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Original article

Efficacy of the intracorporeal one-hand tie technique for renal pedicle control during hand-assisted retroperitoneoscopic nephroureterectomy

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ABSTRACT

Objective: This study examined the efficacy of the intracorporeal one-hand tie technique for renal pedicle control during hand-assisted retroperitoneoscopic nephroureterectomy (HARN).
Methods: The intracorporeal one-hand tie technique was conducted in 32 consecutive patients with upper tract urothelial cancer that underwent HARN and open bladder cuff excision.
Results: All suture ligatures were successful in securing the renal vessels, except one minor venous bleeding that occurred during vessel transection, which was then controlled by additional clips. The process of controlling the renal pedicle took an average of 12.4 minutes (range, 8–30 minutes). No pedicle control related morbidities were noted. By sparing the usage of endovascular clips and staplers, operative costs were reduced and associated malfunctions eliminated.
Conclusion: The intracorporeal one-hand tie technique is an easy, reliable, and cost-effective method in controlling the renal pedicle during HARN. Its efficacy in pedicle control is beyond doubt.

1. Introduction

Renal pedicle control is the most crucial step in both open and laparoscopic nephrectomy. A pedicle injury may result in massive blood loss and open conversion. Common laparoscopic devices used in securing the renal pedicle include the endovascular gastrointestinal anastomosis stapler (Endo-GIAs), traditional titanium clips, and nonabsorbable polymer ligating clips (Hem-o-lok; Weck Closure Systems, Research Triangle Park, NC, USA). Unfortunately these devices are not only expensive, but may also malfunction when used to secure the renal pedicle in laparoscopic nephrectomy.[1–3]

To avoid these disadvantages, a simple, cost-effective renal pedicle ligation technique (the intracorporeal one-hand tie technique) has been developed.[4] To further assess the performance of this technique, we examined its efficacy in 32 consecutive patients who underwent HARN.

2. Materials and methods

The intracorporeal one-hand tie technique for renal pedicle ligation was conducted in 32 consecutive patients with upper tract urothelial cancer who underwent HARN and open bladder cuff excision, including 12 men and 20 women. Average patient age was 65.7 years (range, 52–93 years), average height was 157.3 cm (range, 138–173 cm), average weight was 60.4 kg (range, 34–104 kg), and average body mass index ± standard deviation was 24.1 ± 4.0 kg/m^2 (range, 16.7–36.5 kg/m^2). Patients with kidneys densely adherent to adjacent structures on preoperative imaging were not considered candidates for laparoscopic surgery.

Gross hematuria was the cardinal symptom in 26 patients. Other associated symptoms included four patients with flank pain or soreness, and two incidental finding of hydronephrosis. Tumors were found in the left upper urinary tract in 18 patients and in the right upper urinary tract in 14 patients.

The patient was placed in a supine position with legs extended and abducted (45–60°) under general anesthesia.[5] Three incisions were made, including a lower abdomen oblique Gibson incision for the hand port and two small incisions of different sizes at the umbilical level, of which one was located at the posterior axillary line and one just lateral to the peritoneal reflection. Through the

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Gibson incision, the peritoneum and retroperitoneal fat was bluntly detached from the abdominal wall until a retroperitoneal space was created under the first trocar site at the umbilical level of the posterior axillary line. Under hand guidance in the retroperitoneal cavity, the first trocar was inserted through the incision at the planned site. A GelPort hand port device was placed into the Gibson incision (Applied Medical, Rancho Santa Margarita, CA). Pneumoretroperitoneum was created at 15 mmHg carbon dioxide. Under this pressure, the peritoneum was further detached from the abdominal wall and a retroperitoneal space was created for laparoscopic surgery. A 10-mm 0° laparoscope was inserted through the trocar. The peritoneal reflection was identified. Under this pressure, the peritoneum was pushed medially spontaneously without blunt dissection. The second trocar was inserted into the retroperitoneal space under hand and laparoscope guidance. The laparoscope and operative instrument were inserted into separate trocars. After the kidney was palpated, the ureter was identified and traced upwards to the renal pedicle, and adjacent tissue of the renal vessels was dissected. The renal vessel was singled out and elevated by the tip of the index finger (of the nondominant hand with the palm facing upward) with the tip of the finger protruding 1 cm above the renal vessel. One end of a 45-cm 2-0 silk suture was introduced from the laparoscopic port and brought to loop around the tip of the index finger with an endoforceps. A series of maneuvers were then made. First, the hand was pronated to hook the suture line by the index finger. Then the hand was retracted toward the surgeon so the renal vessel alone was encircled by the suture line. The intra-abdominal end of the suture line was then grasped by the thumb and the index finger. The opposite end of the suture line was held extracorporeally with the dominant hand, and the one-hand tie technique was performed (in a similar way to an open procedure) with the intra-abdominal end (Fig. 1). The knot was pushed upon the renal vessel by the intra-abdominal index finger, and both ends of the suture line were tightened to create equal tension on the knot (Fig. 2). Four three-throw square knots were done to secure the renal vessel ligation (3 were placed proximally, 1 distally) prior to division. After the renal vein and artery were ligated, the artery and vein were transected between the proximal and distal ligatures with an endoscissors. After the renal pedicle was controlled, the upper kidney pole was dissected and the adrenal gland was spared. The remaining renal attachment was then dissected and the kidney and

