NATIONAL INSTITUTE FOR CLINICAL EXCELLENCE

INTERVENTIONAL PROCEDURES PROGRAMME

Interventional procedures overview of laparoscopic pyeloplasty

Introduction

This overview has been prepared to assist members of the Interventional Procedures Advisory Committee advise on the safety and efficacy of an interventional procedure previously reviewed by SERNIP. It is based on a rapid survey of published literature, review of the procedure by Specialist Advisors and review of the contents of the SERNIP file. It should not be regarded as a definitive assessment of the procedure.

Date prepared

This overview was prepared by ASERNIP-S in November 2002.

Procedure name

- Laparoscopic pyeloplasty.

Specialty society

- *British Association of Urological Surgeons.*

Executive summary

There are no high level comparative data available. The few comparative data suggest that laparoscopic pyeloplasty is as effective as open pyeloplasty in removing obstructions. Both procedures have very high rates of operative success, with obstructions typically removed in more than 90% of patients. Complication rates do not appear to differ greatly for either procedure, with rates reported up to 25% for laparoscopic pyeloplasty and 18% for open pyeloplasty, in small groups of patients. Complications mainly appear to involve transitory obstructions, or migration of stents. There is some suggestion that laparoscopic pyeloplasty involves a longer operative time, but shorter postoperative recovery period.

Description

Indications
Pelviureteric junction obstruction.

Summary of procedure
A pyeloplasty is a surgical procedure that is indicated for a pelviutereric junction (PUJ) obstruction. The PUJ is the portion of the collection system that connects the renal pelvis (the larger collecting portion of the kidney, which is funnel shaped and tapers down to the ureter) to the ureter. If the transition from the renal pelvis to the ureter is narrow/tight the urine will not drain easily and backs up, causing dilatation of the collecting system proximal to (behind) that point and enlargement of the renal pelvis. This dilation of the collecting system is referred to as hydronephrosis. PUJ obstruction is usually congenital, but may also be acquired (that is, secondary to other disease processes or previous instrumentation). Many individuals with a PUJ

obstruction do not realise they have this condition until later in life, when the poorly flowing urine becomes infected, or they begin developing symptoms such as pain.

Although different types of pyeloplasty operations have been described, the ultimate goal is to remove the strictured portion of the PUJ, fashion the renal pelvis, and attach it to the ureter in a way that allows easy drainage of urine down the ureter. There are different ways to approach the kidney to perform the operation. These include a flank incision, subcostal (under the rib) incision, transabdominal approach, or sometimes through an incision in the back. Recovery time is usually dependent upon many factors, including the individual patient's age, general medical condition and health, length of operation, and the surgical approach used. However, a hospital stay of approximately 2 to 4 days would be expected, with the time to full recovery ranging anywhere from 4 weeks to 3 months depending on the individual case.[1]

The standard intervention for pelviureteric junction obstruction is open pyeloplasty.

The claimed benefits of laparoscopic pyeloplasty are improved cosmesis, lower morbidity rates and shorter convalescence.

Literature review

A systematic search of MEDLINE, PREMEDLINE, EMBASE, Current Contents, PubMed, Cochrane Library and Science Citation Index using Boolean search terms was conducted, covering the period from the inception of the databases until November 2002. The York Centre for Reviews and Dissemination, Clinicaltrials.gov, National Research Register, SIGLE, Grey Literature Reports, relevant online journals and the Internet were also searched in November 2002. Searches were conducted without language restriction.

Articles were obtained on the basis of the abstract containing safety and efficacy data on laparoscopic pyeloplasty in the form of randomised controlled trials (RCTs), other controlled or comparative studies, case series or case reports. Conference abstracts and manufacturer's information were included if they contained relevant safety and efficacy data. Foreign language papers were included if they contained safety and efficacy data and were considered to add substantively to the English language evidence base. In the case of duplicate publications, the latest, most complete study was included. All identified studies were included.

