Original Article

Urology, Nephrology and Andrology International
Volume 4 Number 1, January - June 2019
DOI: http://dx.doi.org/10.21088/unai.2456-5016.4119.1

Author's Affiliation:
[1]Department of Urology, JN Medical College, KLE Academy of Higher Education & Research (Deemed-to-be-University), JNMC Campus, Belagavi, Karnataka 590010, India and KLES Kidney Foundation, KLES Dr. Prabhakar Kore Hospital & M.R.C, Belagavi, Karnataka 590010, India. [2]Department of Urology, JN Medical College, KLE Academy of Higher Education & Research (Deemed-to-be-University), JNMC Campus, Belagavi, Karnataka 590010, India. [3,4]Department of Urology, KLES Kidney Foundation, KLES Dr. Prabhakar Kore Hospital & M.R.C, Belagavi, Karnataka 590010, India. [5]Department of Biotechnology and Microbiology, Karnatak University, Dharwad, Karnataka 580003, India

Corresponding Author:
R.B. Nerli, Department of Urology, JN Medical College, KLE Academy of Higher Education & Research (Deemed-to-be-University), JNMC Campus, Belagavi, Karnataka 590010, India.

E-mail: rbnerli@gmail.com

Received on 23.05.2019, **Accepted on** 20.06.2019

Laparoscopic Assisted Percutaneous Nephrolithotomy in Children

R.B. Nerli[1], Vishal Kadeli[2], Shridhar C. Ghagane[3], Neeraj S. Dixit[4], Murigendra B. Hiremath[5]

Abstract

Purpose: To present the technique of laparoscopic assisted percutaneousnephrolithotomy for the treatment of stones in ectopic kidneys. *Patients and Methods:* The series included three children (mean age 16 years). Laparoscopic assisted percutaneous nephrolithotomy (PCNL) was performed for renal stones. *Results:* The mean operative time was 90 minutes. There were no complications nor conversions to open surgery. The stone-free rate was 100%. One patient had a renal calculi on the opposite normal kidney and was treated with shock wave lithotripsy. The mean hospital stay was 4 days. *Conclusion:* Laparoscopic assisted PCNL is a safe, feasible and an effective option in the management of renal stones in an ectopic pelvic kidney.

Keywords: Laparoscopy; Ectopic Kidney; Percutaneous Nephrolithotripsy; Renal Stones.

How to cite this article:
R.B. Nerli, Vishal Kadeli, Shridhar C. Ghagane *et al*. Laparoscopic Assisted Percutaneous Nephrolithotomy in Children. Urology, Nephrology and Andrology International. 2019;4(1):5-9.

Introduction

Whenever a mature kidney fails to reach its normal location in the "renal" fossa, then the condition is labelled as *renal ectopia*. This term is derived from the Greek words *ek* ("out") and *topos* ("place"), and it literally means "out of place" [1]. An ectopic kidney can be found in one of the following positions: pelvic, iliac, abdominal, thoracic, and contralateral or crossed. Pelvic ectopia has been estimated to occur in 1 of 2100 to 3000 autopsies [1,2]. The ectopic kidney is more susceptible for the development of hydronephrosis or stones than the orthotopic kidney [1,3]. This could probably result because of the anteriorly placed pelvis and malrotation of the kidney, which impairs the drainage of urine from a high insertion of the ureter to the pelvis or anomalous vasculature that partially obstructs one of the major calyces or the upper ureter [1].

Renal stones occurring in an ectopic kidney are difficult to treat. It is possible to treat small stones either by ESWL (extra-corporeal shockwave lithotripsy) or flexible RIRS (retrograde intrarenal surgery). However large volume stones or failures following ESWL and/or RIRS need alternative techniques. Conventional PCNL is usually not feasible due to the possibility of bowel and vascular

injury unless access is achieved in presence of skilled radiologist. Open surgery is an option but has its own limitations in form of postoperative pain, scar and complications. Laparoscopic assisted PCNL through anterior abdominal approach seems to be a reasonable option in such cases. The first such laparoscopic assisted PCNL was reported by Esghi and colleagues in 1985 [4]. Later on several other authors have successfully removed renal stones in ectopic kidneys using this or similar technique. We retrospectively reviewed our hospital data for patients (18 years of age) who presented with urinary stones in an ectopic kidney.

