NATIONAL INSTITUTE FOR HEALTH AND CLINICAL EXCELLENCE

INTERVENTIONAL PROCEDURES PROGRAMME

Interventional procedure overview of endopyelotomy for pelviureteric junction obstruction

Pelviureteric junction obstruction is a condition caused by a narrowing of the funnel-shaped part of the kidney (known as the renal pelvis) where urine collects before being carried to the bladder by tubes called ureters. The obstruction may cause episodes of loin pain and/or nausea and vomiting, urinary infections and kidney stones. In some patients the condition could also affect the normal function of the kidney.

This procedure (endopyelotomy) aims to widen the renal pelvis by inserting small instruments either up through the urinary tract or down through the skin and into the kidney. The instruments are used to remove the tissue that is causing the obstruction by cutting or burning it away or by applying laser.

Introduction

The National Institute for Health and Clinical Excellence (NICE) has prepared this overview to help members of the Interventional Procedures Advisory Committee (IPAC) make recommendations about the safety and efficacy of an interventional procedure. It is based on a rapid review of the medical literature and specialist opinion. It should not be regarded as a definitive assessment of the procedure.

Date prepared

This overview was prepared in June 2009.

Procedure name

- Endopyelotomy for pelviureteric junction obstruction

Specialty societies

- British Association of Urological Surgeons

Description

Indications and current treatment

Pelviureteric junction (PUJ) obstruction is a stenosis of the junction between the renal pelvis and the ureter that inhibits the flow of urine. The condition is usually congenital (primary PUJ obstruction) but can be acquired secondary to scar formation from another disorder (for example, nephrolithiasis or infection). PUJ can cause chronic or recurrent flank pain as well as urine infections (pyelonephritis in particular).

Interventional treatments aim to reconstruct and normalise the anatomy of the PUJ. These include open pyeloplasty, laparoscopic pyeloplasty (with or without robotic assistance), and the electrocautery cutting balloon procedure.

What the procedure involves

The aim of the procedure is to remove the obstruction at the PUJ using a relatively less invasive procedure than open pyeloplasty.

Under general anaesthesia and with fluoroscopic guidance, a laser instrument, cold steel or a diathermy ablation device is introduced with a guide wire either via a retrograde approach upward via the ureter or via an antegrade approach, accessing the renal pelvis percutaneously. With endoscopic visualisation a full-thickness incision is made to the level of periureteral fat. A stent is inserted during the same procedure following incision, with the aim of maintaining patency, and removed after a number of weeks. Patency may be checked with a contrast retrograde pyelogram.

List of studies included in the overview

This overview is based on 1518 patients from one randomised controlled trial[1], three non-randomised controlled trials[2–4], two case series[5,6] and two case reports[7,8].

Other studies that were considered to be relevant to the procedure but were not included in the main extraction table (table 2) have been listed in appendix A.

Efficacy

A randomised controlled trial of 40 patients reported that a successful outcome (defined as subjective relief of improvement in symptoms, plus objective relief of obstruction and improvement in glomerular filtration rate) was not significantly more common following laser endopyelotomy (85% [17/20]) than following electrocautery cutting balloon treatment (65% [13/20]) ($p = 0.14$) at 30 months' follow-up[1]. Similarly there was no statistically significant difference in the rate of success between the treatment groups in

subgroup analysis of patients with primary PUJ obstruction (p = 0.38) versus those with secondary PUJ obstruction (p = 0.26).

A non-randomised controlled trial of 436 patients reported that success (defined as a complete relief of symptoms plus resolution or improvement in obstruction on radiology) was achieved in 61% (111/182) of patients following endopyelotomy and 82% (144/175) of patients following pyeloplasty at 3.5-year follow-up (measurement of significance not reported)[2]. The 10-year estimated recurrence-free survival was 41% in the endopyelotomy group and 75% in the pyeloplasty group.

A non-randomised controlled trial of 273 patients reported that success (defined as a resolution of symptoms plus improvement or stability of radiographic parameters) was achieved in 60% of patients in the endopyelotomy group, 89% of the laparoscopic pyeloplasty group and 100% of the robotically assisted pyeloplasty group at 20-month follow-up (absolute figures and measurement of significance not reported)[3]. Multivariate analysis (excluding the robotically assisted group) showed that endopyelotomy treatment (compared with laparoscopic pyeloplasty) (hazard ratio 3.16; 95% confidence interval 1.70 to 5.86) (p < 0.001) and age > 41 years at baseline (hazard ratio 2.15; 95% confidence interval 1.30 to 3.75) (p = 0.003) were independent predictors of an unsuccessful outcome.

A non-randomised controlled trial of 235 patients reported that success (defined as absence of pain plus absence of obstruction on intravenous urogram or diuretic renography) was achieved in 80% of the patients in the endopyeloplasty group at -month follow-up and in 98% of patients in the open pyeloplasty group at 30-month follow-up (absolute figures and measurement of significance not reported)[4]. At 24-months follow-up 2 patients in the endopyelotomy group and 1 patient in the open pyeloplasty group had residual symptoms of slight pain after consumption of fluids.

A case series of 320 patients reported a good or satisfactory outcome in 85% (187/220) of patients[5]. A ‘good’ outcome was defined as no obstruction on radiographic assessment and absence of pyelectasia; a ‘satisfactory’ outcome was defined as some obstruction but filling of ureter, and no subjective complaints.

A case series of 212 patients reported that success (defined as complete relief of symptoms plus absence of signs of obstruction on excretory urogram and improved emptying of the renal pelvis) was achieved in 86% (162/189) of patients. The success rate was similar in patients with primary PUJ obstruction (85% [79/93]) and those with secondary PUJ obstruction (86% [83/96])[6].

There was no significant difference in the mean length of hospital stay following laser endopyelotomy (1.1 days) and cutting balloon treatment (1.6 days) in a randomised controlled trial of 40 patients (p = 0.13)[1].

Safety

A randomised controlled trial of 40 patients reported that there was no statistically significant difference in the rate of overall complications (not otherwise defined) between patients treated by laser endopyelotomy (10% [2/20]) and those treated by electrocautery cutting balloon (25% [5/20]) ($p = 0.20$)[1]. A non-randomised controlled trial of 436 patients reported that the rate of overall complications was not significantly different between the endopyelotomy group (11% [25/225]) and the pyeloplasty group (open or laparoscopic) (8% [17/211]) ($p = 0.33$) at a mean follow-up of 3.5 years[2]. A non-randomised controlled trial of 235 patients reported that there were no fatal complications in either treatment group but that the rate of overall complications was significantly lower following endopyeloplasty (11% [15/137]) than following open pyeloplasty (24% [23/98]) at 32-month follow-up ($p < 0.01$)[4].

