Endoballoon Rupture and Stenting for Pelviureteric Junction Obstruction: Technique and Early Results

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Summary—Endoballoon rupture and stenting was performed on 31 patients with pelviureteric junction obstruction. A percutaneous antegrade approach was used in 20 patients, a retrograde technique in 11. Clinical and renographic improvement was seen in 21 patients. Four patients later underwent nephrectomy, all of whom had a GFR of less than 20% in the affected kidney.

Endoballoon rupture is technically undemanding, easier and less invasive than endopyelotomy. In patients with adequate renal function it provides a suitable alternative to pyeloplasty.

Balloon dilatation was first pioneered by Gruntzig and Kumpe (1979) for the treatment of coronary artery obstruction and has now found a wide variety of applications. Advances in endourology have permitted access to the pelviureteric junction (PUJ) and endopyelotomy has now become an accepted alternative to pyeloplasty. The combined use of endourology and balloon rupture is a logical extension of these techniques.

We report the results in 31 patients who underwent endoballoon rupture of PUJ obstruction in 2 urological units (Stirling/Falkirk and Aberdeen).

Patients and Methods

Over the past 2½ years, 18 men and 13 women underwent endoballoon rupture and stenting (ENDOBRST) for obstruction. The age range was 18 to 70 years (mean 33.4). All patients had unequivocal unilateral PUJ obstruction. The diagnosis was established by clinical evaluation, IVU and Tc DPTA or 131I Hippuran renography. Four patients had ipsilateral poor kidney function (<20% on renography); 6 patients had an ipsilateral kidney stone, 5 due to primary PUJ obstruction and 1 coexisting with a PUJ obstruction. Two patients had undergone previous open surgery of the PUJ; 1 patient had had 2 unsuccessful pyeloplasties and the other had an unsuccessful PUJ lysis.

Retrograde ENDOBRST (11 patients)

Under general anaesthesia, cystoscopy was performed and a guide wire and size 8 guiding catheter passed up the ureter and through the narrowed PUJ. The guide wire was removed and the renal pelvis distended with Urografin 38%. The guide wire was then reinserted and the catheter withdrawn. Under fluoroscopy the Olbert balloon 70 cm percutaneous renal access catheter was passed over the guide wire to straddle the PUJ. The balloon was inflated using a pressure inflated handle to a pressure of 180 PSI (9 BAR), reaching a diameter of 10 mm (30F). Waisting of the balloon was seen at the stenosis (Fig. 1A). This disappeared 10 to 20 s after inflation, rupturing the narrowed PUJ (Fig. 1B) and causing extravasation (Fig. 1C). If the waisting did not disappear, the balloon was deflated and then reinflated. This was performed a maximum of 3 times. A size 7 or 8F polyurethane pigtail catheter was then placed to stent the ruptured PUJ for 6 to 8 weeks. A urethral catheter was left in overnight.

Antegrade ENDOBRST (20 patients)

Twenty patients underwent antegrade ENDOBRST, of whom 6 had percutaneous nephrolithotomy at the same time. Under general anaesthesia, cystoscopy was performed and a guide wire passed
up the ureter and manipulated through the narrowed PUJ. Percutaneous nephrostomy and dilatation were performed in the standard fashion. With a nephroscope the guide wire was extracted through the Amplatz sheath. The Olbert balloon catheter was passed over the guide wire and through the narrowed PUJ. The position of the balloon was confirmed by fluoroscopy. The balloon was then inflated for up to 20 s or until the waisting had disappeared. A size 7 or 8F polyurethane pigtail catheter was then placed over the guide wire and left in situ for 6 to 8 weeks. In the early part of the series, 4 patients were treated with size 10F stents.

All patients underwent $^{131}$I Hippuran or $^{99m}$Tc DPTA diuresis renography 3 months post-operatively. Renography, together with IVU and clinical evaluation, were repeated at regular intervals during follow-up.

**Results**

Twenty-one patients (68%) had improvement of the PUJ obstruction based on isotope renography and relief of pain (Fig. 2). One patient died of an unrelated cause prior to evaluation. Nine patients had no change, based on diuresis renography; 4 of these patients had a corrected GFR of less than 20% on the affected side and these patients...
subsequently underwent nephrectomy. One patient underwent a successful pyeloplasty, 2 are asymptomatic and 2 are awaiting pyeloplasty.

The duration of follow-up was 3 months to 2.5 years (mean 9.9 months). No deterioration in renal function or drainage has been seen during follow-up. Some improvement was seen at 6 months in those whose early renographic improvement was slight.

Complications were small in number and relatively minor (Table). We now use routine antibiotic prophylaxis, which had been omitted in those who developed UTI and septicaemia.

The length of hospital stay averaged 4.3 days (range 2–21). Most patients who underwent retrograde ENDOBRST were discharged the day following the procedure.

Discussion

PUJ obstruction is a common pathological condition which traditionally required open pyeloplasty. Notley and Beaugie (1973) showed that good early results of pyeloplasty were maintained over a prolonged period. The percutaneous incision of stricture at the PUJ was first reported by Whitfield et al. (1983), based on the principle of the intubated ureterotomy described by Davis et al. (1943).

Balloon dilatation of PUJ obstruction was first reported by Kadir et al. in 1982. In endopyelotomy, the incision is made in the posterolateral aspect of the stenosed segment to avoid the 20 to 30% of aberrantly placed anterior vessels. With balloon rupture the only requirement is that the balloon straddles the stenosed segment. ENDOBRST is easier and less invasive than endopyelotomy, especially when performed as a retrograde procedure. The operation takes 20 to 30 min and hospitalisation of 2 days is generally adequate.

The antegrade technique has the advantage of allowing the surgeon to perform nephrolithotripsy or biopsy at the same time, while the retrograde technique obviates the need for percutaneous access. During the period of the study, difficulty in negotiating the guide wire through the strictured area occurred in 2 patients, both of whom underwent pyeloplasty.

Four patients had a corrected GFR of less than 20% on the affected side. ENDOBRST was performed in an effort to avoid nephrectomy, but this was unsuccessful. Excluding those with poor renal function, 21 of 26 patients (81%) improved following the procedure. This compares favourably with success rates of 87% for endopyelotomy (Karling et al., 1988). The longest follow-up is 2.5 years and long-term success rates cannot be quoted at present.

Table: Complications

<table>
<thead>
<tr>
<th>Complication</th>
<th>Count</th>
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<tbody>
<tr>
<td>Urinoma</td>
<td>1</td>
</tr>
<tr>
<td>Stent calcification (kidney stone, ureteric colic)</td>
<td>2</td>
</tr>
<tr>
<td>Urinary tract infection</td>
<td>2</td>
</tr>
<tr>
<td>Septicaemia</td>
<td>1</td>
</tr>
<tr>
<td>Stent migration</td>
<td>2</td>
</tr>
</tbody>
</table>

References


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