The role of percutaneous endopyelotomy for ureteropelvic junction obstruction

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ABSTRACT

INTRODUCTION Over the last 20 years, the surgical management of ureteropelvic junction obstruction (UPJO) has been revolutionised by the development of endourological instrumentation and several minimally invasive procedures including: antegrade or retrograde endopyelotomy, retrograde balloon dilatation, and laparoscopic pyeloplasty. Currently, in our department, we offer percutaneous antegrade endopyelotomy (PAE) as primary treatment of UPJO in adults, believing it offers less morbidity, better cosmetic results, and quicker operating time compared with open pyeloplasty.

PATIENTS AND METHODS We performed a retrospective audit of our results for the 14 patients who underwent percutaneous antegrade endopyelotomy between January 2000 and May 2004.

RESULTS Mean operative time was 53 min (range, 30–80 min), mean in-patient stay was 3.8 days (range, 2–7 days), and there were no major postoperative complications for this series with mean follow-up of 31.8 months (range, 12–52 months). Eleven out of the 14 patients (79%) showed radiological improvement on their 3-month MAG 3 (mercaptoacetyl-triglycyl) renogram, and 13 out of the 14 (93%) patients reported significant reduction or resolution of pain, compared with their pre-operative state.

CONCLUSIONS The majority of urologists still offer open pyeloplasty as primary treatment for UPJO with laparoscopic pyeloplasty currently an evolving procedure in the UK. Our series reports comparable success rates for PAE compared to other series. Despite these results, we feel that the future role of percutaneous endopyelotomy will be as a salvage procedure following failed open or laparoscopic surgery. However, in patients with concurrent stone disease or requiring antegrade ureteric access, percutaneous endopyelotomy would be suitable as a primary treatment option.

KEYWORDS

Percutaneous antegrade endopyelotomy – Ureteropelvic junction obstruction – Surgical management

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Ureteropelvic junction obstruction (UPJO) is generally a congenital condition presenting most frequently in childhood. Adults and elderly individuals may also present with UPJO due to a primary obstructive lesion, or one acquired secondary to stones, ureteral manipulation, ureteral compression from extrinsic processes, retroperitoneal fibrosis or other disorders that cause inflammation of the upper urinary tract. In adults, symptomatic UPJO (causing recurrent flank pain, urinary tract stones or infection) should be treated surgically.¹ For over 100 years, however, the optimal surgical correction for UPJO has been a challenge for surgeons.²

In 1886, Trendelenburg unsuccessfully performed the first reconstructive procedure for UPJO but was followed 5 years later by Kuster who published the first successful dismembered pyeloplasty.³ The first half of the 20th century saw the development of several different techniques to treat UPJO but most were troubled with recurrent strictures.³ In 1943, Davis and colleagues popularised the technique of intubated ureterotomy, involving incision into the ureter which was left stented and subsequently regenerated.^{3–5} In 1949, two British surgeons, Anderson and Hynes, described their open dismembered pyeloplasty which, with success rates of over 90%, became the gold standard for the treatment of UPJO.^{6–8}

Over the last 20 years, the management of urological conditions has been revolutionised by the development of endourological instrumentation and several minimally invasive procedures including antegrade or retrograde endopyelotomy, retrograde balloon dilatation, and laparoscopic pyeloplasty.^{5,4,9,10}

Numerous reports from around the world have reported the safety, efficacy and popularity of percutaneous antegrade endopyelotomy (PAE) as a minimally invasive primary treatment alternative to open pyeloplasty, for patients with intrinsic symptomatic UPJO.^{11–16}

Percutaneous endopyelotomy was first introduced over 20 years ago.^{4,17,18} Based on the principles of intubated ureterotomy first described in 1903 by Albarran and popularised by Davis in 1943, several variations of the technique have also been described including ureteroscopic holmium laser endopyelotomy and Acucise retrograde endopyelotomy.^{5,17,19–21} The concept of the procedure involves percutaneous access to the kidney, a full-thickness cold knife incision of the narrow ureteric segment, extending out to the peripelouretal fat, followed by prolonged stenting. Subsequently, the ureteric muscle and mucosa regenerate, leaving a wide, patent, funnelled drainage system.^{5–5,17}

Currently, in our department, we offer PAE as the primary treatment for UPJO in adults, believing it offers less morbidity, better cosmetic results, and quicker operating time compared with open pyeloplasty. We do, however, counsel patients that the functional results are not comparable to open pyeloplasty and around 15% of patients may subsequently require a further procedure. We decided to examine our unit's experience with percutaneous endopyelotomy to assess whether the outcomes of this procedure were acceptable, and if we should still offer it our primary treatment.

Patients and Methods

Patients

We performed a retrospective review of case notes and radiological reports of all patients who underwent percutaneous endopyelotomy for symptomatic (painful) UPJO between January 2000 and May 2004. All procedures were performed by the same surgeon. Fourteen patients (6 males and 8 female) with mean age 47 years (range, 24–70 years) underwent the procedure. All were primary procedures, except one which was a salvage procedure for a patient after failed open pyeloplasty.

Operative procedure and follow-up

A ureteric catheter and guide wire was placed cystoscopically, on the affected side, under general anaesthesia. After being placed prone, contrast was injected via the

ureteral catheter, and a fluoroscopically guided puncture of the renal calyx was made. This tract is then dilated, to 26-Fr using a Seldinger technique. A pyeloscope was introduced into the renal pelvis. The ureteral catheter was then removed, but the guide wire left *in situ*. The UPJ was incised posterior-laterally, using a cold knife, until peripelouretal fat was visualized. Thereafter, two double J-ureteric stents were placed and a 22-Fr nephrostomy Porgies tube left *in situ*.

