Endoscopic Management of Upper Urinary Tract Stones : Review of Four Months Experience at Salmaniya Medical Centre

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ABSTRACT

Between October 1st 1986 and February 1st 1987, a total of 45 patients had endoscopic stone removal with percutaneous nephrolithotomy (PCN) or transurethral ureteroscopy (TUU) as the primary modalities of therapy, 29 and 16 respectively. Two of these are excluded due to either inability to reach the stone or ureteric perforation.

Successful stone extraction was achieved in 26 out of 29 patients (90%) by PCN, and 11 out of 14 patients (78%) by TUU.

Complication rates were low as was the morbidity. Hospital stay was 6 days for most patients (range 5–14 days) with a prompt return to work.

Endoscopic stone management is a far easier and cheaper method of treatment than open surgery.

The successful development of endoscopic stone surgery with the use of the in situ destruction technique, ultrasound lithotripsy (USL) and electrohydraulic lithotripsy (EHL), has meant that we now reserve open surgery for difficult and large staghorn calculi and ureteric stones that cannot be removed endoscopically. With the advent of extracorporeal shock wave lithotripsy (ESWL) it is likely that even those stones will be amenable to minimally invasive techniques.

Until 1981 open surgical removal of upper urinary tract calculi was the only reliable method for treatment. Since that time, endoscopic methods of removing or fragmenting calculi in situ have been practised[1, 2], and now offer a cheaper and far less invasive means of stone removal from the kidney and ureter[3]. Our clinical experience over a 4 month period with these procedures is presented here.

METHODS

Between October 1986 and February 1987, 45 patients that presented with one or more calculi in the upper urinary tract have had either PCN (29 cases) or TUU (16 cases) as the primary modalities for treatment of their calculus disease. The age ranged between 20 and 55 years, 38 males and 7 females.

Of the 29 patients with renal calculi, 22 had simple PCN, and PCN plus USL in the other 7. PCN was a one stage procedure (tract construction and stone removal at the same time) in 27 patients and a two stage procedure in 2 patients. Seventeen patients had cystoscopy and urethral catheterisation prior to the puncture for administration of the contrast medium and the rest received IV contrast medium to visualise the collecting system. All patients were treated in the full prone position with a pillow under

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the abdomen[4]. We used a C arm flouroscopy machine and a locally constructed table with a wooden top.

Puncture and tract dilation to size 30 F with application of the Amplatz sheath were done under general anaesthesia[5] in 28 cases and local anaesthesia in one (the first patient).

Lower pole posterior calyx was the usual puncture place for pelvic or lower pole stones and also for some upper calyceal stones. The middle pole calyx was used for middle calyceal stones or stones at or below the pelviureteric junction (PUJ). On 2 occasions, a supra 12 (above the 12th rib) approach was used, for stones in the upper calyx. Five direct pelvic punctures were done.

We used the rigid 26 F sheathed Karl-Storz nephroscope for stone removal and/or fragmentation[6, 7, 8]. For a single small (1 cm or less) stone, Miller-Wickham triradiate forceps were used. USL in situ was performed in 7 cases to fragment staghorn calculi or stones that were more than 12 mm [9, 10].

All PCN patients had identical preoperative preparation as for open renal stone surgery, and in all a nephrostomy tube was inserted postoperatively.

Sixteen patients with ureteric calculi underwent TUU. This was performed using a Karl-Storz 12.5 F uteroscope after preliminary dilation of the ureter to 12–13.5 F size by fleximetallic dilators on a guide wire[11], and the stone was removed by Dormia or Pfiser-Shwartz baskets or grabbers[12]. In 4 patients, the stone was 8 mm or more and thus subjected to fragmentation by ultrasound before removal. The whole procedure was done under general anaesthesia.

Of the 29 patients that underwent PCN, 4 had previously undergone open surgery on the same kidney for calculus disease, and of the ureteroscopy group, 2 had previously had an open ureterolithotomy for stone disease.