Materials & Methods

We retrospectively reviewed our hospital data for patients with urolithiasis and ectopic/ pelvic kidneys. The study was conducted following consent obtained from the University/ Institutional ethical committee. The demographic data, symptoms, age, gender, imaging data and indications for surgery was analyzed.

Surgical technique: A modified Valdivia position was used to position the patient. Cystoscopy was performed and a 5 Fr ureteric catheter was inserted on the affected side for performing retrograde pyelography (Fig. 1a). A 1-1.5 cm incision was made on the inferior aspect of the umbilicus so as to insert a 10 mm endoscopic port using the Hasan technique. Pneumoperitoneum was created and gas pressure maintained up to 14 mm Hg. Secondary trocars were introduced under vision at both iliac fossa, a 10 mm on the affected side and a 5 mm on the opposite side. Care was taken so as to avoid blood vessels which could be easily seen under light. The renal bulge was identified (Fig. 1b) and a minimal dissection was carried out to expose the kidney (Fig. 1c). The exposed kidney would usually be rotated medially. Contrast is injected through the ureteric catheter to opacify the renal system under fluoroscopy.

Through the port on the same side, an initial puncture needle was introduced under fluoroscopy guidance and the appropriate renal calyx was punctured (Fig. 1d). The entry of the needle into the collecting system was confirmed by aspirating urine through the needle. Guide wire was inserted into the pelvicalyceal system through the needle and the tract was dilated

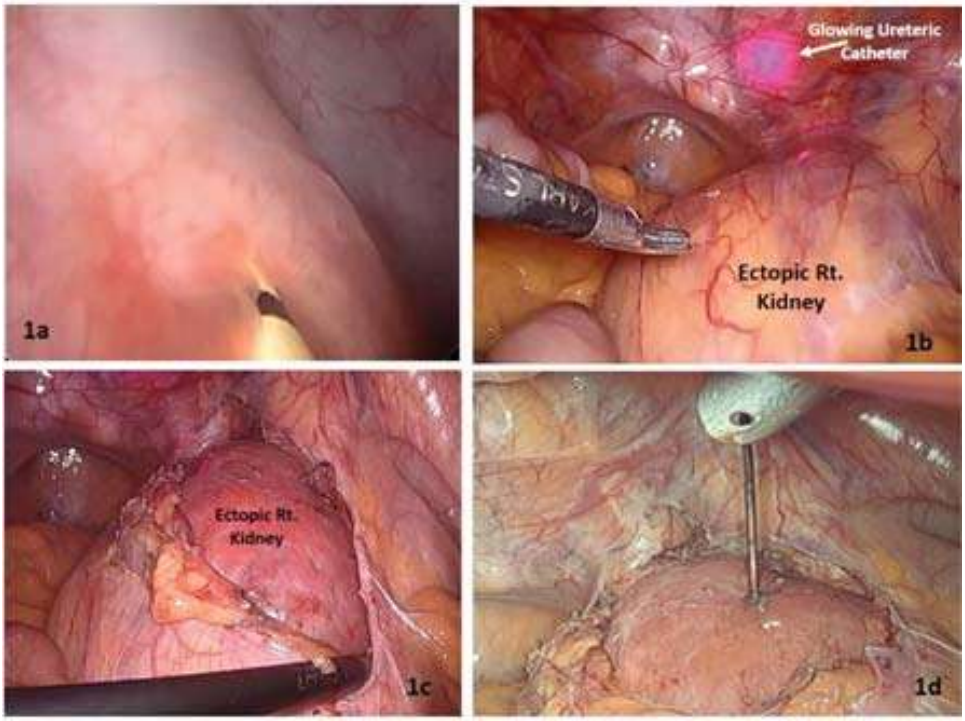

Fig. 1a: Cystoscopy performed and the 5Fr ureteric catheter inserted on the affected side for performing RGP.

