

Case Report

Laparoscopic Bilateral Hand-Assisted Nephrectomy

End-Stage Renal Disease From Tuberculosis, An Unusual Indication for Nephrectomy Before Transplantation

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Summary: The purpose of the study was to sterilize renal tuberculous foci in a pretransplantation patient with a laparoscopic hand-assisted approach and to verify the feasibility of bilateral nephrectomy for this indication. This case report is the first description of hand-assisted laparoscopic bilateral nephrectomy for this pathologic condition. The 33-year-old patient had end-stage renal disease from renal tuberculosis. A commercially available hand-assistance device was used through a midline 8-cm supraumbilical incision and with four ports. The procedure was successfully completed. The total operative time was 3 hours and 40 minutes. Estimated blood loss was 250 mL. The postoperative course was uneventful, and clinical follow-up at 3 weeks revealed a successful outcome. Hand-assisted bilateral laparoscopic nephrectomy in patients with chronic renal failure from tuberculosis represents a viable option because it is feasible and effective. The hand-assisted approach increases the safety of the procedure while retaining all the advantages of minimally invasive surgery. **Key Words:** Kidney—Laparoscopy—Nephrectomy—Tuberculosis.

Genitourinary tuberculosis accounts for 14% of the extrapulmonary localizations of the disease. In the Western world, a genitourinary disease occurs in only 8% to 10% of patients with pulmonary tuberculosis, but this percentage increases to 15% to 20% in developing countries (1).

Dormant mycobacteria can survive inside macrophage cells even after efficient antibiotic therapy. Reactivation of the disease can occur several years after the primary infection (2) in favorable circumstances such as concur-

rent debilitating disease, trauma, diabetes, or corticosteroid and immunosuppressive therapy.

Nephrectomy has the advantage of sterilizing mycobacterial foci at risk for reactivation after kidney transplantation and treating the associated hypertensive disease. Bilateral laparoscopic nephrectomy has proved to be an effective alternative to open surgery (3). However, because laparoscopic nephrectomy is technically demanding, the operative time is prolonged even in experienced hands, and bilateral laparoscopic nephrectomy is far from becoming a routine procedure.

The recent advent of the laparoscopic hand-assistance device has greatly facilitated ablative laparoscopic renal surgery (4,5). Hand-assisted laparoscopic nephrectomy was initially reported in 1996 by Bannenburg et al., who used a porcine model (6). In 1997 Keeley et al. described clinical hand-assisted laparoscopic nephroureterectomy (7). Subsequently, numerous reports of success with the

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hand-assisted approach to laparoscopic renal surgery have been published (8–10). Using this technique, surgeons can maintain tactile sensation and the ability to proceed with rapid blunt dissection, while simultaneously softening the transition from open to standard laparoscopic surgery.

We report our initial experience with bilateral hand-assisted nephrectomy for renal tuberculosis in a young dialysis patient who was a candidate for transplantation.

CASE REPORT

In 1999, a 33-year-old woman was referred to our transplantation center because of chronic renal failure due to renal tuberculosis diagnosed at biopsy in 1995. Infection resolved after 2 years of antibiotic therapy, but unfortunately the patient had to undergo hemodialysis because of developing end-stage renal disease, characterized by severe hypertension and anemia. Her serum creatinine level at admission was 8.2 mg/dL.

Because of the possible risks connected with persistence of infectious foci of *Mycobacterium tuberculosis* in the renal parenchyma, performance of a bilateral nephrectomy before transplantation was recommended.

A preoperative radiologic evaluation by means of magnetic resonance imaging showed markedly decreased flow in the renal arteries, and computed tomography showed two small kidneys without signs of perirenal fat involvement.

After induction of general anesthesia, the patient was put in a supine position with inflatable cuffs placed beneath each side of the back. Alternatively inflating the cuffs and rotating the operating table yielded a 60° tilt.

The port placements for the entire procedure are shown in Fig. 1. Pneumoperitoneum was achieved through an 8-cm supraumbilical midline incision. The template was placed on the skin overlying the incision and an Intromit (Applied Medical, Santa Margarita, CA, USA) hand-assistance device was then inserted.

After insufflation, the surgeon's right arm was placed intra-abdominally for the right nephrectomy. After mobilization of the right colonic flexure, the atrophic kidney could be easily identified by manual palpation. Gentle manual retraction of the kidney facilitated laparoscopic dissection with scissors or a hook. Comparable to open surgery, digital dissection was used to free the kidney from the surrounding structures. The renal hilum was identified by digital palpation, and the renal vessels and the ureter were isolated after careful dissection.

Four clips were placed on the renal artery before division.

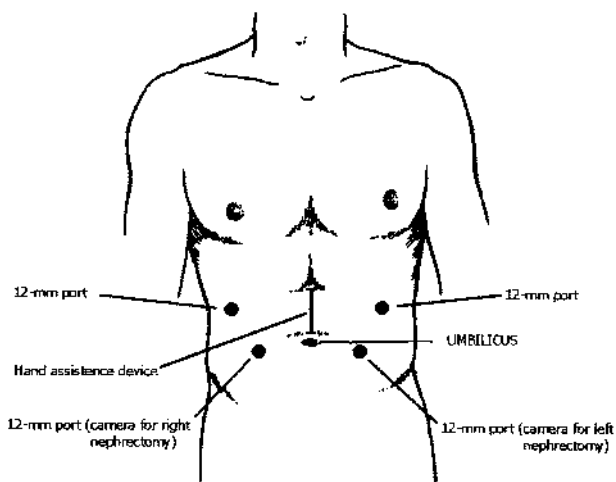


FIG. 1. Trocar positioning for laparoscopic hand-assisted nephrectomy.