A non-randomised controlled trial of 436 patients reported that bleeding requiring transfusion occurred in 1% (3/225) of patients in the endopyelotomy group and 1% (2/211) of patients in the pyeloplasty group (measurement of significance not reported)[2]. A case series of 320 patients reported that haemorrhage requiring electrocoagulation occurred in 1% (4/320) of patients[5], and a case series of 212 patients reported haemorrhage requiring transfusion in 1% (2/212) of patients; 1 patient required further intervention (not otherwise described)[6].

A case series of 320 patients reported that PUJ rupture during drain insertion occurred in 1% (4/320) of patients, and debris obstructing the PUJ was noted in 2% (6/320) of patients[5]. A case series of 212 patients reported ureteral avulsion requiring an open procedure in < 1% (1/212) of patients[6]. A case report describes fibrosis of tissue around the kidney and vena cava following endopyelotomy requiring right nephrectomy for a Page kidney at 8-year follow-up[7]. A second case report describes ureteral intussusception following endopyelotomy at 3-month follow–up, which was treated by pyeloplasty reconstruction[8].

A case series of 320 patients reported that reoperation was required in 10% (33/320) of patients, including repeat endopyelotomy, open pyeloplasty or nephrectomy[5]. A case series of 212 patients reported that a repeat endopyelotomy was required in < 1% (1/212) of patients, a secondary intervention by pyeloplasty in 9% (18/212), ureterocalicostomy in 2% (4/212) and ileal interposition in < 1% (1/212)[6].

A non-randomised controlled trial of 235 patients reported that respiratory insufficiency (requiring intensive care unit stay) occurred in 0% (0/137) of patients treated by endopyelotomy and 2% (2/98) of patients treated by open pyeloplasty[4]. The rates of pneumothorax (treated conservatively) were 0% (0/137) and 4% (4/98) respectively, and the rate of infection (described as urosepsis) were 1% (1/137) and 2% (2/98) respectively (measurement of significance not reported).

Literature review

Rapid review of literature

The medical literature was searched to identify studies and reviews relevant to endopyelotomy for PUJ obstruction. Searches were conducted of the following databases, covering the period from their commencement to 10 June 2009 and updated to 01 October 2009: MEDLINE, PREMEDLINE, EMBASE, Cochrane Library and other databases. Trial registries and the Internet were also searched. No language restriction was applied to the searches (see appendix C for details of search strategy). Relevant published studies identified during the consultation or resolution process that are published after this date may also be considered for inclusion.

The following selection criteria (table 1) were applied to the abstracts identified by the literature search. Where selection criteria could not be determined from the abstracts the full paper was retrieved.

Table 1 Inclusion criteria for identification of relevant studies

Characteristic	Criteria
Publication type	Clinical studies were included. Emphasis was placed on identifying good quality studies. Abstracts were excluded where no clinical outcomes were reported, or where the paper was a review, editorial, or a laboratory or animal study. Conference abstracts were also excluded because of the difficulty of appraising study methodology, unless they reported specific adverse events that were not available in the published literature.
Patient	Patients with PUJ obstruction
Intervention/test	Endopyelotomy (for example, laser, cold steel or ablation)
Outcome	Articles were retrieved if the abstract contained information relevant to the safety and/or efficacy.
Language	Non-English-language articles were excluded unless they were thought to add substantively to the English-language evidence base.

Existing assessments of this procedure

There were no published assessments from other organisations identified at the time of the literature search.

Related NICE guidance

Below is a list of NICE guidance related to this procedure. Appendix B gives details of the recommendations made in each piece of guidance listed.

Interventional procedures

- Laparoscopic pyeloplasty. NICE interventional procedures guidance 046 (2004). Available from www.nice.org.uk/IPG046

Table 2 Summary of key efficacy and safety findings on endopyelotomy for pelviureteric junction obstruction

Abbreviations used: NSAID, non-steroidal anti-inflammatory drug; PUJ/UPJ, pelviureteric junction obstruction

<table>
<tr><th>Study details</th><th>Key efficacy findings</th><th>Key safety findings</th><th>Comments</th></tr>
<tr>
<td>el-Nahas AR (2006)[1]

Randomised controlled trial

Country: Egypt

Study period: Jan 2001 to Oct 2003

Study population: patients with PUJ confirmed by radiological assessment. Age: 39 years (mean). Sex: 55% male. Primary UPJ n = 14, secondary UPJ n = 26.

n = 40 (20 endopyelotomy)

Inclusion criteria: patients without hugely dilated renal pelvis, ipsilateral split renal function < 25%, or renal stones or crossing vessel at the UPJ.

Technique: holmium YAG laser incision under direct visualisation via a ureteroscope to incise UPJ layer by layer to periuretereal and peripolvic fat vs cutting balloon with the Acucise device under fluorosopic control, cutting wire activated at 75–100 W and balloon inflated to incise the waist of the stricture. Stent inserted into UPJ for 6 weeks in both groups.

Follow-up: 30 months (mean)

Conflict of interest: not reported</td>
<td>Overall success
Success was defined as a subjective relief or improvement in symptoms plus objective relief of obstruction (half-time less than 20 minutes [not otherwise described]) and improvement in glomerular filtration rate.
<table>
<tr><th>Outcome</th><th>Balloon</th><th>Laser</th><th>p</th></tr>
<tr><td>Success</td><td>65.0% (13/20)</td><td>85.0% (17/20)</td><td>0.14</td></tr>
<tr><td>Success primary UPJ</td><td>66.7% (4/6)</td><td>87.5% (7/8)</td><td>0.38</td></tr>
<tr><td>Success secondary UPJ</td><td>64.3% (9/14)</td><td>83.3% (10/12)</td><td>0.26</td></tr>
</table>
Operative characteristics
<table>
<tr><th>Outcome</th><th>Balloon</th><th>Laser</th><th>p</th></tr>
<tr><td>Operative time (min)</td><td>58.7 ± 20.1</td><td>64.7 ± 22.4</td><td>0.44</td></tr>
<tr><td>Length of stay (days)</td><td>1.6 ± 1.26</td><td>1.1± 0.25</td><td>0.13</td></tr>
</table>
</td>
<td>Complications
There was one intraoperative complication in each group.

