Early Experience of Lumboscopy in Paediatric Upper Urinary Tract Calculi

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Abstract. Objective: Objective of this study was to present our early experience with lumboscopy in treatment of paediatric urolithiasis of upper urinary tract. Methods: Paediatric urolithiasis cases treated by lumboscopy approach from July 2013 to December 2013 were included in this prospective study. Lumboscopy was performed in prone position using three ports to approach kidney and ureter in all patients. The patient characteristics were analysed. Intraoperative and postoperative details were taken. Data was analyzed regarding age, sex, diagnosis, surgical procedure, anaesthetic details, intraoperative problems encountered, postoperative pain, time to oral feed, length of hospitalization, complications and final outcome. Results: Between July 2013 and December 2013, a total of 6 patients underwent lumboscopic procedures for upper urinary tract calculi. There were 5 males and one female; median age at surgery was 7.5 years (range 2-12 years). Four patients underwent lumboscopic pyelolithotomy, one lumboscopic ureterolithotomy and one lumboscopic bilateral ureterolithotomy and pyelolithotomy. The mean operating time was 120 minute; range 80-200 minute. There were no special anaesthetic requirements and no intraoperative problems were encountered. There was minimal postoperative pain. All the patients were started orally within 24 hours. The mean duration of hospital stay was 5 days; range 3-10 days. There were no incision related or port site complications. All the patients were asymptomatic in the follow up period. Conclusion: Lumboscopy is an easy, effective, technically safe, low morbidity alternative for management of upper urinary tract calculi in paediatric population.

Keywords: Lumboscopy, Paediatric urolithiasis, Pyelolithotomy, Ureterolithotomy

Received: 26 January 2014 / Accepted: 28 January 2014

Introduction
Paediatric urolithiasis is an uncommon occurrence but the incidence has been increasing over the last decade. It poses a technical challenge to the paediatric urologist. Despite the success of minimally invasive techniques, open surgery is still commonly practiced for treatment of paediatric urolithiasis. The wide spectrum of paediatric upper urinary tract calculi warrants for an approach which focuses on decreasing morbidity, cosmetically acceptable smaller incisions and technically feasible access. The lumboscopy approach fits into the requirements and is an affordable option.
intravenous analgesia requirements and any intraoperative hemodynamic event such as bradycardia, fall in blood pressure and electro-cardio-graphic (ECG) changes.

The procedures were performed after informed consent as per hospital protocol. Children were intubated after standard intravenous and inhalational anaesthesia. Prone position was maintained by roll under the pelvis, thick pad under the shoulders and upper chest leaving the thorax and abdomen free for movements. Head was turned to one side for securing the airway. The following landmarks were identified: 12th rib, vertebral column, erector spinae and the iliac crest. A small 12mm incision was given at the renal angle at the lateral margin of paraspinal muscles. Posterior lamina of the dorsolumbar fascia was pierced vertically. A retroperitoneal space was created using blunt and sharp dissection. Gerota’s fascia was then opened. Indigenous balloon made using the middle finger of a surgical glove (No 8) fixed at the end of a suction catheter was inserted into the space created and gradually inflated by insufflating 200-300ml of air. After insufflation (which was gradual and over 5-10 min) we waited for 20-25 minutes for sufficient creation of the space. Once the space was created a 12mm port was inserted and 10mm telescope inserted to visualize the retroperitoneum. Standard three port technique was used (Fig. 2). Subsequent 5mm ports were then inserted under vision and fixed. Urinary tract (ureter or pelvis) was identified and opened with laparoscopic scalpel and stone was removed intact using indigenously designed stone retrieval bag (Fig. 3). Double J stent was placed and urinary tract closed with 4-0 absorbable sutures. Penrose drain was placed in all the cases. Operating time, intraoperative complications, postoperative pain, time to oral feeds, duration of hospital stay and final outcome were analyzed.

