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ROBOTIC NEPHRECTOMY FOR KIDNEY CANCER IN A HORSESHOE KIDNEY WITH RENAL VEIN TUMOR THROMBUS: NOVEL TECHNIQUE FOR THROMBECTOMY

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INTRODUCTION

Surgical management of a renal vein thrombus during radical nephrectomy can be challenging under laparoscopic conditions. Laparoscopic radical nephrectomy in the setting of a renal vein tumor thrombus has been described utilizing various GIA stapling, Statinsky clamping, or hand-assist techniques to milk back the renal vein thrombus.¹ These techniques for milking the tumor thrombus have potential limitations, such as the challenge of placing a wide GIA stapler between the IVC and thrombus while avoiding a positive margin at the staple line, the potential for injury to the renal vein when a Statinsky clamp is used to milk the thrombus, or the need for a hand port. We present a 63 year-old woman with an 11 cm left renal mass in a horseshoe kidney and a renal vein tumor thrombus extending to the inferior vena cava (IVC) (Fig. 1), that was managed utilizing robotic assistance for radical heminephrectomy and renal vein thrombectomy. We describe a novel hemolock clip technique for management of a renal vein thrombus during radical nephrectomy with a minimally invasive approach.

TECHNIQUE

Our technique of patient positioning, trocar placement, and robot docking for robotic transabdominal kidney surgery has been previously described.² Using robotic assistance, the bowel was mobilized to expose the aorta and IVC. The renal isthmus and renal artery were dissected utilizing robotic assistance and transected using laparoscopic staplers. The renal vein and IVC were carefully dissected and a laparoscopic ultrasound probe was used to identify the thrombus in the renal vein.

We utilized a novel technique to milk back the renal vein thrombus: An extra-large hemolock clip was partially closed around the renal vein proximal to the tumor thrombus and was used to retract the thrombus toward the kidney (Fig. 2a). The clip was then applied, creating a space in the renal vein between the clip and the IVC, which was confirmed to be free of tumor thrombus by intraoperative ultrasound. Additional hemolock clips were applied on the renal vein at the junction with the IVC. The renal vein was incised circumferentially between clips, with visual confirmation of absence of thrombus at the resected margin (Fig. 2b), and the kidney was removed using a specimen retrieval bag.

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Operative time was 190 minutes and blood loss was 450 ml. No complications occurred and discharge was on postoperative day 2. Histological evaluation confirmed clear cell renal cell carcinoma, Fuhrman grade 3 with negative surgical margins, pT3bN0Mx (Fig 3).

DISCUSSION

Desai et al.¹ and other groups have described laparoscopic radical nephrectomy in the setting of a renal vein tumor thrombus utilizing various stapling or clamping techniques. Bhayani et al. described laparoscopic heminephrectomy in a horseshoe kidney for renal cell carcinoma.³ We report the first case of robotic heminephrectomy for kidney cancer in a horseshoe kidney with a renal vein thrombus. The decision was made to utilize robotic assistance in the event that a cavotomy with intracorporeal suture repair of the IVC was needed. Although IVC reconstruction did not prove to be necessary, we did identify a novel technique for retraction and exclusion of a renal vein thrombus utilizing extra-large hemolock clips.

Early ligation of the renal artery may decrease venous pressure and retract the thrombus slightly to enable placement of an extra-large hemolock clip across the renal vein, which can be used to “milk” the thrombus away from the IVC. A potential advantage of using hemolock clips is that they may be easier to place between the IVC and thrombus than a wider endovascular stapling device and it avoids the possibility of thrombus being incorporated into the staple line. The hemolock clip can be partially closed around the renal vein with a controlled amount of pressure to facilitate milking of the thrombus without undue force that could cause trauma to the renal vein. Our technique also allows for confirmation of absence of tumor thrombus at the surgical margin, both by intraoperative ultrasound and by direct visualization as the renal vein is incised. We recognize that some renal veins could potentially be too wide for safe use of the hemolock clip, although the extra-large clip should accommodate most situations. Our technique of utilizing hemolock clips to control the tumor thrombus avoided the need for a cavotomy and IVC reconstruction in this particular case. This technique can be utilized with either a robotic or laparoscopic approach.