List of studies found

- Randomised controlled trials 0
- Non-randomised comparative studies 4
- Case series 30
- Case series 30

Papers were rejected if they reported no clinical outcomes, were review articles without data, involved techniques other than laparoscopic pyeloplasty, or reported data that is included in later papers. Data for five papers are tabulated below. Papers were chosen for tabulation firstly if they were comparative. Then case series were rated by breadth of study population – thus prospective multicentre studies were rated most highly, followed by papers that reported outcomes for patients with diverse aetiologies, and then those reporting on the application of a particular subtype of intervention. Retrospective studies were given the lowest rating. Studies for which data were not tabulated are listed in Appendix A.

[1] http://www.medhelp.org/forums/urology/archive/1370.html

Table 1 Summary of key efficacy and safety findings (1)

Study details	Key efficacy findings	Key safety findings	Appraisal/Comments
Non-randomised comparative studies			
Bauer et al.[1] 1999 USA a. 42 laparoscopic pyeloplasty patients b. 35 open pyeloplasty patients a. Aug 1993 – April 1997 b. Aug 1986 – April 1997 Follow up: a. mean 22 months b. mean 58 month Selection criteria: pelviureteric junction obstruction	No conversions from laparoscopic to open surgery a. n=41 (98%) had no obstruction at follow up b. n=33 (94%) had no obstruction at follow up All patients with failed open or laparoscopic. pyeloplasty had decreased renal function preoperatively (< 20% on renal scan) and subsequently underwent successful nephrectomy Pain relief: a. 26/42 (62%) pain free / 12/42 (29%) significant improvement in flank pain postoperatively b. 21/35 (60%) pain free / 11/35 (31%) significant improvement in flank pain postoperatively No statistically significant differences in pain scores between procedures	**a. complications** n=5 (12%) • obstruction after removal of stent (2) • injury to colonic diverticulum (1) • pneumonia (1) • thrombophlebitis (1) **b. complications** n=4 (11%) • obstruction requiring stent or tube (3) • postop bleed requiring transfusion (1)	**Potential for bias:** Longer follow-up period for open group. 70 patients underwent laparoscopic pyeloplasty and of these 42 had at least 12 months follow-up and were reported on. Method of allocating patients to groups not described. **Outcome measures and their validity:** analogue pain – visual scale. **Other comments:** • Crossing vessel noted in 38% of the open surgery group and high insertion reported in 12. • Type of pyeloplasty, eg dismembered, Y-V plasty, was at the discretion of the surgeon.

Study details	Key efficacy findings	Key safety findings	Appraisal/Comments
Brooks et al.[2] 1995 USA 1990 – 1994 a. 13 antegrade endopylotomy patients b. 9 acucise endopylotomy patients c. 12 laparoscopic pyeloplasty patients d. 11 open pyeloplasty pts Follow up (months): a. 20.4 (4–53) b. 23.8 (15–32) c. 13.6 (2–30) d. 26 (9–44) Selection criteria: pelviureteric junction obstruction documented preoperatively by clinical presentation and radiologic demonstration of narrowing of the pelviureteric junction with proximal dilation or delayed exertion.	**Operating time** (min): a. 145 (75–270) b. 46 (30–90) c. 356 (210–510) d. 228 (165–300) **Success rate**: a. 10/13 (77%) b. 7/9 (78%) c. 12/12 (100%) d. 11/11 (100%) **Management of failures** (conversions to open pyeloplasties not included in group d): a. 2 open pyeloplasties; 1 patient living with stent b. 2 open pyeloplasties **Postop analgesia** (mg morphine): a. 17.9 (0–58) b. 1.2 (0–6) c. 19.3 (1–128) d. 190.3 (74–382) – 7 evaluable **Hospital stay (days) / recovery time (weeks):** a. 3 (2–6) / 4.7 (1–6) b. 0.2 (0–2) / 1.0 (4 days–2 weeks) c. 3.1 (2–4) / 2.3 (5 days–12 weeks) d. 7.3 (5–9) / 10.3 (6 days–14 weeks ***[correct?]***)	**Patients transfused/units transfused:** a. 3/13 (23%)/2.7 b. 2/9 (22%)/3 c. 0/12 (0%)/0 d. 0/11 (0%)/0 **Complications**: **a. 2/13 (15%)** • obstruction of stent with replacement (1) • bulbar ureteral stricture (1) **b. 1/9 (11%)** • obstruction of stent with replacement (1) **c. 3/12 (25%)** • transient PUJ obstruction (2) • midureteral stricture (1) **d. 2/11 (18%)** • transient PUJ obstruction (1) • urosepsis related to nephrostogram (1)	**Potential for bias:** Not all operations carried out by same surgeons. Not prospective. Data collected from disparate sources: chart review, telephone interview and personal interview. Small patient numbers. Method of allocating patients to groups not described. **Outcome measures and their validity:** Conventional outcome measures, mostly objective. **Other comments:** 1 patient from the laparoscopic pyeloplasty group had a previously unsuccessful antegrade endopyelotomy. Success defined as no symptoms and improvement in contrast drainage by IVU or diuretic renal scan.

