

Computed Tomography Appearance of Hem-O-Lok Clips in Patients Who Have Undergone Laparoscopic Nephrectomy or Nephroureterectomy

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ABSTRACT

Background and Objectives: Hem-o-lok clips are safe and reliable for controlling the renal vasculature. We retrospectively evaluated the CT appearance of Hem-o-lok clips in patients who had undergone laparoscopic radical nephrectomy (LRN) or nephroureterectomy (LRU) as well as their appearance on ex vivo CT scans.

Methods: Between January 2006 and December 2006, 19 patients underwent LRN or LRU, and their CT images were reviewed within 5 postoperative months. The Hem-o-lok clips were radiopaque in all of the patients' CT images, and their radiodensity value was 222 Hounsfield Units (HU). To confirm that Hem-o-lok clips are radiopaque on CT images, an ex vivo CT scan was performed.

Results: We confirmed that these clips are radiopaque on CT images and that they have a radiodensity of 223 HU.

Conclusion: We conclude that the Hem-o-lok clips are radiopaque on CT images. It is important for urologists and radiologists to be aware of the CT appearance of Hem-o-lok clips when following up patients who have undergone LRN or LRU.

Key Words: Computed tomography, Hem-o-lok, Laparoscopic surgery, Nephrectomy, Nephroureterectomy.

INTRODUCTION

Recently, significant progress has been made in the surgical techniques used to treat both benign and malignant diseases due to the worldwide acceptance of laparoscopic surgery. Laparoscopic radical nephrectomy (LRN) is a valid option for malignant diseases of the kidney.¹ One crucial step in LRN is obtaining control of the renal vasculature. Although multiple devices have been created to make the procedure easier, the Weck Closure System (Hem-o-lok) has been shown to be a reliable and economical device for obtaining vascular control in LRN.² Hem-o-lok clips are nonabsorbable locking clips with a curved design, which allows expansion in thicker tissue and increases their closing strength in thinner tissue.² Although multiple publications have attested to the safety and feasibility of using Hem-o-lok clips for laparoscopic nephrectomy,²⁻⁴ there are few reports about the radiographic appearance of the clips, and the few reports that do exist have produced differing results.^{2,5,6} We should be aware of the computed tomography (CT) appearance of Hem-o-lok clips when following up patients who have undergone LRN or laparoscopic radical nephroureterectomy (LRU). Herein, we investigate the CT appearance of Hem-o-lok clips in patients who had undergone LRN and LRU in retrospective and ex vivo studies.

MATERIALS AND METHODS

Nineteen CT images of patients who had undergone LRN or LRU between January 2006 and December 2006 were reviewed. Hem-o-lok clips were used to control the renal artery and vein in all cases. The CT scans were performed on an Aquilion16 (Toshiba CT scanner) within 5 months of surgery. We examined whether the Hem-o-lok clips were visible on the patients' CT scans. The radiodensity values of the Hem-o-lok clips and the inferior vena cava (as a control) were measured in Hounsfield Units (HU). To confirm the appearance of the Hem-o-lok clips on CT images, 3-dimensional CT images of several of the patients were constructed.

An ex vivo CT scan of the clips was also performed to confirm that they were radiopaque on CT images. To do this, the clips were placed on a stand made of acrylic fiber

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and scanned according to the routine method for adult abdominal CT.

RESULTS

Nineteen patients underwent a CT scan within 5 months of LRN or LRU. We recognized 12-mm to 17-mm ra-

