Laparoscopic Nephrectomy for Renovascular Hypertension in a 6-Month-Old Infant

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ABSTRACT

Laparoscopic procedures continue to gain popularity over traditional open operations for a variety of abdominal and retroperitoneal surgical procedures. With regard to urological surgery, the first laparoscopic nephrectomy was performed in an adult in 1991. In the following years, the feasibility of laparoscopic management of pediatric urological disorders was described, and in 1992 the first laparoscopic nephrectomy in an 8-month-old infant with a multicystic dysplastic kidney was reported. We report the feasibility of laparoscopic nephrectomy for the management of renovascular hypertension in a 6-month-old infant with a dysplastic left kidney.

Key Words: Nephrectomy, Laparoscopic, Infant, Renovascular hypertension.

INTRODUCTION

The first successful minimally invasive surgical nephrectomy was reported in an adult patient by Clayman et al.1 Since that report, the feasibility of laparoscopic management of urological diseases has been described in children including laparoscopic nephrectomy. In 1992, Koyle et al2 reported an 8-month-old infant with a large multicystic dysplastic kidney treated by laparoscopic nephrectomy. To our knowledge, the case report here is the first report of a laparoscopic nephrectomy in the management of an infant with renovascular hypertension secondary to a small dysplastic left kidney. This case supports the use of laparoscopic nephrectomy as an effective and safe treatment modality in pediatric surgery.

CASE REPORT

The patient was a 6-month-old male referred to our institution for assessment of severe renovascular hypertension secondary to a hypoplastic/dysplastic left kidney. The patient was born prematurely at 32 weeks and required captopril 1 mL 3 times a day to manage his hypertension since birth. His workup included a renal perfusion scan and aortogram that confirmed the presence of a left hypoplastic left kidney with minimal function and 2 small hypoplastic renal arteries. The right kidney was normal. Ultrasound examinations at 1 and 3 months of age revealed a progressive decrease in size of the left dysplastic kidney with decreased blood flow. The ultrasound examination of the right kidney and serum creatine were normal. Because of the infants worsening renovascular hypertension despite drug therapy, left nephrectomy was recommended.

Operative Technique

The patient, while under general anesthesia, was placed in a partial right lateral decubitus position. A small umbilical incision was made through which a 5-mm Step trocar (Innerdyne, Salt Lake City, Utah) was placed and pneumoperitoneum was established with carbon dioxide. The pressure limit was set at 6 mm Hg. A 30-degree angled laparoscope was introduced, and visualization of the peritoneal cavity did not reveal any visceral abnor-
Ehrlich et al reported an initial case series of 17 children aged 4 months to 11 years who underwent transperitoneal laparoscopic renal surgeries including giant renal cyst excision, as well as partial and complete nephrectomy. In 6 cases, a laparoscopic nephrectomy was performed for large symptomatic multicystic kidneys (average age 7 months) in addition to an 11-month-old child with poorly controlled diastolic hypertension from a dysplastic kidney.

As the popularity of laparoscopic renal surgery expands, the surgical approaches to laparoscopic nephrectomy have included the utilization of retroperitoneoscopic techniques. In a review by Valla et al, laparoscopic renal surgery was reported to have been performed in 18 children (3 months to 14 years) by using a retroperitoneal approach for multicystic dysplastic kidneys and obstructive uropathy. The technique of retroperitoneal laparoscopic nephrectomy involved placing the patient in a lateral kidney position, a 1.5-cm incision at the lower border of the 12th rib in the midaxillary line, blunt dissection of musculature and placement of the first trocar (10, 8, or 5 mm). Insufflation and dissection between the renal capsule and perinephric fat progressed until the poles and posterior surface of the kidney were freed. Additional ports (10, 5, or 3 mm) were placed and the nephrectomy was performed. Only 1 case was converted to an open procedure due to a missed upper pole vessel and subsequent repair of a small duodenal perforation. In 1999, Borer et al published a report describing successful modifications of retroperitoneal laparoscopic renal surgery in 14 children. Modifications included the prone patient position; the number, site, and technique of trocar placement; an inflatable dissecting device; and use of 2-mm instrumentation. No major complications occurred. These studies demonstrate ongoing efforts by surgeons to optimize retroperitoneal laparoscopic renal surgery in the pediatric population.