**Results**

A total of 6 children underwent lumboscopic procedures for upper urinary tract calculi from July 2013 to December 2013. Five were males while one was a female. The median age at surgery was 7.5 years; range 2 to 12 years. Four had renal calculi, one had ureteric calculi of one side and one had renal and bilateral ureteric calculi. Children with renal calculi
underwent lumboscopic pyelolithotomy, while in cases of ureteric calculi lumboscopic ureterolitotomy was performed. One case underwent lumboscopic bilateral ureterolithotomy and pyelolithotomy, each side approached separately. The mean operating time was 120 minutes with a range of 80-200 minutes. There were no special anaesthetic requirements and no intraoperative problems were encountered. None of our patients experienced any significant anaesthetic problem. All of the patients were maintained on intravenous and inhalational anaesthetic agents. Intraoperative analgesia was in form of intravenous fentanyl (one microgram/kg) and all patients were extubated smoothly. There was minimal postoperative pain reported in all cases which was managed in form of intravenous paracetamol (PCM) on first day and oral PCM on the day after. Intravenous fluids were stopped by next morning and oral feeds were encouraged. All the patients were started orally within 24 hours of surgery. Penrose drain was removed on post-operative day 2 or 3. The mean duration of hospital stay was 5 days; range 3-10 days. There were no incision related or port site complications. None of our patients had wound disruption or infection. All of them were asymptomatic in the follow up period.

Discussion

With the adoption of evidence based medicine in past couple of decades the practice of surgery has been more or less standardized. The newer concepts and approaches are frequently questioned and tested in relation to the established practices. The surgeon by his own nature keeps innovating and practicing such techniques which he finds more suitable and convenient. Such techniques often evolve in the process of improvisation and meeting needs of the time. Surgeries involving the retroperitoneal structures like kidney are quite common in paediatric age group. The wide spectrum of urological diseases in these age groups warrants for an approach which focuses on decreasing morbidity, cosmetically acceptable smaller incisions and technically feasible access.

Paediatric urolithiasis though uncommon as opposed to adults, has shown an increase in incidence in recent years. Use of minimally invasive techniques has been a major breakthrough in paediatric urology in the past decade. Despite this, the management of paediatric urolithiasis remains a surgical challenge. More and more such cases are now being managed laparoscopically with the improved expertise of the operating surgeon and availability of paediatric laparoscopic instruments. Laparoscopy can be performed by transperitoneal or retroperitoneal approach. Transperitoneal route has the obvious disadvantage of peritoneal breach and resultant complications which can be avoided in retroperitoneal approach.

Lumboscopy with gas insufflation was described in an animal model by Roberts and in humans by Wikham in 1976, who first performed retroperitoneal endoscopic ureterolithotomy using a standard laparoscope in 1979.[1] Laparoscopic procedures are still not widely performed in paediatric urology because of operating time and costs as well as the lack of indications and, thus, the lack of sufficient surgeon experience.[2]

Retroperitoneal approach provides a laparoscopic technique comparable to conventional renal surgery.[2] By avoiding the peritoneal cavity the risk of visceral and vascular injury may be reduced. Also, the risk of adhesive obstruction is eliminated. It is a more direct approach to the kidney and other retroperitoneal structures. In 1996, Valla et al reported their experience with 18 cases of retroperitoneal laparoscopic nephrectomies in children aged 3 months to 14 years. The median operating time was 106 minutes. There were no complications and only one conversion.[3] In a systematic review of 689 paediatric nephrectomies by Kim C et al in 2009, it was reported that retroperitoneal approach was associated with a shorter operative time, comparable hospital stay and overall complication rate compared to transperitoneal approach.[4]

The lumboscopy approach fits into the requirements and is an affordable option. A surgeon who is familiar with lumbotomy approach can perform lumboscopy and identify structures more easily and confidently than a real beginner for this approach. The data on lumboscopic treatment of paediatric urolithiasis is limited. In 2013, Agarwal et al reported their experience of 22 cases of children with urinary tract stones who were treated by transperitoneal laparoscopy. Twelve underwent pyelolithotomies while in 10 ureterolithotomy was performed. Complete removal of calculi was achieved in 21 (95.45%) and one required conversion to open surgery. One patient developed a small localized urinoma after laparoscopic pyelolithotomy while one had omental prolapsed on drain removal which was managed by repositioning and repair of fascia. Mean hospital stay was 3 days. None had recurrence or residual stones, in a mean follow up of 11 months.[5]

Senior author who did lumboscopy in all cases had vast experience of lumbotomy approach for upper urological diseases.[6-7] So it became easy and technically safe for the surgeon and his team members to do the procedure like lumboscopy for upper urinary tract stones. We used the three port technique with patient in prone position. Our mean operating time was 120 minutes and it improved as the number of cases increased. Postoperative recovery was very quick in these patients, early feeding was initiated and there was minimal postoperative pain, most were discharged without any complication. With increasing availability of small sized
laparoscopic instruments, lumboscopy holds great promise for treatment of paediatric urolithiasis.

**Conclusion**

Lumboscopy is an effective procedure for management of ureteric and renal calculi in paediatric population with low morbidity. We continue to use and advocate this approach as primary option for removal of all upper urinary tract calculi.

**References**