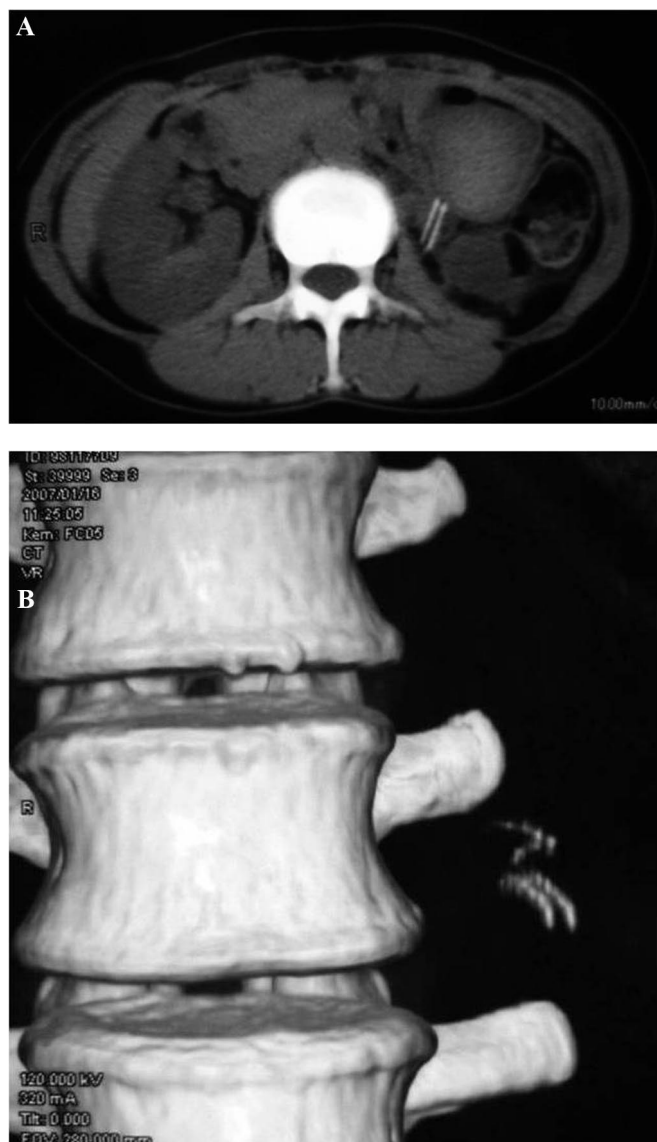


Figure 1. a. The 1-month follow-up CT scan of a patient who underwent LRU. The arrow indicates the radiopaque objects observed near the renal vein, on which Hem-o-lok clips were placed. **Figure 1b.** Radiopaque objects with a curved design matching that of the Hem-o-lok clips are recognized in the same position as the radiopaque objects shown in Figure 1a on a 3-dimensional CT scan of the same patient.

diopaque objects located near the renal hilum on all of the patients' CT scans, although none of the radiopaque objects were present during preoperative imaging (**Figures 1a and 1b**). Large and extra-large Hem-o-lok clips were used on the artery and vein of the kidney, respectively. The size and location of these clips were almost the same and near the renal hilum, respectively, and the clips displayed a radiodensity value of 222HU.

A sample of Hem-o-lok clips was subjected to ex vivo CT imaging to confirm their CT appearance (**Figure 2**). These clips were radiopaque, and their radiodensity value was 223HU, which was similar to that of the radiopaque objects observed on the patients' CT scans.

DISCUSSION

Hem-o-lok clips have been successfully used in many operations, including both open and laparoscopic operations. They are made of a nonabsorbable polymer and include a lock-engagement feature as well as teeth within their jaws.⁶ A multi-institution review found that Hem-o-lok clips are safe, effective, and reliable for LRN.³ Moreover, the operative costs of renal vein ligation are markedly decreased compared with those of endovascular GIA

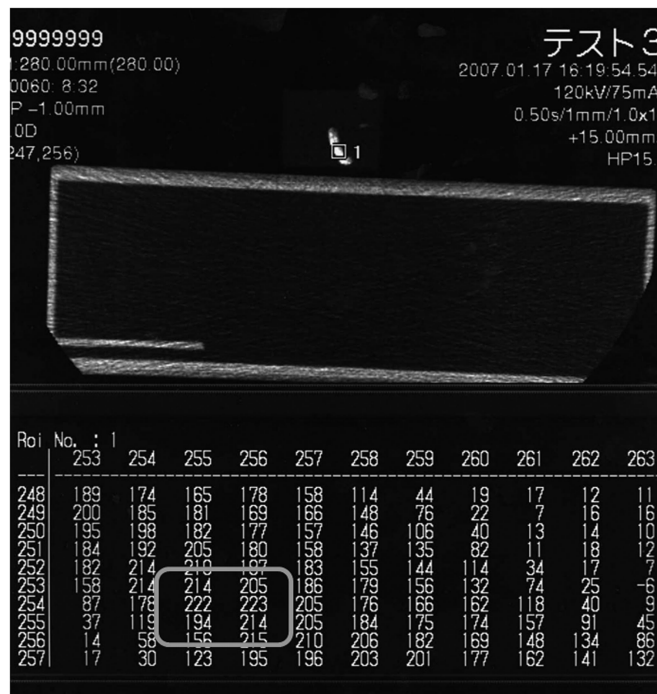


Figure 2. An ex vivo CT scan of the Hem-o-lok clips was performed. The Hem-o-lok clips were radiopaque on this CT scan.

so Hem-o-lok clips are routinely used for vascular ligation at our institution.⁶

Some studies have reported that Hem-o-lok clips are radiolucent on CT, whereas others did not agree.^{2,5,6} These reports could lead to problems when radiopaque objects, such as Hem-o-lok clips, stones, or foreign bodies, are recognized near to the renal hilum on postoperative CT scans of patients who have undergone LRN or LRU. In particular, when a patient suffers postoperative flank or abdominal pain, radiopaque objects detected on postoperative CT scans might be thought to be foreign bodies related to surgery, such as part of a drainage tube. The findings of this study will also be useful for the follow-up of partial nephrectomy, during which Hem-o-lok clips are often used to secure the renorrhaphy sutures. In this setting, radiodense objects located adjacent to the renal parenchyma could be confused with recurrence. Differences between the radiographic methods used at each institution might have caused the discrepancies between the findings of previous reports.⁵ In this study, we found that Hem-o-lok clips were radiopaque on CT scans of patients who had undergone LRN or LRU.

CONCLUSION

These findings are valuable for following up patients who have undergone LRN or LRU. In order to follow-up such patients safely, it is important for urologists and radiolo-

gists to be aware of the appearance of Hem-o-lok clips on CT scans to avoid misinterpretations.

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