An EndoGIA vascular load stapler (United States Surgical Corp., Norwalk, CT, USA) was used to occlude and divide the renal vein. The kidney was then retrieved manually through the midline incision after the section of the ureter between clips. The operating table was then rotated to elevate the left side, and the cuff on this side was inflated.

The surgeon used the left hand as a dissector/blunt retractor and the right hand to control the laparoscopic electro-surgical instruments.

The splenocolic ligament was incised with electrocautery. Kidney dissection was continued by incision of Gerota's fascia. The renal artery was dissected, clipped, and cut. The renal vein was secured with the stapler. The ureter was secured with clips and cut. The specimen was then removed via the hand port.

After removing the hand port device, the midline incision and the four trocar sites were closed. Two abdominal drainages were left in contact with the retroperitoneal tissues and removed on day 2.

The total operative time was 3 hours and 40 minutes, with right and left nephrectomy requiring 80 and 70 minutes, respectively. Estimated blood loss was 250 mL.

Hemodialysis began the day after surgery. The postoperative course was uneventful. The patient required postoperatively a total of 10 mg morphine sulphate and received one blood transfusion on day 4 because the hemoglobin value was 7.6 g/L, in comparison with the preoperative value of 10.3 g/L.

The patient was discharged to home on postoperative day 8. Histological examination of the specimens showed the presence of fibrous tissue alternated with tubercles and typical granulomas with the classic features of secondary tuberculosis.

Clinical follow-up at 3 weeks revealed a successful outcome, with uncomplicated wound healing and no need for pain treatment.

DISCUSSION

The indication for nephrectomy in genitourinary tuberculosis is a nonfunctioning kidney, accompanied by hypertension and pelviureteral obstruction. Asymptomatic patients with sterile urinary culture could still have some foci of dormant mycobacteria. In fact, Osterhage et al. (11), investigating the activity of *M. tuberculosis* after efficient chemotherapy on the basis of histologic findings after nephrectomy, retrieved active tuberculosis in 50% of the patients despite stable sterility of the urine in culture.

In this case nephrectomy offered the advantage of sterilizing mycobacterial foci at risk for reactivation after kidney transplantation and treating the associated hypertensive disease.

Twenty years ago open bilateral nephrectomy before planned renal transplantation was associated with significant mortality and morbidity. Viner (12) and Yarimizu (13) reported mortality rates of 4% and 3.6% and morbidity rates of 18% and 40%, respectively. More recently and after the advent of laparoscopy, Fornara et al. (3) compared the results of patients undergoing bilateral laparoscopic and open nephrectomy. The complication rates in the laparoscopic and open surgery groups were 27% and 20%, respectively, but the patients in the laparoscopy group benefited from rapid oral intake, decreased use of analgesics, shorter hospital stays, and earlier return to normal activities.

The hand-assisted approach is recent and seems to shorten the learning curve in laparoscopic renal surgery procedures. Compared with standard laparoscopic techniques, hand assistance appears to facilitate the operative speed and safety of the procedures without sacrificing the benefits of minimally invasive surgery (4,10).

Several devices are available for hand-assisted laparoscopy. In our case we used the Intromit hand-assistance device. It consists of an intraperitoneal ring with an attached valve mechanism and an outer plastic flange that adheres to the patient's skin with an adhesive.

We found the use of Intromit very simple because the device does not require a specific sleeve or an additional glove, enabling the surgeon to freely introduce and remove either hand. The only disadvantage is the big diameter of the outer plastic flange, which could interfere with trocar positioning.

With the hand-assistance device the operative time of bilateral nephrectomy is less than or equal to that of

single nephrectomy without hand assistance (14). However, it requires operators to be functionally ambidextrous because fine dissection is performed with the left hand on one side and the right hand on the other side.

Our operative time of 220 minutes is similar to the usual times described in literature. As reported by Chueh et al. (15), we used a system of inflatable cuffs placed beneath each side of the patient's back, enabling us to keep a clear operative field for the whole procedure and to eliminate time loss in repositioning the patient.

The tubercular kidneys required careful dissection because of the presence of dense fibrotic adhesions, but their manipulation was easy because they were small.

Like Kim et al. (16), we demonstrated that the presence of tubercular kidneys is no longer a relative contraindication for laparoscopic nephrectomy.

Concerning the technical aspects of the operation, we found that the advantages of hand assistance include the regaining of tactile feedback, enabling digital retraction and dissection of the kidney and palpation of the renal vessels. It also increases the safety of the procedure because it enables the surgeon to rapidly identify vascular structures and, in the case of accidental bleeding, allows immediate hemostatic control by digital compression.

The perioperative blood loss in our case was 250 mL, comparable to that noted in other reports showing that there is no significant difference between open and laparoscopic hand-assisted approaches (12).

Laparoscopic nephrectomy in dialysis patients requires a higher transfusion rate than in nondialysis patients. This is due to a lower preoperative hemoglobin concentration and is not aggravated by effects of the clotting system that are possible in patients with chronic uremia (17). Nevertheless, some authors advocate the use of heparin-free dialysis, at least in the postoperative period, to reduce the risk of bleeding (18). Our patient required a blood transfusion, but the preoperative hemoglobin value was 10.3 g/L.

CONCLUSION

With the advent of hand-assistance devices, laparoscopic bilateral nephrectomy is feasible. Renal tuberculosis does not represent a contraindication to the procedure. Hand assistance appears to facilitate the operative speed and safety of laparoscopic nephrectomy, retaining all the advantages of minimally invasive surgery.

Dialysis patients waiting for kidney transplantation can now greatly benefit from this approach.

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