Study details	Key efficacy findings	Key safety findings	Appraisal/Comments
Pardalidis et al.[3] 2002 Greece Dates unknown. a. 14 percutaneous endopyelotomy patients b. 8 lap. Dismembered pyeloplasty patients Follow up (months): a. 53.8 (47–61) b. 52.5 (47–62) Selection criteria: Pelviureteric junction obstruction. Diagnosis based on ultrasound and/or excretory urography. Patients also examined with a furosemide washout renogram to evaluate the functional relevance of the stenosis. Retrograde ureteropyelography was then performed to demonstrate the course of the ureter and verify obstruction. Intrinsic cases of pelviureteric junction stenosis were diagnosed in 14 patients who were treated with a. Indications for treatment via lap. dismembered pyeloplasty were demonstrated in 8 patients (crossing vessels = 5; distended renal pelvis = 2; long pelviureteric junction stricture = 1).	**Mean hours of operation:** a. 1.20 (0.83–2.20) b. 3.50 (3.15–6.10) $p < 0.05$ **Mean days hospitalisation:** a. 4.2 (3–5) b. 5 (4–12) **Mean days return to work:** a. 15.7 (10–19) b. 17.8 (12–20) **Success rate** (subjective and objective): a. 13/14 (92.8%) b. 8/8 (100%) (1 pelviureteric junction stricture recurrence at 3 months, subsequently treated with lap. dismembered pyeloplasty was not included in lap. group) **Mean tablets postop** paracetamol/codeine: a. 5.4 (4–8) b. 6.3 (5–11) **Radiographic outcome:** a. significant improvement 12 (85.7%) moderate improvement 1 (7.1%) except for patient with treated recurrence b. significant improvement 5 (62.5%) moderate improvement 2 (25%) minimal improvement 1 (12.5%)	**Mean estimated blood loss (ml):** a. 152 (40–320) b. 150 (120–312) **Complications:** **a. n = 2** • stent positioned incorrectly (required fluoroscopic repositioning) **b. n = 1** • stent migrated (repositioned under fluoroscopic guidance).	**Potential for bias:** Somewhat different underlying causes of pelviureteric obstruction in each group; this was used to allocate patients to their treatment groups: pelviureteric junction stenosis was treated with percutaneous endopylotomy; crossing vessels, distended renal pelvis, and long pelviureteric stricture were treated with pyeloplasty. Not known if the study was conducted prospectively. Small patient numbers. **Outcome measures and their validity:** Hydronephrosis grade of unknown validity. **Other comments:** Both procedures performed by the same group of surgeons under general anaesthetic.

