

CASE REPORT

Failure of Hem-o-lok clips used on a renal artery after laparoscopic renal surgery

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Abstract : Hem-o-lok clips are commonly used for renal artery ligation in laparoscopic renal surgery. However, failure of the renal artery ligation clips is potentially fatal. A 61-year-old man underwent hand-assisted laparoscopic nephroureterectomy using a retroperitoneal approach for left ureteral carcinoma. One hour postoperatively, he was diagnosed with hemorrhagic shock. An immediate laparotomy revealed two closed, undamaged Hem-o-lok clips around the left renal artery. Pulsatile bleeding was observed, and the renal artery was immediately ligated with non-absorbable thread. We determined that the failure of the Hem-o-lok clips on the renal artery was caused by the lack of space between the two Hem-o-lok clips and the distal renal artery cuff beyond the distal clip. To prevent a potentially fatal failure of the renal artery ligation clips, one should maintain a sufficient space between the Hem-o-lok clips and an adequate distal renal artery cuff beyond the distal clip. *J. Med. Invest.* 68:393-395, August, 2021

Keywords : Hem-o-lok clip, laparoscopic renal surgery, renal artery

INTRODUCTION

Hem-o-lok clips are commonly used to ligate the renal artery in laparoscopic renal surgery (1). However, the FDA reported in 2006 that Hem-o-lok clips may become dislodged following ligation of the renal artery after laparoscopic donor nephrectomy (LDN). Hem-o-lok clips are now contraindicated for use in ligating the renal artery during laparoscopic nephrectomies in living donor patients because of the hemorrhagic deaths of several living kidney donors owing to failure of Hem-o-lok ligating clips used on the renal artery (2, 3). In LDN, surgeons need to harvest the longest possible segment of renal artery, a factor which might be related to the failure of Hem-o-lok ligation clips used on the renal artery. Here, we present a case from 20 years ago involving a patient who survived failure of Hem-o-lok clips used on the renal artery after laparoscopic nephroureterectomy (LNU). This case is reported to warn surgeons about the proper use of Hem-o-lok clips in laparoscopic renal surgery.

CASE REPORT

A 61-year-old man (weight, 58.6 kg ; height, 158 cm) was diagnosed with left ureteral carcinoma, cT1N0M0. He had a history of hypertension and normal preoperative laboratory values. He underwent hand-assisted LNU using a retroperitoneal approach with a 3-port (hand port, laparoscope, and instrument trocar) approach. The two renal arteries and one renal vein were ligated using Hem-o-lok clips. First, two Hem-o-lok clips were applied to the patient side and one Hem-o-lok clip was applied to the kidney side of these vessels. The vessels were then transected

using surgical scissors. Because one of the two renal arteries was behind the renal vein, only one XL Hem-o-lok clip was applied to this artery, and the vein was then transected. After transecting the renal vein, the renal artery was dissected to a sufficient length to apply three XL Hem-o-lok clips. Three XL Hem-o-lok clips were tightly applied to the renal artery, and the artery was transected (Fig. 1). After releasing the kidney, the incision of the hand port was extended toward the lower abdomen, and the left ureter and bladder cuff were removed. Two information drains were placed in the retroperitoneal cavity. All surgical procedures were performed in the retroperitoneal cavity and were completed without any intraoperative complications. The operating time was 260 min. The estimated blood loss was 240 mL. One hour after the operation, 1,200 mL of blood was suddenly discharged from the drain placed in the Retzius cavity. The other drain, placed in the retroperitoneal cavity, was occluded. The patient's systolic blood pressure dropped to 80 mmHg. Due to the reddish color of blood from the drain, he was diagnosed with hemorrhagic shock due to failure of Hem-o-lok clips on the artery. The drains were immediately clamped, the patient was transported to the operating room, and a laparotomy was performed using the retroperitoneal approach with a flank incision in the lateral decubitus position. Two closed, undamaged XL Hem-o-lok clips and a large hematoma were found around the left renal artery and were removed. Pulsatile bleeding was observed in one of the left renal arteries transected after transecting the renal vein. The two XL Hem-o-lok clips were removed from the renal artery. The renal artery was immediately ligated with a non-absorbable thread. Two ligatures with non-absorbable threads and one penetrating ligature with a non-absorbable thread were added to the renal artery to prevent postoperative bleeding. No other bleeding events were observed. The time from the confirmation of postoperative bleeding to ligation of the bleeding renal artery was 165 min. A total of 12 units of red cell concentrate and 6 units of fresh frozen plasma were required for transfusion. The patient was discharged 14 days after surgery.