In the laser group 5% (1/20) of patients had bleeding from the edge of the pelvis which was managed with low pressure balloon tamponade without transfusion.

In the balloon cutting group the catheter balloon ruptured in 5% (1/20) of patients. Ureteroscopy confirmed adequate incision had been achieved.

Failure of extravasation of contrast medium occurs in 15% (3/20) of patients in the cutting balloon group.

Haematuria was reported in 15% (3/20) of patients in the cutting balloon group at 2, 4 and 5 days respectively. This was treated conservatively and with blood transfusion in each.
<table>
<tr><th>Outcome</th><th>Balloon</th><th>Laser</th><th>p</th></tr>
<tr><td>Overall complications</td><td>25% (5/20)</td><td>10% (2/20)</td><td>0.20</td></tr>
</table>
</td>
<td>Concealment of treatment allocation by sealed envelopes; method of randomisation is not reported.

Blinding of outcome assessment is not reported.

No significant difference between treatment groups in terms of demographic or clinical characteristics except that 65% of the laser group had left side obstruction compared with 75% right side in the balloon cutting group (p = 0.01).</td>
</tr>
</table>

Abbreviations used: NSAID, non-steroidal anti-inflammatory drug; PUJ/UPJ, pelviureteric junction obstruction

Study details	Key efficacy findings	Key safety findings	Comments
Dimarco DS (2006)[2] **Non-randomised controlled trial** Country: USA Study period: Jan 1988 to Mar 2004 Study population: patients with PUJ confirmed by radiological assessment. Age: 45 years (mean). Sex: 47% male. Flank pain 82%; haematuria 5%. **n = 436 (225 endopyelotomy)** Inclusion criteria: patients over the age of 14 years Technique: antegrade endopyelotomy with nephroscopic guidance. Cold cut knife (or electrocautery) passed over guide wire and posteriolateral full thickness cut into peripelvic fat. Balloon dilation where necessary, and stent insertion for 6 weeks vs open or laparoscopic pyeloplasty. **Follow-up: 3.5 years (mean). 3.1 years for the endopyelotomy group, and 3.9 for the pyleoplasty group.** Conflict of interest: not reported	***Overall success*** Success was defined as a complete relief of symptoms plus resolution or improvement in obstruction by radiographic assessment. Overall 61% (111/182) of patients had a successful outcome following endopyelotomy, and 82% (144/175) of patients following pyeloplasty (measurement of significance not reported). The 10-year estimated recurrence-free survival was 41% (n = 8) in the endopyelotomy group, and 75% (n = 21) in the pyeloplasty group. A history of pyeloplasty adversely affected the success of salvage pyeloplasty (p = 0.009) bit did not affect salvage endopyelotomy.	***Complications*** **Outcome** / **Endopyelotomy** / **Pyeloplasty** / **p** Overall complications: 11% (25/225) / 8% (17/211) / 0.33 **Outcome** / **Endopyelotomy** / **Pyeloplasty** Bleeding requiring transfusion: 1% (3/225) / 1% (2/211) Renal artery pseudoaneurysm – coil placement by interventional radiology: 1% (2/225) / 0% (0/211) Hydrothorax – tube drain: < 1% (1/225) / 0% (0/211) Pneumothorax – tube drain: 0% (0/225) / < 1% (1/211) Haematoma – conservative management: 1% (2/225) / 0% (0/211) Stent repositioning: 4% (8/225) / 0% (0/211) Myocardial infarction: < 1% (1/225) / 0% (0/211) Pulmonary embolus: < 1% (1/225) / 0% (0/211) Urosepsis: < 1% (1/225) / 0% (0/211) Readmission for pain: 1% (2/225) / 0% (0/211) Urine leakage – conservative management: 0% (0/225) / 3% (7/221) Prolonged ileus: 0% (0/225) / 1% (2/211) Transient atrial fibrillation: 0% (0/225) / 1% (2/211) Wound infection: 0% (0/225) / < 1% (1/211) Retained drain – surgical removal: 0% (0/225) / < 1% (1/211) Measurement of significance not reported	Follow-up protocol well defined. The mean age of the endopyelotomy group (47.2 years) was significantly older than the pyeloplasty group (42.8 years) at baseline (p < 0.0001). Loss to follow-up for efficacy out comes is not well described. Patient selection criteria are not clearly defined, and choice of treatment allocation is unknown. Retrospective case note review

Abbreviations used: NSAID, non-steroidal anti-inflammatory drug; PUJ/UPJ, pelviureteric junction obstruction			
Study details	**Key efficacy findings**	**Key safety findings**	**Comments**
Yanke BV (2008)[3] **Non-randomised controlled trial** Country: USA Study period: 1995 to 2006 Study population: patients with PUJ confirmed by radiological assessment. Age: not reported. Sex: 39% male. Primary PUJ obstruction 71%; secondary PUJ obstruction 29%. **n = 273 (128 endopyelotomy)** Inclusion criteria: not reported Technique: retrograde endopyelotomy with flexible ureteroscopic guidance. Electrocautery or laser incision to full thickness of the ureter. Balloon dilation and stent insertion for 6–8 weeks vs laparoscopic or robotically assisted pyeloplasty and stent insertion for 6 weeks. **Follow-up: 20 months (mean), 19 months for robotically assisted group.** Conflict of interest: some authors have financial interest/relationship with manufacturer.	**Overall success** Success was defined as a resolution of symptoms plus improvement or stability of radiographic parameters. Success was achieved in 60% of patients in the endopyelotomy group, 89% of the laparoscopic pyeloplasty group and 100% of the robotic pyeloplasty group (absolute figures and measurement of significance not reported). Estimated 7-year failure-free survival was 50% for patients treated with endopyelotomy, and 76% for laparoscopic pyeloplasty ($p < 0.001$). Multivariate analysis reported endopyelotomy rather than laparoscopic pyeloplasty to be an independent predictor of failure (hazard ratio 3.16; 95% confidence interval 1.70–5.86) ($p < 0.001$). Similarly age > 41 years at baseline was also an independent predictor of failure (hazard ratio 2.15; 95% confidence interval 1.30–3.57) ($p = 0.003$).	**Complications** Safety outcomes were not reported on.	Retrospective chart review Follow-up availability was 88% (128/145) for endopyelotomy, 97% (116/120) for laparoscopic pyeloplasty, and 100% (29/29) for robotic pyeloplasty. Ongoing follow-up every 6 months initially and then every 12 months