**DISCUSSION**

Laparoscopy continues to gain widespread applicability in managing common abdominal and pelvic surgical disorders. Laparoscopic surgery in children has proved beneficial in comparison with the traditional open operations evident by reduced hospitalization, decreased time to full recovery, and better cosmetic results. In 1991, Clayman performed the first successful laparoscopic nephrectomy in an adult. The following year, Koyle et al performed a laparoscopic nephrectomy on an 8-month-old boy for an asymptomatic multicystic dysplastic right kidney. The first published report of laparoscopic nephrectomy by Ehrlich in 1992 further demonstrated the technical feasibility of laparoscopy in renal surgery in a child. In 1994, Ehrlich et al reported an initial case series of 17 children aged 4 months to 11 years who underwent transperitoneal laparoscopic renal surgeries including giant renal cyst excision, as well as partial and complete nephrectomy. In 6 cases, a laparoscopic nephrectomy was performed for large symptomatic multicystic kidneys (average age 7 months) in addition to an 11-month-old child with poorly controlled diastolic hypertension from a dysplastic kidney.

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**CONCLUSION**

Laparoscopic nephrectomy is emerging as an alternative to the open surgical procedure. In the current report, a 6-month-old infant underwent laparoscopic nephrectomy with a transperitoneal approach for the management of severe renovascular hypertension. Postoperative pain was minimal and the patient was discharged within 24 hours. Reports such as this one demonstrate that laparoscopic nephrectomy in children is technically feasible, safe, allows for reduced hospital stay and time to recovery, and has excellent cosmetic results. Reported complications of laparoscopic nephrectomy in children include retroperitoneal hematoma, duodenal perforation, colonic...
serosa tears, and incisional hernia. Potential complications include vascular/visceral injury, intestinal adhesions, and omental evisceration. While the popularity of laparoscopic nephrectomy increases, the indications for surgery as well as the standardization of the surgical technique warrant scrutiny. Large comparative studies are not yet available due to the limited number of cases. As illustrated by this case, laparoscopic nephrectomy can be safely performed in young infants with excellent results.

References:

1. Clayman RV, Kavoussi LR, Soper NJ, et al. Laparoscopic nephrectomy: Initial case report. J Urol. 1991;146:278-282.

2. Koyle MA, Woo HH, Kavoussi LR. Laparoscopic nephrectomy in the first year of life. J Pediatr Surg. 1993;28:693-695.

3. Georgeson K. Laparoscopic gastrostomy and fundoplication. Pediatr Ann. 1993;18:192-196.

4. Ehrlich RM, Gershman A, Fuchs G. Laparoscopic nephrectomy in a child: expanding horizons for laparoscopy in pediatric urology. J Endourol. 1992;6:463-465.

5. Ehrlich RM, Gershman A, Fuchs G. Laparoscopic renal surgery in children. J Urol. 1994;151:735-739.

6. Valla JS, Guilloneau B, Montupet P, et al. Retroperitoneal laparoscopic nephrectomy in children. Preliminary report of 18 cases. Eur Urol. 1996;30:490-493.

7. Borer JG, Cisek I, Atala A, et al. Pediatric retroperitoneoscopic nephrectomy using 2-mm instrumentation. J Urol. 1999;162:1725-1730.

8. Kobashi KC, Chamberlin DA, Rajpoot D, et al. Retroperitoneonal laparoscopic nephrectomy in children. J Urol. 1998;160:1142-1144.

9. Hamilton BD, Gatti JM, Cartwright PC, et al. Comparison of laparoscopic versus open nephrectomy in the pediatric population. J Urol. 2000;163:937-939.

10. Gillick JMD, Nicholas JL, Fitzgerald RJ. Pediatric laparoscopic nephrectomy: Review of 5 years’ experience at three centers. J Pediatr Endosurg Innov Tech. 2000;4:237-241.