



Review – Renal Disease

Minimally Invasive Treatment of Ureteropelvic Junction Obstruction: A Critical Analysis of Results

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Abstract

Objectives: To analyse the indications and long-term results of endoscopic and minimal access approaches for the treatment of ureteropelvic junction (UPJ) obstruction and to compare them to open surgery.

Methods: A review of the literature from 1950 to January 2007 was conducted using the Ovid Medline database.

Results: A lack of standardisation of techniques used to diagnose UPJ obstruction and to follow up treated patients introduces a degree of inaccuracy in interpreting the success rates of the various modalities of treatment. However, there is no indication that any one of these techniques is affected by this to a greater or lesser extent than another. Open pyeloplasty achieves very good (90–100% success) results, endopyelotomy and balloon disruption of the UPJ fail to match these results by 15–20%, and minimal access pyeloplasty produces results that are at least as good as those of open surgery but with the advantages of a minimal access approach.

Conclusions: Minimal access pyeloplasty is likely to gradually replace endopyelotomy and balloon disruption of the UPJ for the treatment of UPJ obstruction. The much higher cost of robotic pyeloplasty and greater availability of laparoscopic expertise in teaching centres are likely to limit the dissemination of robotic pyeloplasty.

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1. Introduction

Obstruction of the ureteropelvic junction (UPJ) is the most common congenital abnormality of the ureter, with a reported incidence of 5/100,000 annually. Indications for intervention in adults include loin pain, which may be exacerbated by fluid loading,

urinary infection, stone formation, hypertension, and deteriorating renal function.

Historically, open pyeloplasty has been the standard method of treatment, with success rates of 90–100%. However, dissatisfaction with the consequences of the loin incision used to perform open pyeloplasty (chiefly pain and a prolonged

convalescence) has led to the development during the past two decades of minimal access alternatives to open surgery in the form of endopyelotomy, balloon disruption of the UPJ, and, more recently, minimal access pyeloplasty. Although the advocates of a lumbotomy approach for pyeloplasty continue to extol its virtues, the reality is that this technique has never assumed popularity because of the limited access it affords in some patients.

2. Endopyelotomy

In 1983, Wickham and Kellett described the technique of full-thickness incision of the obstructing UPJ with a cold knife inserted through a dilated percutaneous nephrostomy track, which they named percutaneous pyelolysis. Postoperatively, a ureteral stent was left in situ for 4 wk to act as a scaffold for ureteric healing, according to the principles of the intubated ureterotomy. This technique is now better known as endopyelotomy. A retrograde ureteroscopic approach to the UPJ has assumed greater popularity because it obviates the need for percutaneous renal access, the exception being for kidneys containing large stones when percutaneous access allows for more rapid stone removal. Success rates for the two approaches are similar at 78% for the antegrade and 79% for the retrograde route [1]. Although the importance of using a stent postoperatively to act as a scaffold for urothelial and myofibroblast regeneration and to prevent urinoma formation is undisputed [2], there is no consensus regarding stent size or duration, with some workers advocating the use of a tapered stent (with a larger calibre proximal portion) and others choosing to use a stent of conventional diameter.

Although diathermy and laser energy have been used as alternatives to cold knife incision of the UPJ

with similar success rates (76% [3], 85% [4], and 86% [5]), there is a concern that diathermy might produce more tissue necrosis and fibrosis, which may lead to a higher stricture rate, but this is currently unproven.

Endopyelotomy was initially thought to be best suited to the treatment of secondary UPJ obstruction but the series of Motola et al involving 212 patients with a minimum of 6 mo follow-up shows that the procedure is equally effective in primary (85% success) and secondary (86% success) obstruction [6]. Although endopyelotomy can improve drainage through an obstructed UPJ, it is not capable of establishing dependent drainage and is generally thought to be unsuitable when the renal pelvis is large or the insertion of the ureter into the renal pelvis is high. The relevance of vessels adjacent to the UPJ, which are usually suggested by intravenous urography (IVU) and then confirmed by helical computed tomography (CT), magnetic resonance imaging (MRI) angiography, or endoluminal ultrasound, is more controversial. There is no doubt about the potential for severe bleeding even when the UPJ is incised posterolaterally, but not all authors agree that vessels adjacent to the UPJ represent a contraindication to performing endopyelotomy [7] or that they adversely affect the result [8]. Sampaio's cadaveric resin studies have estimated that 65% of patients with UPJ obstruction have such a vessel, but also that there is a direct relation between a large vessel and the dorsal aspect of the UPJ in only 6.2% [9]. The proportion of these vessels causing UPJ obstruction remains hotly debated, with the true incidence probably falling somewhere between these two figures. Additional contraindications to endopyelotomy include extensive periureteral fibrosis, a bleeding diathesis, a ureter too small to accommodate an endopyelotomy stent, and a long (>2 cm) stenosed ureteropelvic segment [5].

Table 1 – Results of endopyelotomy series in which $n \geq 50$

	<i>n</i>	Follow-up, mo (range)	Primary success rate	Secondary success rate
Motola [6]	212	NS (6–96)	85%	86%
Kletscher [14]	50	12 (4–74)	90%	82%
Knudsen [15]	80	55 (16–138)	65%	74%
Kunkel [16]	201	12.5 (11–63)	92%	NA
Mendez-Torres [17]	133	NS (36–168)	76%	NS
Shalhav [18]	149	27 (12–16)	89% antegrade 71% retrograde	77% antegrade 83% retrograde
van Cangh [19]	102	60 (12–120)	73%	NS
Mean			82%	82%

Values are mean or median (range).
NS = not stated; NA = not applicable.

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