Abbreviations used: NSAID, non-steroidal anti-inflammatory drug; PUJ/UPJ, pelviureteric junction obstruction

Study details	Key efficacy findings	Key safety findings	Comments
Dobry E (2007)[4] **Non-randomised controlled trial** Country: Switzerland Study period: 1980 to 1999 Study population: patients with PUJ confirmed by radiological assessment. Age: 36 years (median). Sex: 46% male. Primary PUJ obstruction 88%; secondary PUJ obstruction 12%. Ipsilateral stones 26%. **n = 235 (137 endopyelotomy)** Inclusion criteria: not reported Technique: antegrade percutaneous endopyelotomy with guidewire and knife or scissors making a lateral incision. Stent insertion for 6 weeks vs open pyeloplasty. **Follow-up: 32 months (median)** Conflict of interest: not reported	***Overall success*** Success was defined as absence of pain plus absence of signs of obstruction on intravenous urogram or diuretic renography. Overall success was achieved in 80% of patients in the endopyelotomy group (28 months' follow-up) and 98% in the open pyeloplasty group (30 months' follow-up) (absolute figures and measurement of significance not reported). ***Residual symptoms*** All of the patients with residual symptoms had no evidence of obstruction on radiology, and did not require further treatment. At 24 months' follow-up **Outcome** / **Endopyelotomy** / **Pyeloplasty** Flank pain: n = 0 / n = 7 Feeling of pressure in the flank: n = 8 / n = 0 Slight pain after fluid consumption: n = 2 / n = 1 Colic: n = 0 / n = 1 Pain at incision site: n = 0 / n = 5	***Complications*** There were no fatal complications in either group. **Outcome** / **Endopyelotomy** / **Pyeloplasty** / **p** Overall complications: 11% (15/137) / 24% (23/98) / < 0.01 **Outcome** / **Endopyelotomy** / **Pyeloplasty** Respiratory insufficiency (ICU): 0% (0/137) / 2% (2/98) Pulmonary embolism: 0% (0/137) / 1% (1/98) Deep venous thrombosis: 1% (1/137) / 1% (1/98) Pneumothorax – conservative treatment: 0% (0/137) / 4% (4/98) Pneumonia: 0% (0/137) / 2% (2/98) Wound infection: 0% (0/137) / 1% (1/98) Wound haematoma: 0% (0/137) / 1% (1/98) Urinary fistula – spontaneous closure: 0% (0/137) / 1% (1/98) Urosepsis: 1% (1/137) / 2% (2/98) Fever > 38 °C: 3% (4/137) / 8% (8/98) Reobstruction – percutanous drainage: 0% (0/137) / 1% (1/98) Bleeding – conservative treatment: 1% (1/137) / 0% (0/98) Pyelonephritis: 1% (1/137) / 0% (0/98) Catheter blockage: 1% (1/137) / 0% (0/98) **Pain medication requirement** The need for postoperative pain medication and residual symptoms were analysed from patients' charts. Group mean ± standard deviation **Outcome** / **Endopyelotomy** / **Pyeloplasty** / **p** Morphine (mg): 15 ± 24 / 78 ± 41 / < 0.001 Metamizol (doses): 1 ± 3 / 20 ± 14 / < 0.001 NSAID(doses): 17 ± 17 / 6 ± 11 / < 0.001	Controls were from a historical cohort of patients treated 1980 to 1991 while the endopyelotomy patients were treated 1991 to 1999. It is not clear whether concomitant treatment was the same over this time period. Retrospective case note review The baseline clinical and demographic characteristics of the two groups were not significantly different except that there were more male patients in the open pyeloplasty group. Authors state that a possible endopyelotomy failure can be retreated by the more invasive open pyeloplasty without substantial technical difficulties compared with a primary open procedure.

Abbreviations used: NSAID, non-steroidal anti-inflammatory drug; PUJ/UPJ, pelviureteric junction obstruction

Study details	Key efficacy findings	Key safety findings	Comments
Khan AM (1997)[5] **Case series** Countries: Hungary, Yemen, Pakistan Study period:1986 to 1995 Study population: patients with PUJ not otherwise described. Age: 4 to 80 years (range) n = 36 children. Sex: 47% male. Primary PUJ obstruction 66%, secondary PUJ obstruction 34%. Stones 44%. **n = 320** Inclusion criteria: not reported Technique: antegrade percutaneous endopyelotomy with guidewire and knife making a dorsolateral incision to the periureteral fat. Drain inserted for 6 weeks and fixed to skin with a suture. **Follow-up: 6 months (median)** Conflict of interest: not reported	***Overall success*** Good result was defined as no obstruction on radiographic assessment and absence of pyelectasia; satisfactory outcome was defined as some obstruction but filling of ureter, and no subjective complaints. Good or satisfactory outcome was reported in 85% (187/220) of patients. ***Operative characteristics*** **Outcome** / **Hungary** / **Yemen** / **Pakistan** Length of stay (days) / 5 / 4.2 / 6.4 Patients ambulated on the first postoperative day.	***Complications*** **Complication** – **Rate** Haemorrhage – requiring electrocoagulation – 1% (4/320) PUJ rupture when drain inserted – requiring open surgery – 1% (4/320) Blood clot blocking drain – replacement with stent – 1% (4/320) Drain migration – replacement with stent – 3% (10/320) Debris obstructing the PUJ – removed and patency checked with a catheter – 2% (6/320) Patients rarely complained of pain. Reoperation was required in 10% (33/320) of patients, including repeat endopyelotomy, open pyeloplasty or nephrectomy.	Number of centres participating in each country not reported Case selection criteria not reported Significant loss to follow-up for efficacy outcomes not explained. Very short follow up.