Study details	Key efficacy findings	Key safety findings	Appraisal/Comments
Soulie et al.[4] 2001 France Oct 1997–Jan 2000 a. 25 retroperitoneal laparoscopic pyeloplasty patients, with 1 bilateral procedure. b. 28 open pyeloplasty patients Follow up: up to 12 months. Selection criteria: choice of operation made on patient's anaesthetic ability to tolerate laparoscopic surgery, previous PUJ surgery, associated renal pathologic findings, and laparoscopic expertise of the surgeons. Diagnosis of PUJ obstruction assessed by IVU with diuretic renogram. 5 had anaesthetic contraindications to laparoscopy.	**Operating time** (min): a. 165 (120–260) b. 145 (80–250) **Hospital stay** (days): a. 4.5 (3–7) b. 5.5 (4–9) **Intravenous urography results at 3 months:** Patent uretopelvic junction: a. 25/25 (100%) b. 28/28 (100%) Improved hydronephrosis: a. 22/25 (88%) b. 25/28 (89%) Pain free: a. 20/25 (80%) b. 19/28 (68%)	No intraoperative complications in either group: n=1/25 (4%) required conversion to open pyeloplasty. **Postop complications:** **a. laparoscopic pyeloplasty:** • severe pyelonephritis (resolved with antibiotics and stent had to be removed 3 weeks postop) (1) • anemia (1) • migration of stent (required open end-to-end anastomosis of renal pelvis) (1) **b. open pyeloplasty:** • delayed pyelonephritis (treated with antibiotics) (2) • wound infection (resolved with observation) (2) No significant difference in complication rates between groups. **Blood loss** (ml): a. 92 (50–250) b. 84 (30–300)	**Potential for bias:** Patients allocated to treatment group depending on ability to tolerate laparoscopic pyeloplasty, previous pelviureteric surgery, associated renal pathologic findings, and laparoscopic expertise of surgeons. Small patient numbers. Preoperative and postoperative IVU read by same surgeon. **Outcome measures and their validity:** Conventional outcome measures, mostly objective. **Other comments:** In group a, no patient had associated renal pathologic findings or previous renal surgery. In group b, 2 patients had PUJ obstruction previously treated by antegrade endopyelotomy. Renal pelvis dilated in 25, retracted in 3. 9 had associated renal pathologic findings. Crossing vessels were present in: a. 10 (38.5%) b. 9 (32%)

Study details	Key efficacy findings	Key safety findings	Appraisal/Comments
Case series			
Janetschek et al.[5] 1996 Austria April 1993 – August 1995 17 patients Follow up: up to 28 months Selection criteria: pyeloureteral obstruction. Underlying causes: intrinsic stenosis (8), aberrant vessels (7), adhesions (1), horseshoe kidney (1). Extent of obstruction assessed by urography and isotope nephrography.	Operating time: 240 min (120–360) Hospital stay: 5.1 days (2–11) Technique and number with marked improvement determined by clinical exam/urography/isotope nephrography: • Anderson Hynes (n = 8): 8/8/5* • Fengerplasty (n = 3): 3/3/3 • Pelvic end-to-end anastomosis (n = 1): 1/1/0 • Ureterolysis (n = 4): 2/2/1 *not performed in 1 patient Analgesia: 0/17 required analgesia beyond 48 hours postop.	• 1/17 (6%) conversion to open surgery due to cardiopulmonary problems • 1/17 (6%) patients with transient lesion of the sympathetic chain • 1/17 (6%) pulmonary embolism (required anticoagulants)	**Potential for bias:** Small patient numbers. **Outcome measures and their validity:** Conventional outcome measures. Not all outcomes measured in all patients. **Other comments:** Various operative techniques employed, including Anderson-Hynes, Fengerplasty. This led to considerable differences in operative time and length of hospital stay. 2 patients had previously undergone abortive attempts at endopyelotomy. 14 (82%) underwent the procedure using a modified transperitoneal approach and 3 (18%) underwent a retroperitoneal approach.

Specialist advisor's opinion

Specialist advice was sought from consultants who have been nominated or ratified by their Royal College or Specialist Society.

The Specialist Advisors expressed no concerns about the efficacy of this procedure. One Advisor, however, commented on the lack of randomised comparisons of open versus laparoscopic procedures, and a scarcity of long-term follow-up data.

One Specialist Advisor commented that the risks of this procedure are similar to those expected with conventional open surgery: infection, failure to correct obstruction, and bleeding. This Advisor also noted the usual safety issues associated with laparoscopic surgery applied, as well as the effects of a prolonged procedure, and the need to convert to open surgery.

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Appendix A: Additional papers that met the inclusion criteria but were not included in the summary tables

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