All PCN and TUU patients received parenteral analgesia of pethidine/phenergan combined postoperatively, 4 hourly PRN, but they rarely needed this beyond 24 hours.

RESULTS

Percutaneous Nephrolithotomy

We had a total of 29 patients. The renal calculi were distributed as follows : 5 in the upper calyx, 3 in the middle calyx, 8 in the lower calyx, 11 in the pelvis and 2 in the upper ureter but pushed up into the pelvis by the ureteroscope. Seven patients had 2 or more stones. In situ disintegration of the stone by ultrasound was performed in 7 cases. PCN was successful in 26 cases (90%). Open operative procedures were carried out in the 3 failures: one to remove a residual stone (PCN and USL used), the second to remove the whole stone that had been obscured by bleeding and the 3rd had upper ureteric perforation that needed exploration and splinting.

Bleeding from the nephrostomy tract occured in 4 patients (13%). In 3 cases this occured during the PCN and in one the bleeding was reactionary. All settled by tube nephrostomy, antibiotics and blood transfusion.

Three patients (10%), developed postoperative ileus, all of whom had large or staghorn calculi in which USL was used. All settled with conservative treatment.

One patient developed urinary-cutaneous fistula which settled after draining the kidney and stenting the ureter by a double J stent.

The operating time averaged 60 minutes but improvement in the puncture and tract dilation technique, as well as proper selection of patients, resulted in a shorter operating time. In some cases this was no more than 30 minutes.

Transurethral Ureteroscopy

We had a total of 16 patients with ureteric calculi; 5 in the upper third, 4 in the middle third and 7 in the lower third. Four patients had 2 or more calculi. The size of the ureteric stones ranged between 5 and 14 mm but the majority were 8 mm or less. In 14 cases TUU was performed to remove the stone. Extraction of the intact stone was achieved in 7 cases and in 4, in situ disintegration before removal was necessary (total 11 cases). In 2, the stones were not reached because of upper third S shape ureteric kinking and in one, ureteric perforation occurred

that necessitated immediate exploration; reimplantation of the ureter resulted in complete recovery (total 3 cases). In 2 cases, TUU was used to push the stone up into the pelvis to be removed percutaneously; this was successful.

Three patients developed postoperative ileus and one developed complete ureteric obstruction due to oedema; all settled with conservative management.

Six patients from either group underwent intravenous urography and micturating cystourethrography 6 weeks postoperatively, and in none ureteric stricture or vesico-ureteric reflux was demonstrated.

DISCUSSION

Removal of stones from the kidney was first described in 1941 by Rupel and Brown. They removed stones blocking the kidney through the nephrostomy tract made to drain the kidney[13]. It was not until 1976 that Fernstrom and Johansson described their technique for percutaneous stone extraction from a non-dilated collecting system[14].

Reduction of the operating time, increased success in access, tract dilatation and endoscopic removal of the stones, and less complications, can all be achieved through experience and appropriate selection of cases. The use of a C arm fluoroscopy machine is important in that the puncture site and the stone can be viewed in several planes almost simultaneously without changing the position of the patient. Also, visualisation of the collecting system by administering the contrast medium through a ureteric catheter is far better and quicker than by intravenously administered contrast medium. Distension of the collecting system prior to puncture is invariably achieved through the retrograde route. Only about 20 cc of water soluble iodinated contrast medium is needed to be introduced via the ureteric catheter while 50–100 cc needs to be given by the IV route. In our last 17 cases, the use of a retrograde ureteric catheter size 6 F was routine[15]. This catheter also served to prevent a stone from dropping down the ureter (especially if initially pushed up), and to splint a traumatised (post-ureteroscopy) ureter.

Initial problems of glycine extravasation — intravasation (absorption) were eliminated by using normal saline, instead, as an irrigant solution.

CONCLUSION

PCN and TUU should now replace open surgery for the majority of urinary calculi. The success rate is high. The hospital stay averages 6 days, with a prompt return to work. With the advent of ESWL[16], these procedures will be relegated to a secondary role but will still remain an important and essential adjuvant technique for modern renal stone surgery.

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