Abbreviations used: NSAID, non-steroidal anti-inflammatory drug; PUJ/UPJ, pelviureteric junction obstruction

Study details	Key efficacy findings	Key safety findings	Comments
Motola JA (1993)[6] **Case series** Country: USA Study period: Oct 1983 to Nov 1991 Study population: patients with PUJ confirmed by symptoms and radiological assessment. Age: 41 years (median). Sex: 47% male. Primary PUJ obstruction 52%, secondary PUJ obstruction 48%. **n = 212** Inclusion criteria: not reported Technique: under fluoroscopic guidance antegrade percutaneous endopyelotomy with guidewire and knife. Posterolateral full thickness incision to the periureteral fat. Stent insertion for 6 weeks. **Follow-up: 6 months to 8 years** Conflict of interest: not reported	***Overall success*** Success was defined as complete resolution of symptoms plus absence of signs of obstruction on excretory urogram and improved emptying of the renal pelvis. **Outcome** / **Endopyelotomy** Success: 86% (162/189) Success primary UPJ: 85% (79/93) Success secondary UPJ: 86% (83/96) There was no statistically significant difference in success rate between male and female patients, or between left and right side obstruction. Success rate did not vary significantly with the chronological position in the series which suggested no effect of a learning curve.	***Complications*** **Complication** / **Rate** Haemorrhage – requiring transfusion (and further intervention in 1 patient): 1% (2/212) Ureteral avulsion – open procedure: < 1% (1/212) Stent repositioning: 14% (29/212) Uterovesical junction stenosis – corrected endourologically: 1% (2/212) Repeat endopyelotomy: < 1% (1/212) Pyeloplasty: 8% (18/212) Ureterocalicostomy: 2% (4/212) Ileal interposition: < 1% (1/212)	Consecutive patients treated Outcomes on 89% (189/212) of patients (those with minimum follow-up of 6 months) were analysed for efficacy outcomes. Follow-up protocol well described 47 patients followed up for a minimum of 5 years Authors state that several contraindications to this procedure have been identified during this series including > 2 cm long avascular segments of the PUJ.

Abbreviations used: NSAID, non-steroidal anti-inflammatory drug; PUJ/UPJ, pelviureteric junction obstruction

Study details	Key efficacy findings	Key safety findings	Comments
Mufarrij P (2005)[7] **Case report** Country: USA Study period: 1995 Study population: patient with PUJ and right flank pain. Age: 38 years. Sex: 100% male. Obese, and with hypertension. **n = 1** Inclusion criteria: not reported Technique: antegrade percutaneous endopyelotomy with placement of nephrostomy tube **Follow-up: 8 years** Conflict of interest: not reported	No perioperative complications resulted, but postoperative computed tomography scan revealed a subcapsular collection thought to be a haematoma which was managed conservatively. Flank pain disappeared for several months but returned at 1 year follow-up. Further computed tomography and magnetic resonance imaging revealed a subcapsular collection characterised as a heterogeneous mass. Open exploration revealed a perinephric collection that was drained. No urine leak was present and the PUJ appeared patent. Episodic intermittent pain was managed with NSAIDs and occasionally narcotic drugs but became progressively worse. Computed tomography scan with and without contrast showed an atrophic right kidney surrounded by thick retroperitoneal tissue with peripheral coarse calcifications. A renal scan demonstrated 15% functioning of the right kidney, and an inferior vena cavagram showed 90% stenosis of the vena cava at the level of the left renal vein and no filling of the right renal vein; this was treated by percutaneous balloon angioplasty. At 8 years' follow-up the patient was operated on for right nephrectomy for a Page kidney (hypertension secondary to renal suppression associated with a perinephric or subcapsular haematoma). Dense fibrous tissue adherent to the kidney was chiselled out and the kidney removed in pieces. A lower pole crossing vessel was ligated and the inferior vena cava liberated from the fibrous tissue. The patient recovered fully and was discharged on the 6th postoperative day. Lower extremity oedema was markedly reduced on the 17th postoperative day and the patient was well at last follow-up.		Number of patients (denominator) treated at the centre is not reported. Procedure description not fully detailed Case selection criteria/diagnosis of PUJ obstruction not defined

Abbreviations used: NSAID, non-steroidal anti-inflammatory drug; PUJ/UPJ, pelviureteric junction obstruction

Study details	Key efficacy findings	Key safety findings	Comments
Chiong E (2004)[8] **Case report** Country: Singapore Study period: not reported Study population: patient with bilateral PUJ obstruction (right more severe) and gross hydronephroses. Associated right lower pole renal calculi. Age: 15 years. Sex: 100% male. **n = 1** Inclusion criteria: not reported Technique: right sided antegrade percutaneous nephrolithotripsy endopyelotomy with significant (but not total) denuding of the ureteral mucosa. Stent placement 3 months. **Follow-up: 3 months** Conflict of interest: not reported	Postoperative recovery was uneventful without fever or flank pain, and the patient was asymptomatic on follow-up visits (period not reported). Renography at 3 months' follow-up showed deterioration of right renal function which was contributing only 1.6% of total renal function. Retrograde ureteropyelography revealed 'bell-shaped' configuration of the distal part of the upper ureter and ureteroscopy confirmed antegrade ureteral intussusceptions causing complete obliteration of the ureteral lumen. All attempts failed to cannulate the ureteral lumen beyond the neck of the intussusception. The obstruction was subsequently relieved by percutaneous nephrostomy drainage. Antegrade nephrostography revealed no PUJ obstruction but complete obstruction of the upper ureter and right kidney function only marginally improved. To preserve renal function surgical excision of the obstructing ureteral segment with pyeloplasty reconstruction was subsequently performed.		Final clinical outcome is not described. Number of patients (denominator) treated at the centre is not reported. Endopyelotomy procedure is not fully described. It is not postulated which of the interventions lithotripsy or endopyelotomy contributed to this complication.

Validity and generalisability of the studies

- Definition of success (in terms of both subjective and objective measurements) varied between studies making comparison of outcomes difficult.
- Where definition of success includes a composite of subjective and objective factors it is not clear how the overall result was adjudicated.
- Only one randomised controlled trial is available; outcomes for other comparative studies may be confounded by case selection bias.
- Some data date back to patients treated 20 or more years ago.

Specialist Advisers' opinions

Specialist advice was sought from consultants who have been nominated or ratified by their Specialist Society or Royal College. The advice received is their individual opinion and does not represent the view of the society.

Mr R C Calvert (British Association of Urological Surgeons) Mr S Irving (British Association of Urological Surgeons), Mr G Smith (British Association of Urological Surgeons) .