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DISCUSSION

In laparoscopic surgery, failure of the ligating clips used on the renal artery is potentially fatal (2). The Japanese Society of Endourology recommends maintaining a sufficient space between Hem-o-lok clips used on the renal artery (4). The artery between the two clips serves as a cushioning material, and the clips are much less likely to slip out. Tereflex Medical's instructions clearly state, "In procedures other than laparoscopic donor nephrectomy, Teleflex Medical recommends ligation of the renal artery with more than one clip on the patient side with a minimum distal renal artery cuff of 2-3 mm beyond the distal clip. (5)" In the case presented, the cause of failure of the Hem-o-lok clips on the renal artery was the lack of space between the two clips and the lack of a distal renal artery cuff beyond the distal clip (Fig. 1). Because the retroperitoneal approach was used in this case, the tamponade effect from the localized retroperitoneal cavity prevented continuous heavy bleeding. Fortunately, the patient survived. However, when the same events occur in patients after laparoscopic renal surgery using the transperitoneal approach, the result is likely fatal. Based on our experience with this case,

we recognized the importance of maintaining sufficient space between the Hem-o-lok clips used on the renal artery and leaving a distal renal artery cuff of more than 2 mm beyond the distal clip. To avoid potentially fatal consequences, our current practice is to apply three Hem-o-lok clips on the patient side of the renal artery, when maintaining sufficient space between the Hem-o-lok clips used on the renal artery and leaving a distal renal artery cuff of more than 2 mm beyond the distal clip are possible (Fig. 2). In the 20 years since this case, we have had no further cases of postoperative bleeding from the renal artery.

In laparoscopic renal surgery excluding LDN, it is important to maintain a sufficient space between Hem-o-lok clips used on the renal artery and a distal renal artery cuff of more than 2 mm beyond the distal clip to avoid failure of the ligating clips used on the renal artery. A sufficient length of the renal artery should also be dissected for such procedures.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

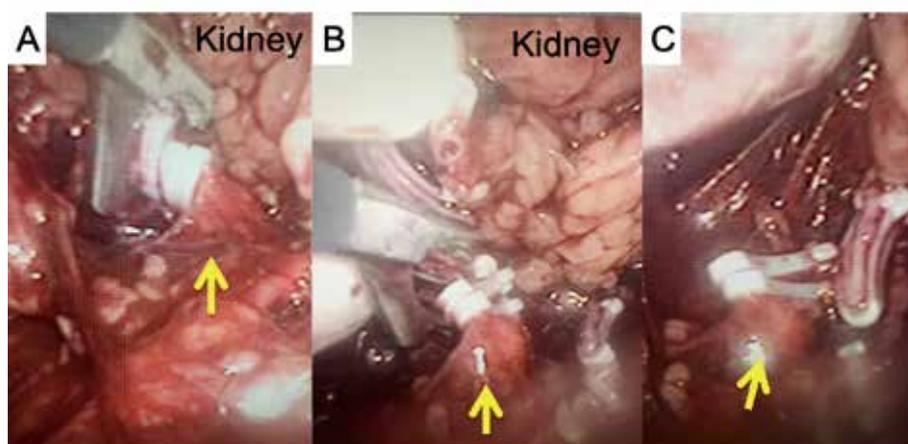


Figure 1. The procedure of transecting the renal artery in the presented case
Yellow arrows show the renal artery.
A. Three Hem-o-lok clips are applied to the renal artery without sufficient space.
B. The renal artery is transected without a distal renal artery cuff beyond the distal clip.
C. Two Hem-o-lok clips are placed on the patient side of the renal artery.

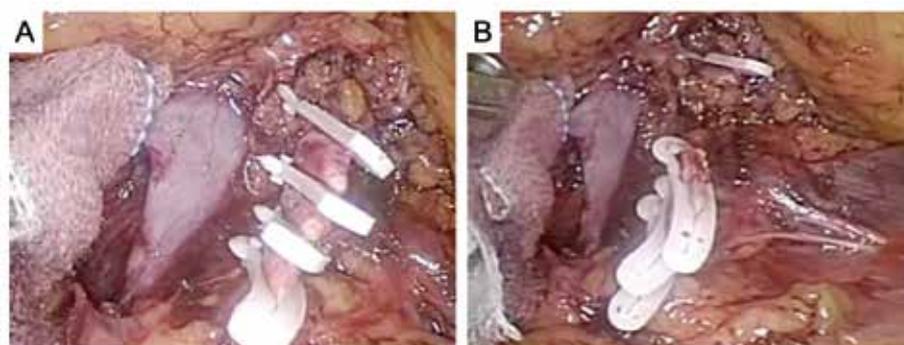


Figure 2. The current procedure for transecting the renal artery in our institution
A. Three Hem-o-lok clips are applied on the patient side of the renal artery.
B. The renal artery is transected with a minimum distal renal artery cuff of 2-3 mm beyond the distal clip.

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