1b. Laparoscopic view shows the renal bulge

1c. Minimal dissection carried out to expose the kidney

1d. Under fluoroscopic guidance an initial puncture needle introduced into the appropriate renal calyx.

using serial metal dilators (Fig. 2a). All steps were closely monitored by the laparoscopic camera as well as fluoroscopy. The 10 mm laparoscopic port was removed and replaced by a 18/28 Fr amplatz dilator and followed by a sheath (Fig. 2b). A 15/26 Fr nephroscope was used through this sheath and connected to a separate video monitor. The stones were identified and fragmented using a ballistic lithoclast. Stones that were not accessible were then extracted using a flexible scope and dormia basket until complete clearance was achieved (Fig. 2c). A double J ureteric stent was inserted in an antegrade fashion using fluoroscope guidance. The amplatz sheath was removed under laparoscopic guidance and the nephrostomy site on the renal parenchyma was closed using a 3/0 vicryl suture (Fig. 2d). The peritoneal collection of blood and fluid was sucked out and a drain placed through one of the ports. The ports were closed. The drain was removed after 24-48 hours, and the urethral catheter removed after 48 hours. Complications were classified according to the Clavien classification of surgical complications.

Results

During the study period Jan 2001 till Dec 2015 a total of 18 children (18 years of age) were treated for renal stones in an ectopic kidney (Fig. 3) at our hospital. Seven of these children had an associated UPJ obstruction and were treated with pyelolithotomy with dismembered pyeloplasty. Of the remaining 11 patients, five underwent laparoscopic pyelolithotomy, two underwent retrograde intra-renal ureteroscopy, and fragmentation of renal calculi, one underwent open pyelolithotomy and three others underwent laparoscopic assisted PCNL.

The mean age of the children who underwent laparoscopic assisted PCNL was 16 years. All the ectopic kidneys in these three children was on the right side. The mean operating time was 90 minutes and mean drop in hemoglobin was 0.1 gm%. The stone-free rate was 100%. The post-operative period was uneventful in all these three children. The mean hospital stay was 4 days. There were no post-operative complications noted in these three children. One child required shockwave lithotripsy (SWL) for a small 11 mm calculi on the opposite normal kidney.

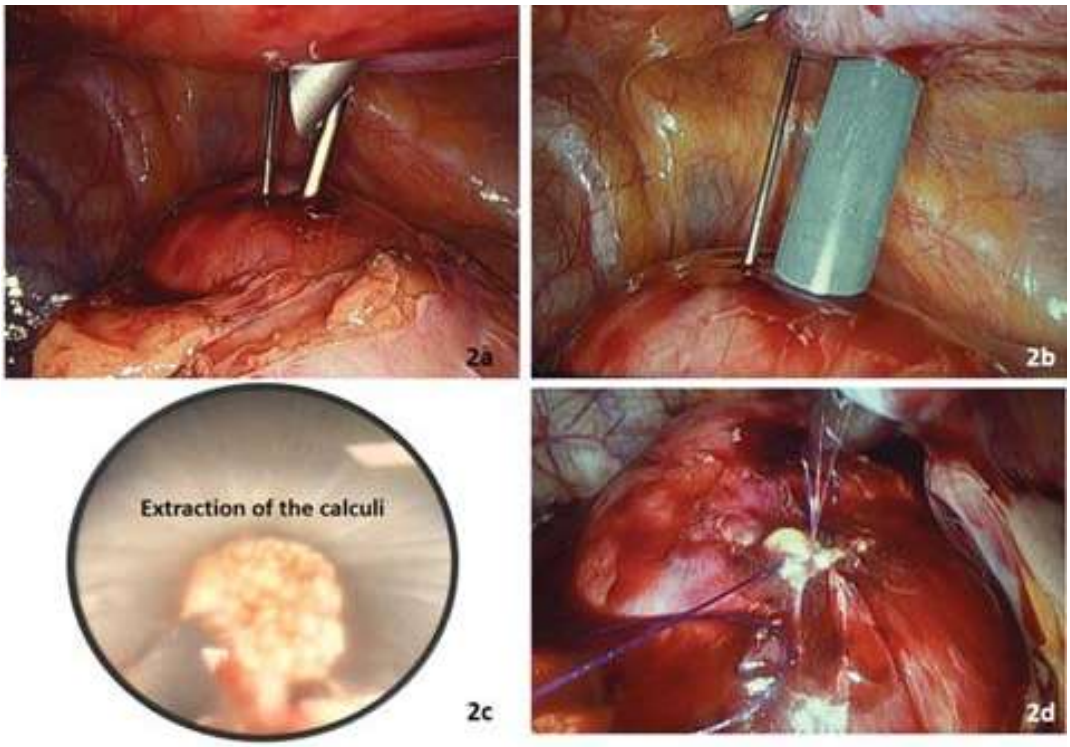

Fig. 2a: Over a guide wire the renal tract was established and dilated.
2b. Laparoscopic port replaced by an amplatz sheath.
2c. Stone being extracted.
2d. The site of nephrostomy being closed with a vicryl suture.