- Two Specialist Advisers classified the procedure as established practice and no longer new, and one was unable to classify the status of the procedure within the categories provided.
- The main comparator would now be laparoscopic pyeloplasty.
- The key efficacy outcomes for this procedure include short-term relief of pain and symptoms, normalisation of renographic obstruction, preservation of renal function, and long-term success in terms of restenosis
- Reported adverse events relating to the procedure include haemorrhage, stent related problems, and aorto-ureteral fistula.
- Additional theoretical procedures may include failure/restenosis, infection, perforation, and fibrosis.
- This procedure has declining popularity and is suitable for a small select number of patients.
- Two Specialist Advisers thought that if found to be safe and efficacious the procedure would be made available at a minority of hospitals (at least ten);

one Specialist Adviser thought it would be offered at fewer than ten specialist centres.

Patient Commentators' opinions

- The NICE Patient and Public Involvement Programme were unable to obtain patient commentary for this procedure.

Issues for consideration by IPAC

- Non-English language studies were excluded from this overview.
- Data from studies treating patients with ureteral stenosis rather than PUJ obstruction were excluded from this overview. Some studies included patients with renal stones as well as PUJ obstruction; these have been included but highlighted where possible.
- Length of follow-up is of particular concern in this procedure where late failure may occur.

References

1 el-Nahas AR, Shoma AM, Eraky I et al. (2006) Prospective, randomized comparison of ureteroscopic endopyelotomy using holmium:YAG laser and balloon catheter. Journal of Urology 175: 614–18

2 Dimarco DS, Gettman MT, McGee SM et al. (2006) Long-term success of antegrade endopyelotomy compared with pyeloplasty at a single institution. Journal of Endourology 20: 707–12

3 Yanke BV, Lallas CD, Pagnani C et al. (2008) The minimally invasive treatment of ureteropelvic junction obstruction: a review of our experience during the last decade. Journal of Urology 180: 1397–1402

4 Dobry E, Usai P, Studer UE et al. (2007) Is antegrade endopyelotomy really less invasive than open pyeloplasty? Urologia Internationalis 79: 152–6

5 Khan AM, Holman E, Pasztor I et al. (1997) Endopyelotomy: experience with 320 cases. Journal of Endourology 11: 243–6

6 Motola JA, Badlani GH, Smith AD (1993) Results of 212 consecutive endopyelotomies: an 8-year followup. Journal of Urology 149: 453–6

7 Mufarrij P, Sandhu JS, Coll DM et al. (2005) Page kidney as a complication of percutaneous antegrade endopyelotomy. Urology 65: 592 e26-e28

8 Chiong E, Consigliere D (2004) Antegrade ureteral intussusception: a rare complication of percutaneous endopyelotomy. Urology 64:1231e12–e14

Appendix A: Additional papers on endopyelotomy for pelviureteric junction obstruction

The following table outlines the studies that are considered potentially relevant to the overview but were not included in the main data extraction table (table 2). It is by no means an exhaustive list of potentially relevant studies. For brevity case series with less than 50 patients, and non randomised controlled trials that compare different endopyelotomy techniques (as opposed to endopyelotomy versus other intervention) are not listed here.

Article	Number of patients/follow-up	Direction of conclusions	Reasons for non-inclusion in table 2
Acher, Peter L., Nair, Raj, Abburaju, Jai S. et al (2009) Ureteroscopic Holmium Laser Endopyelotomy for Ureteropelvic Junction Stenosis After Pyeloplasty. Journal of Endourology 23 (6) 899-902	Case series n=15 FU= 3 months	Laser endopyelotomy is an appropriate minimally invasive procedure for postpyeloplasty stenosis. Results are better in patients with ureteric stents in situ before the procedure	Larger studies included in table 2 Atypical indication – restenosis after pyeloplasty.
Badlani G, Karlin G, Smith AD (1988) Complications of endopyelotomy: analysis in series of 64 patients. Journal of Urology 140(3): 473–5	Case series n = 64 Follow-up = not reported	There were 2 intraoperative complications (3.1%) necessitating an open operation	Studies with longer follow-up are include in table 2
Banerjee GK, Ahlawat R, Dalela D (1994) Endopyelotomy and pyeloplasty: face to face. European Urology 26(4): 281–5	Non-randomised controlled trial (NRCT) n = 46 (23 endopyelotomy) Follow-up = 3 months	Endopyelotomy scores over pyeloplasty with a shorter operating time and hospital stay	Larger studies are included in table 2
Bhatyal HS, Sharma R (1999) Endopyelotomy versus conventional pyeloplasty in P.U.J. obstruction. JK Practitioner 6(3): 201–3	NRCT n = 506 (25 endopyelotomy) Follow-up = to 1 year	Endopyelotomy group had advantage in a number of variables as compared to open pyeloplasty except success rate was 72% in endopyelotomy and 96% in open conventional pyeloplasty	Larger studies are included in table 2
Biyani CS, Powell CS (1998) Guidewire fragmentation during holmium:YAG laser endopyelotomy. Techniques in Urology 4(1): 51–3	Case report n = 1 Follow-up = 6 weeks	A guidewire fracture is a rare complication of laser surgery. We report that this rare complication occurred during a retrograde endoureteropyelotomy with the holmium:YAG laser	Not clinically important adverse event