The nephrostomy was clamped the following postoperative day, and removed if the patient remained pain-free. The ureteric stents were removed by flexible cystoscopy at 6 weeks, and the patient underwent a MAG 3 (mercaptoacetyl-triglycyl) renogram at 3 months to assess for radiological improvement, and was seen in clinic to assess symptomatic improvement.

Results

Fourteen patients underwent percutaneous endopyelotomy for symptomatic UPJO. The mean operative time was 53 min (range, 30–80 min), mean in-patient stay was 3.8 days (range, 2–7 days) and there were no major postoperative complications for this series with a mean follow-up 30 months (range, 12–52 months). One patient underwent simultaneous stone extraction from the renal pelvis at the same time. While 13 out of the 14 (93%) patients reported resolution of pain, 11 out of the 14 patients (79%) showed radiological improvement on their 3-month MAG 3 renogram. The one patient whose symptoms did not resolve underwent successful salvage open pyeloplasty without complication.

Discussion

Open pyeloplasty for correction of UPJO, offers success rates of over 90% and is the gold standard against which other techniques are compared.^{6–8} Modern endourological and laparoscopic techniques offer comparable success rates, with reduced morbidity. PAE has traditionally offered a minimally invasive alternative to the open procedure. Up to 45% of American urologists would consider endopyelotomy as the primary treatment for UPJO if no crossing vessel were found.²² World-wide, PAE been widely accepted and used as a primary treatment for correction of UPJO.^{12,15,15,16,25,24} Compared with open pyeloplasty, PAE offers the advantage of shorter operative time, decreased postoperative pain, shorter recovery time and smaller incision with better cosmetic result.¹² Most urologists have the endoscopic skills required to perform the procedure and most departments that perform endoscopic stone surgery

have the required equipment. Functional success rates are reported between 67–93% for PAE, although often symptomatic results are better.^{12,23,25–27} As with dismembered pyeloplasty, PAE failures become evident within the first 12 months of follow-up, at which stage open or laparoscopic salvage surgery can be performed.

In our unit, PAE offers success rates comparable with other published results, with symptomatic results been better than radiological results. Currently, we continue to offer PAE as our primary treatment for UPJO. Our laparoscopic urological service is evolving and we envisage that we will soon be offering laparoscopic dismembered pyeloplasty as our primary treatment for UPJO.

Laparoscopic dismembered pyeloplasty is relatively new to the UK, with the first major case series being reported in 2001.²⁸ The main drawbacks of laparoscopic surgery are its steep learning curve, which results from the significant changes in the surgical environment, high initial cost of equipment and operative time equal to or greater than the open procedures.^{29,30} Laparoscopic dismembered pyeloplasty offers similar results to open pyeloplasty, but without the disadvantages of a painful loin incision, prolonged hospitalisation and delayed return to normal activities.²⁸

Comparing endoscopic with laparoscopic treatment of UPJO, blood loss, unit doses of analgesics, days of hospitalisation and time to return to normal activities are similar.²⁸ Both procedures are suitable as a primary procedure for patients with intrinsic UPJO. However, operative time is significantly longer in the laparoscopic groups which may be particularly significant in elderly patients or those with significant co-morbidity.^{27,31} Laparoscopic dismembered pyeloplasty, however, is advantageous in cases of complicated UPJO, including patients with crossing vessels or peri-ureteral fibrosis, and is likely to offer better long-term functional results, with up to 98% success rates reported.^{27,32,33} Success rates for laparoscopic pyeloplasty, coupled with the increasing number of centres offering this procedure, suggest that it will soon replace open surgery as the gold standard for the treatment for UPJO.³⁴

PAE will still have a role to play in the management of UPJO. First, in patients with concurrent stone disease or requiring antegrade ureteric access, percutaneous endopyelotomy would be suitable and should be used as a primary treatment option. Following failures of dismembered pyeloplasty, treatment options included repeat open or laparoscopic repair or endourological procedure. PAE offers a minimally invasive endourological alternative to repeat open or laparoscopic repair, and is an excellent second-line treatment since visibility will not be hampered by scar tissue, any crossing vessels would have been mobilised at the time of the primary surgery and it provides excellent functional results, with long-term success rates of around 70%, without any increased morbidity.^{35–37}

Conclusions

Percutaneous endopyelotomy is a relatively simple procedure which can be performed by anyone with urological endoscopic skills. It is currently accepted worldwide as a first-line treatment option for UPJO. In our unit, we offer PAE as our primary treatment for UPJO. Although functional results are not as good as for dismembered pyeloplasty, in our hands most patients improve symptomatically after the procedure.

As laparoscopy continues to replace open surgery, we shall see the role of PAE change from a primary treatment for UPJO to salvage procedure following laparoscopic/open surgery, as there are relatively fewer surgical risks. However, in specific cases such as patients with concurrent stone disease or where upper ureteric access is required, PAE still offers an excellent primary treatment option.

The final treatment option for UPJO depends on several factors, including the operative surgeon's experience, equipment availability, concurrent stone disease, requirement of ureteric access and the success and morbidity of the procedure. As long as patients are given the relevant information, they will be able to make an informed choice about treatment.

Acknowledgement

NJ Rukin and DA Ashdown contributed equally to writing of this paper.

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