Fig. 3: CT scan showing a renal calculus in an ectopic kidney.

Discussion

Urinary stones within an ectopic or pelvic kidney pose a unique challenge to the Urologists. The treatment options include extracorporeal shockwave lithotripsy (SWL), percutaneous nephrolithotomy (PCNL), retrograde intrarenal surgery, laparoscopically assisted PCNL, laparoscopic pyelolithotomy, and open surgery. PCNL has been the most favored initial treatment option in the management of renal stones greater than 20 mm in size [5]. Conventional PCNL is not possible, Laparoscopic assisted PCNL through an anterior abdominal approach seems to be a reasonable option in these cases.

Goel *et al.* [6] reported on two patients presented with calculi in ectopic kidneys. Complete clearance of calculi was achieved by laparoscopic assisted PCNL. Similarly Hamdy *et al.* [7] reported on the combination of laparoscopy and nephroscopy in 11 patients with stones in pelvic ectopic kidneys. The mean operative time was 164 ± 30 minutes. There were neither complications nor conversions to open surgery. The stone-free rate was 91% (10 patients). One patient had a residual caliceal fragment that was treated with shockwave lithotripsy. The mean hospital stay was 3.5 ± 0.7 days.

Alternatively, laparoscopic retroperitoneal pyelolithotomy has been performed in a pelvic/ ectopic kidney [8,9]. The first laparoscopic pyelolithotomy was described by Chang and Dretller in 1996 [11]. Laparoscopic pyelolithotomy is claimed to be superior to percutaneous nephrolithotomy, as it appears to be more nephron sparing. In ectopic kidneys where the pelvis is likely to be more accessible, it is always better to go through the pelvis rather than the cortex [12].

Conclusion

Laparoscopic assisted PCNL is a safe, feasible and an effective option in the management of renal stones in an ectopic pelvic kidney.

Compliance with Ethical Standards

* Disclosure of potential conflicts of interest- Nil

* Informed consent- Yes

References

1. Shapiro E and Telegrafi S. Anomalies of the upper urinary tract. In Wein AJ, Kavoussi LR, Partin AW, Peters CA. Ed Campbell-Walsh Urology 11th rev. Philadelphia: Elsevier; 2016.p.2975.
2. Stevens AR. Pelvic single kidneys. J Urol. 1937; 37:610.
3. Benchekroun A, Kasmaoui EH, Jira H, *et al.* Pathological pelvic kidney. *Ann Urol* (Paris). 2002; 36:231–5.
4. Eshghi AM, Roth JS, Smith AD. Percutaneous transperitoneal approach to a pelvic kidney for endourological removal of staghorn calculus. *J Urol*. 1985;134:525-27.
5. Segura JW, Preminger GM, Assimos DG, *et al.* Nephrolithiasis Clinical Guidelines Panel summary report on the management of staghorn calculi. The American Urological Association Nephrolithiasis Clinical Guidelines Panel. *J Urol*. 1994;151:1648-51.
6. Goel R, Yadav R, Gupta NP, Aron M. Laparoscopic assisted percutaneous nephrolithotomy (PCNL) in ectopic kidneys: two different techniques. *Int Urol Nephrol*. 2006;38:75-8.
7. Hamdy A. El-Kappany, Ahmed R. *et al.* Combination of laparoscopy and nephroscopy for the treatment of stones in pelvic ectopic kidneys. *Journal of Endourology*. 2007;21:1131-36.
8. Nerli RB, Magadum PV, Pathade A, Patil SM, Mungarwadi A, Ghagane S, *et al.* Laparoscopic Pyelolithotomy in a Patient with Ectopic Kidney and Extrarenal Calyces. Urology, Nephrology and Andrology Int. 2016;1(2):71-73.

9. Harmon WJ, Kleer E, Segura JW. Laparoscopic pyelolithotomy for calculus removal in a pelvic kidney. *J Urol.* 1996;155:2019-20.
10. Chang TD, Dretller SP. Laparoscopic pyelolithotomy in an ectopic kidney. *J. Urol.* 1996;156:1753.
11. Kamat N and Khandelwal P. Laparoscopic pyelolithotomy: A technique for the management of stones in the ectopic pelvic kidney. *Int J Urol*. 2004;11:581-84.