Article	Number of patients/follow-up	Direction of conclusions	Reasons for non-inclusion in table 2
Braga LHP, Lorenzo AJ, Skeldon S (2007) Failed Pyeloplasty in children: comparative analysis of retrograde endopyelotomy versus redo pyeloplasty. Journal of Urology 178(6): 2571–5.	NRCT n = 32 (18 endopyelotomy) Follow-up = 47 months	Retrograde endopyelotomy had a significantly lower success rate than redo pyeloplasty for correction of recurrent UPJ obstruction after failed pyeloplasty in children	Larger studies are included in table 2
Butani RP, Eshghi M (2008) Cold-knife retrograde endopyelotomy: a long-term follow-up. Journal of Endourology 22(4): 657–60	Case series n = 155 Follow-up = 60 months	Retrograde endopyelotomy should be considered a viable first-line treatment option for the management of patients with UPJ obstructions	Larger studies are included in table 2
Chow GK, Geisinger MA, Streem SB (1999) Endopyelotomy outcome as a function of high versus dependent ureteral insertion. Urology 54(6): 999–1002	NRCT n = 60 (36 endopyelotomy) Follow-up = 10 months	The type of ureteral insertion (that is, high versus dependent) had no significant impact on the outcome of endopyelotomy by way of either a percutaneous or retrograde approach	Larger studies are included in table 2 Studies with longer follow-up are include in table 2
Combe M, Gelet A, Abdelrahim AF (1996) Ureteropelvic invagination procedure for endopyelotomy (Gelet technique): review of 51 consecutive cases. Journal of Endourology 10(2): 153–7	Case series n = 51 Follow-up = 16 months	We recommend the use of the ureteropelvic invagination technique as the first-line therapy for primary hydronephrosis in adults in the absence of a crossing vessel	Larger studies are included in table 2
Danuser H, Ackermann D K Bohlen D (1998) Endopyelotomy for primary ureteropelvic junction obstruction: risk factors determine the success rate.]. Journal of Urology 159(1): 56–61	Case series n = 80 Follow-up = 24 months	Endopyelotomy in primary ureteropelvic junction obstruction is a safe, minimally invasive procedure with a high primary success rate and a low relapse rate	Larger studies are included in table 2
Desai MM, Desai MR, Gill IS (2003) Endopyeloplasty versus endopyelotomy versus laparoscopic pyeloplasty for primary ureteropelvic junction obstruction. Urology 64(1): 16–21	NRCT n = 44 (15 endopyelotomy) Follow-up = 12 months	The results of this retrospective comparison of patients with primary UPJ obstruction suggest that percutaneous endopyeloplasty may have functional superiority over percutaneous endopyelotomy	Larger studies are included in table 2 Studies with longer follow-up are include in table 2
Doo CK, Hong B, Park T, (2007) Long-term outcome of endopyelotomy for the treatment of ureteropelvic junction obstruction: how long should patients be followed up? Journal of Endourology 21(2): 158–61	Case series n = 85 Follow-up = 37 months	The success rate of endopyelotomy decreases as the follow-up increases. Although most failures were detected within 1 year of the procedure, it appears that follow-up of at least 36 months is required.	Larger studies are included in table 2

Article	Number of patients/follow-up	Direction of conclusions	Reasons for non-inclusion in table 2
El-Nahas AR, Shoma AM, Eraky I (2006) Percutaneous endopyelotomy for secondary ureteropelvic junction obstruction: prognostic factors affecting late recurrence. Scandinavian Journal of Urology & Nephrology 40(5): 385–90	Case series n = 50 Follow-up = 6 years	As late recurrence was observed in 14% of cases after percutaneous endopyelotomy, long-term follow-up is needed	Larger studies are included in table 2
Jabbour, ME, Goldfischer ER, Klima WJ (1998) Endopyelotomy after failed pyeloplasty: the long-term results. Journal of Urology 160(3 I): 690–3	Case series n = 72 Follow-up = 89 months	Endopyelotomy is the treatment of choice for recurrent ureteropelvic junction obstruction after failed pyeloplasty, with a high and sustained long-term success rate and no reported new failures after 1-year follow-up	Larger studies are included in table 2
Karlin GS, Badlani GH, Smith AD (1988) Endopyelotomy versus open pyeloplasty: comparison in 88 patients. Journal of Urology 140(3): 476–8	NRCT n = 88 (56 antegrade endopyelotomy) Follow-up = to 3.5 years	Endopyelotomy was successFollow-upl in 87.5% of patients, with all failures being apparent within 6 weeks and they were easily correctable by traditional methods. Reported success rates of pyeloplasty ranged from 95 to 98%.	Larger studies are included in table 2
Kletscher BA, Segura JW, Leroy AJ (1995) Percutaneous antegrade endoscopic pyelotomy: review of 50 consecutive cases. Journal of Urology 153(3 I): 701–3	Case series n = 50 Follow-upP = not reported	These results support the argument that endoscopic pyelotomy should be considered as first line therapy for most adults with ureteropelvic junction obstructions	Larger studies are included in table 2
Knudsen BE, Cook AJ, Watterson JD (2004) Percutaneous antegrade endopyelotomy: long-term results from one institution. Urology 63(2): 230–4	Case series n = 80 Follow-up = 55 months	Our long-term results of percutaneous endopyelotomy demonstrated somewhat lower success rates than that reported in published studies	Larger studies are included in table 2
Lee WJ, Badlani GH, Karlin GS (1988) Treatment of ureteropelvic strictures with percutaneous pyelotomy: experience in 62 patients. American Journal of Roentgenology 151(3): 515–18	Case series n = 862 Follow-up = not reported	Our experience indicates that percutaneous pyelotomy is an effective alternative to traditional open pyeloplasty and has a similar success rate, lower morbidity and shorter recovery time	Larger studies are included in table 2

Article	Number of patients/follow-up	Direction of conclusions	Reasons for non-inclusion in table 2
Minervini A, Davenport K, Keeley Jr (2006) Antegrade versus retrograde endopyelotomy for Pelvi-Ureteric Junction (PUJ) obstruction. European Urology 49(3): 536–42	NRCT n = 68 (19 antegrade endopyelotomy) Follow-up = 24 to 46 months	The overall success of antegrade and retrograde endopyelotomy in this series appears to be largely a factor of lead-time bias and is similar enough to recommend retrograde endopyelotomy with holmium laser	Larger studies are included in table 2
Ost MC, Kaye JD, Guttman MJ (2005) Laparoscopic pyeloplasty versus antegrade endopyelotomy: comparison in 100 patients and a new algorithm for the minimally invasive treatment of ureteropelvic junction obstruction. Urology 66 5:Suppl) Suppl-51	NRCT n = 100 (50 endopyelotomy) Follow-up = 16 months	In the instance of a UPJ obstruction associated with a high degree of hydronephrosis, patients may be better served with a laparoscopic pyeloplasty	Larger studies are included in table 2 Studies with longer follow-up are include in table 2
Pardalidis NP, Papatsoris AG, Kosmaoglou EV (2002) Endoscopic and laparoscopic treatment of ureteropelvic junction obstruction. Journal of Urology 168(5): 1937–40	NRCT n = 22 (14 endopyelotomy) Follow-up = 53 months	Percutaneous endopyelotomy should be the treatment of choice for intrinsic ureteropelvic junction obstruction	Larger studies are included in table 2
Ponsky LE, Streem, SB (2006) Retrograde endopyelotomy: a comparative study of hot-wire balloon and ureteroscopic laser. Journal of Endourology 20(10): 823–6	NRCT n = 64 (37 endopyelotomy) Follow-up = 73 months	These two alternatives for retrograde endopyelotomy provide comparable success rates for similarly selected patients	Larger studies are included in table 2
Rassweiler JJ, Subotic S, Feist-Schwenk M (2007) Minimally invasive treatment of ureteropelvic junction obstruction: long-term experience with an algorithm for laser endopyelotomy and laparoscopic retroperitoneal pyeloplasty. Journal of Urology 177(3): 1000–5	NRCT n = 256 (113 endopyelotomy) Follow-up = 63 months	The inferior success of laser endopyelotomy even in optimally selected cases and the increasing expertise with endoscopic suturing may favour laparoscopic pyeloplasty with or without robotic assistance in the Follow-upture	Larger studies are included in table 2
Schenkman EM, Tarry WF (1998) Comparison of percutaneous endopyelotomy with open pyeloplasty for pediatric ureteropelvic junction obstruction. Journal of Urology 159(3): 1013-–15	NRCT n = 28 (20 endopyelotomy) Follow-up = 3 years	Endopyelotomy may be performed effectively for primary ureteropelvic junction obstruction in children	Larger studies are included in table 2