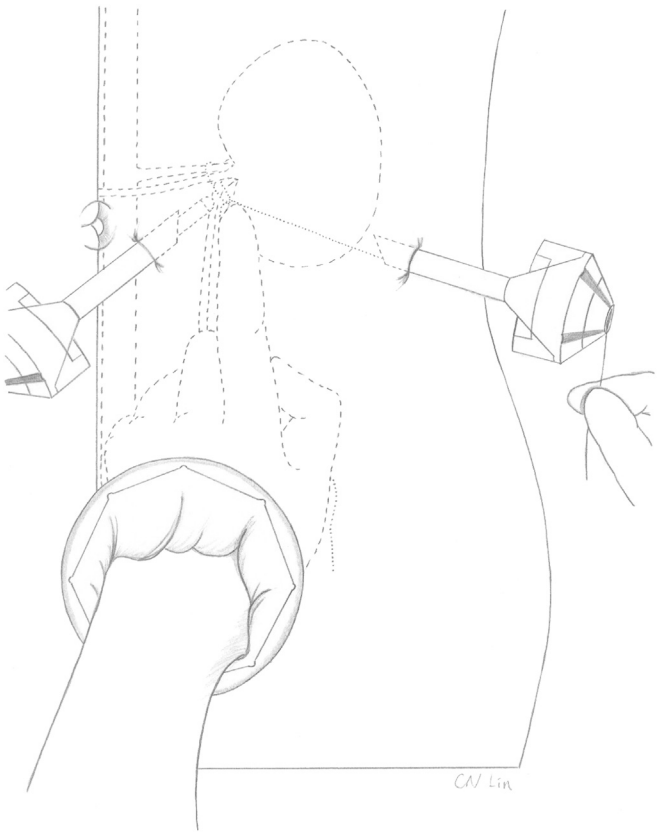

Fig. 2. Creation of one-hand tied suture ligation.

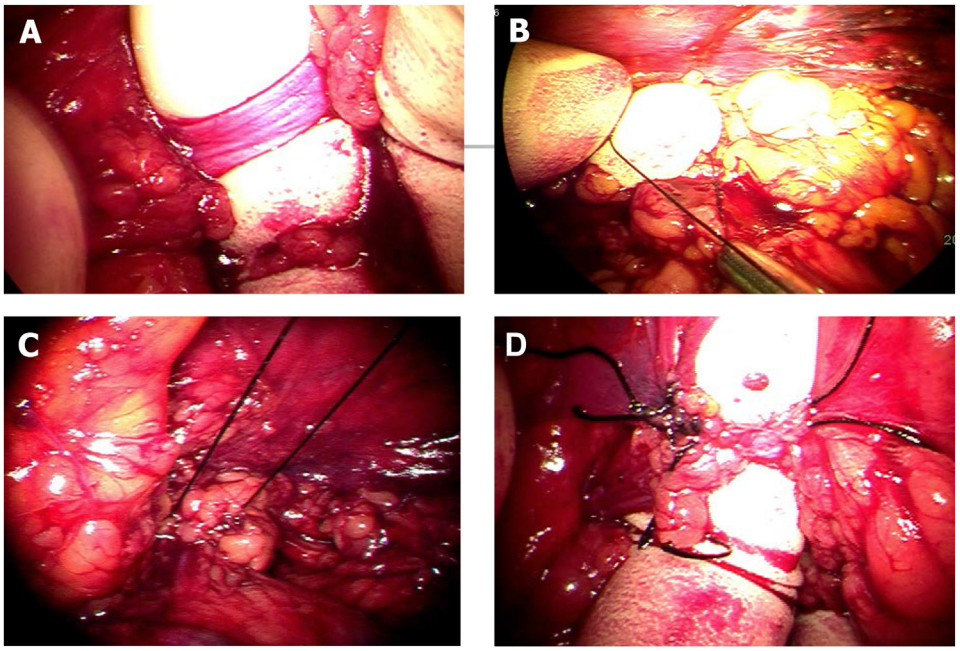

Fig. 1. (A) The renal vessel (vein) looped posterior by the index finger. (B) One end of a 2-0 silk suture is fed to the index finger through the trocar with endoforceps to form a loop on the index finger. (C) The renal vessel is encircled with the suture posterior. (D) Repeat three knots per silk suture and a total of four sutures to secure the vessel (artery; 3 proximal and 1 distal).