventional radiologic technique^(11,12).

Conclusions

Percutaneous endopyelotomy has developed from the advances of endourology and is widely accepted as the first choice for the correction of ureteropelvic junction obstruction due to less morbidity, less operative time, less anesthetic requirement and shorter recovery period with a high success rate.

References

1. Tawfik ER, Liu J, Bagley DH: Ureteroscopic treatment of ureteropelvic junction obstruction. *J Urol* 1998; 160: 1643-7.
2. Sosa RE: Editorial: endopyelotomy-should it become first line treatment for ureteropelvic junction obstruction? *J Urol* 1998; 160: 698-9.
3. Kumar U, Turk TMT, Albala DM: The treatment of adult ureteropelvic junction obstruction: Issues and answers. *AUA Update Series* 2001, vol xx, lesson 36: 281-8.
4. Cassis AN, Brannen GE, Bush WH: Endopyelotomy: review of results and complications. *J Urol* 1991; 146: 1492-5.
5. Shalhav AL, Giusti G, Elbahnasy AM, et al: Adult endopyelotomy: impact of etiology and antegrade versus retrograde approach on outcome. *J Urol* 1998; 160: 685-9.
6. Jabbour ME, Goldfischer ER, Klima WJ, et al. Endopyelotomy after failed pyeloplasty: the long-term results. *J Urol* 1998; 160: 690-3.
7. Horgan JD, Maidenbery MJ, Smith AD.: Endopyelotomy in the elderly. *J Urol* 1993; 150: 1107-9.
8. Brannen GE, Bush WH, Lewis GP: Endopyelotomy for primary repair of uretero-pelvic junction obstruction. *J Urol* 1988; 139: 29-32.
9. Karlin GS, Smith AD: Endopyelotomy. In Smith AD, ed. *Urol Clin North America* 1988; 15; 3: 439-44.
10. Weiss JN, Badlani GH, Smith AD: Complications of endopyelotomy. In Smith AD, ed. *Urol Clin North America* 1988; 15; 3: 449-51.
11. Malden ES, Picus D, Clayman RV: Arteriovenous fistula complicating endopyelotomy. *J Urol* 1992; 148: 1520-3.
12. Strem SB, Geisinger MA: Prevention and management of hemorrhage associated with cautery wire balloon incision of ureteropelvic junction obstruction. *J Urol* 1995; 153: 1904-6.

13. Bellman GC, Yamaguchi R: Special considerations in endopyelotomy in a horseshoe kidney. Urol 1996; 47: 582-6.
14. Jabbour ME, Goldfischer ER, Stravodimos KG: Endopyelotomy for horseshoe and ectopic kidneys: J Urol 1998; 160: 694-7.

การรักษารอยต่อระหว่างกรวยไตและท่อไตตีบ โดยวิธีส่องกล้องผ่านทางผิวหนัง

บรรณกิจ โฉจนาภิวัฒน์, บุญเลิศ เลิศสุภกุล

ความก้าวหน้าของการผ่าตัดส่องกล้อง ทำให้การรักษาภาวะตีบระหว่างกรวยไตและท่อไตตีบ โดยการผ่าตัดส่องกล้องเป็นที่ยอมรับมากขึ้น เนื่องจากมีข้อได้เปรียบมากกว่าวิธีเปิดแผลผ่าตัดหลายประการ เช่น อาการปวดหลังผ่าตัด ระยะเวลาที่นอนในโรงพยาบาลและระยะเวลาพักฟื้นหลังผ่าตัด น้อยกว่า

ผู้ป่วยที่มีภาวะรอยต่อระหว่างกรวยไตและท่อไตตีบจำนวน 15 ราย ได้รับการผ่าตัดโดยวิธีส่องกล้องผ่านทางผิวหนัง ซึ่ง 11 รายมีนิ่วในไตร่วมด้วย ผู้ป่วยทุกรายได้รับการวินิจฉัยโดยการตรวจพิเศษ โดยการฉีดสารทึบแสงเข้าเส้นเลือด หรือ ฉีดสารทึบแสงผ่านสายสวนท่อไต หรือ ทำรีโนแกรม หลังการผ่าตัดผู้ป่วยทุกรายได้รับการใส่สายสวนท่อไตไว้ 6 สัปดาห์ หลังการติดตามผลในระยะเวลาเฉลี่ย 18 เดือน พบว่า ผู้ป่วยไม่มีอาการผิดปกติร้อยละ 93 และพบดีขึ้นจากการตรวจโดยเอ็กซเรย์ร้อยละ 73 โดยสรุปการผ่าตัดแก้ไขภาวะรอยต่อระหว่างกรวยไตและท่อไตตีบ โดยวิธีการผ่าตัดส่องกล้องผ่านทางผิวหนัง น่าจะเป็นทางเลือกแรกของผู้ป่วยที่มีความผิดปกติของภาวะนี้ เนื่องจาก พบปัญหาแทรกซ้อนน้อยและระยะเวลาการนอนในโรงพยาบาล และระยะพักฟื้น หลังการผ่าตัดสั้น