Article	Number of patients/follow-up	Direction of conclusions	Reasons for non-inclusion in table 2
Shalhav AL, Giusti G, Elbahnasy AM (1998) Endopyelotomy for high-insertion ureteropelvic junction obstruction. Journal of Endourology 12(2): 127–30	NRCT n = 149 (83 endopyelotomy) Follow-up = 15 to 34 months	High insertion is not a contraindication to endopyelotomy	Larger studies are included in table 2
Singh P, Jain P, Dharaskar A, et al (2009) Minimal invasive treatment of ureteropelvic junction obstruction in low volume pelvis: A comparative study of endopyelotomy and laparoscopic nondismembered pyeloplasty. Indian Journal of Urology 25:68-71	NRCT n = 60 (26 endopyelotomy) Follow-up = 37 months	Percutaneous endopyelotomy is associated with significantly less operative time and postoperative complication rate and provides equivalent success in comparison to nondismemebered laparoscopic pyeloplasty in patients with PUJ obstruction and low volume pelvis.	Larger studies are included in table 2
Szewczyk W, Szkodny A, Noga A (1992) Endopyelotomy for ureteropelvic junction stenosis. International Urology & Nephrology 24(2): 105–8	Case series n = 64 Follow-up = not reported	The total success rate was 61%. It is pointed out that the results depend in a great part on the skill of the surgeon	Larger studies are included in table 2
Szydelko T, Kopec R, Kasprzak J, (2009) Antegrade endopyelotomy versus laparoscopic pyeloplasty for primary ureteropelvic junction obstruction. Journal of Laparoendoscopic & Advanced Surgical Techniques Part (1): 45–51	NRCT n = 165 (75 endopyelotomy) Follow-up = 30 months	Laparoscopic pyeloplasty should be the procedure of choice in the treatment of primary UPJ obstruction	Larger studies are included in table 2
Vaarala MH, Marttila T, Paananen I (2008) Retrospective analysis of long-term outcomes of 64 patients treated by endopyelotomy in two low-volume hospitals: good and durable results. Journal of Endourology 22(8): 1659–64	NRCT n = 64 (47 endopyelotomy) Follow-up = 78 to 152 months	Endopyelotomy offers good and durable results in the long term. Complications were common, however, and laparoscopic pyeloplasty may be a recommended option for management of primary UPJ obstruction.	Larger studies are included in table 2

Appendix B: Related NICE guidance for endopyelotomy for pelviureteric junction obstruction

Guidance	Recommendations
Interventional procedures	**Laparoscopic pyeloplasty. NICE interventional procedures guidance 046 (2004)** 1.1 Current evidence on the safety and efficacy of laparoscopic pyeloplasty appears adequate to support the use of this procedure, provided that the normal arrangements are in place for consent, audit and clinical governance. 1.2 Clinicians undertaking this procedure should have adequate training before performing the technique. The British Association of Urological Surgeons has agreed to produce standards for training.

Appendix C: Literature search for endopyelotomy for pelviureteric junction obstruction

Database	Date searched	Version/files
Cochrane Database of Systematic Reviews – CDSR (Cochrane Library)	10/06/09	Issue 2, 2009
Database of Abstracts of Reviews of Effects – DARE (CRD website)	10/06/09	N/A
HTA database (CRD website)	10/06/09	N/A
Cochrane Central Database of Controlled Trials – CENTRAL (Cochrane Library)	10/06/09	Issue 2, 2009
MEDLINE (Ovid)	10/06/09	1950 to May Week 5 2009
MEDLINE In-Process (Ovid)	10/06/09	June 9, 2009
EMBASE (Ovid)	10/06/09	1980 to 2009 Week 23
CINAHL (NLH Search 2.0)	10/06/09	1981 to present
BLIC (Dialog DataStar)	10/06/09	1995 to date

The following search strategy was used to identify papers in MEDLINE. A similar strategy was used to identify papers in other databases.

[Insert MEDLINE search strategy (cut and paste from Information Services)]

1	(Endopyelo* or Endo-pyelo* or Endo pyelo*).tw.
2	(Percutane* adj3 pyelo*).tw.
3	Diathermy/
4	(Diatherm* adj3 ablat*).tw.
5	or/1-4
6	Ureteral Obstruction/
7	(Ureter* adj3 (Obstruct* or Stenos* or Occlus* or Constrict*)).tw.
8	((Pelviureter* or Pelvi-ureter* or Pelvi* Ureter*) adj3 Junct* adj3 (Obstruct* or Stenos*)).tw.
9	((Ureteropelvic* or Uretero-pelvic* or Uretero* pelvic*) adj3 Junct* adj3 (Obstruct* or Stenos*)).tw.
10	(PUJ or UPJ).tw.
11	exp Hydronephrosis/
12	(Hydronephros* or Hydro-nephros* or Hydro

	nephros*).tw.
13	Pyonephrosis/
14	(Pyonephros* or Pyo-nephros* or Pyo nephros*).tw.
15	(Pyelonephros* or Pyelo-nephros* or Pyelo nephros*).tw.
16	Nephrohydros*.tw.
17	(Kidn* adj3 Dilate*).tw.
18	Aperistal*.tw.
19	or/6-18
20	5 and 19
21	Animals/ not Humans/
22	20 not 21