Robotic radical nephrectomy is safe and feasible in the setting of a horseshoe kidney with renal vein tumor thrombus. Hemolock clips can be used to retract and entrap the renal vein thrombus, facilitating successful tumor resection.

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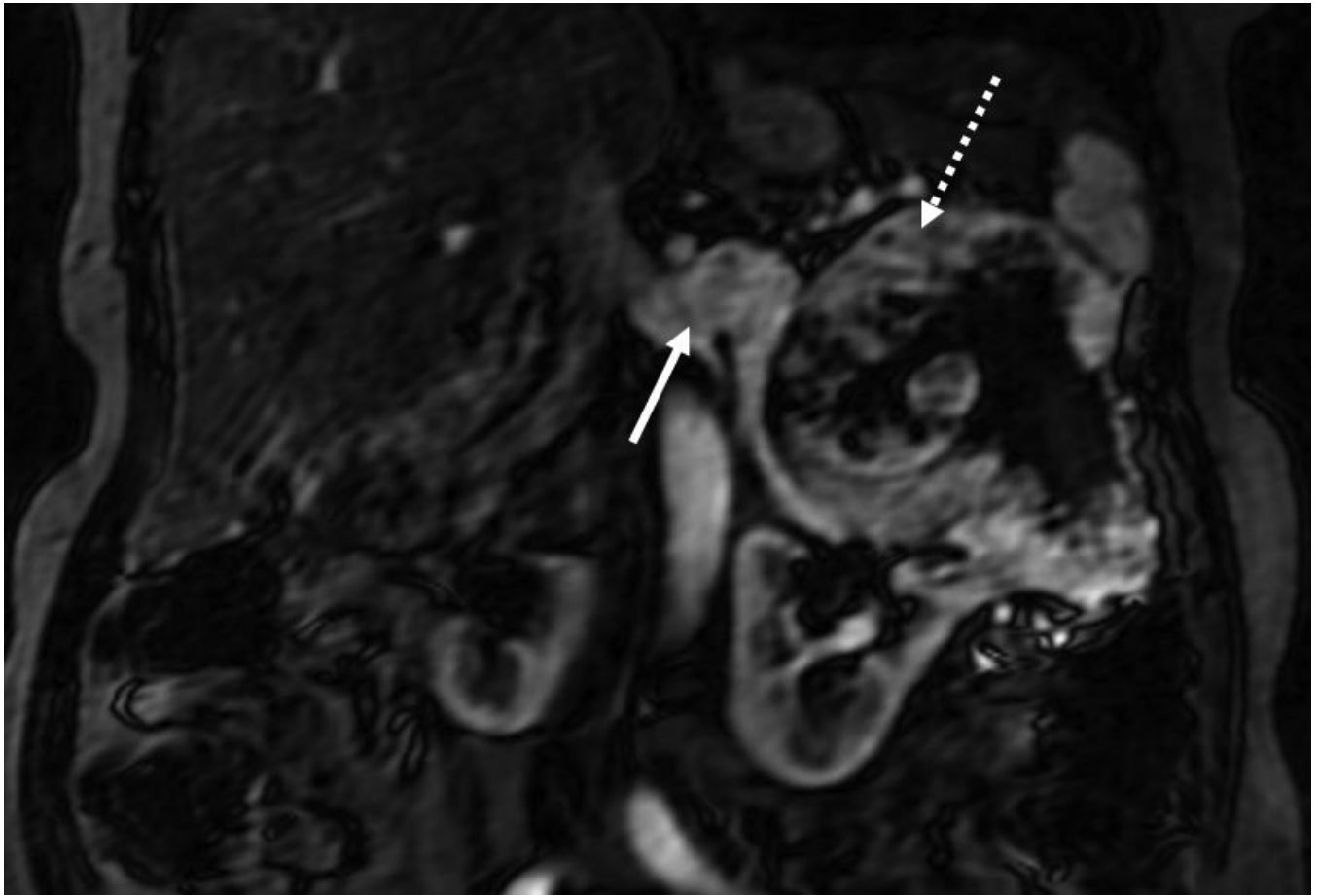
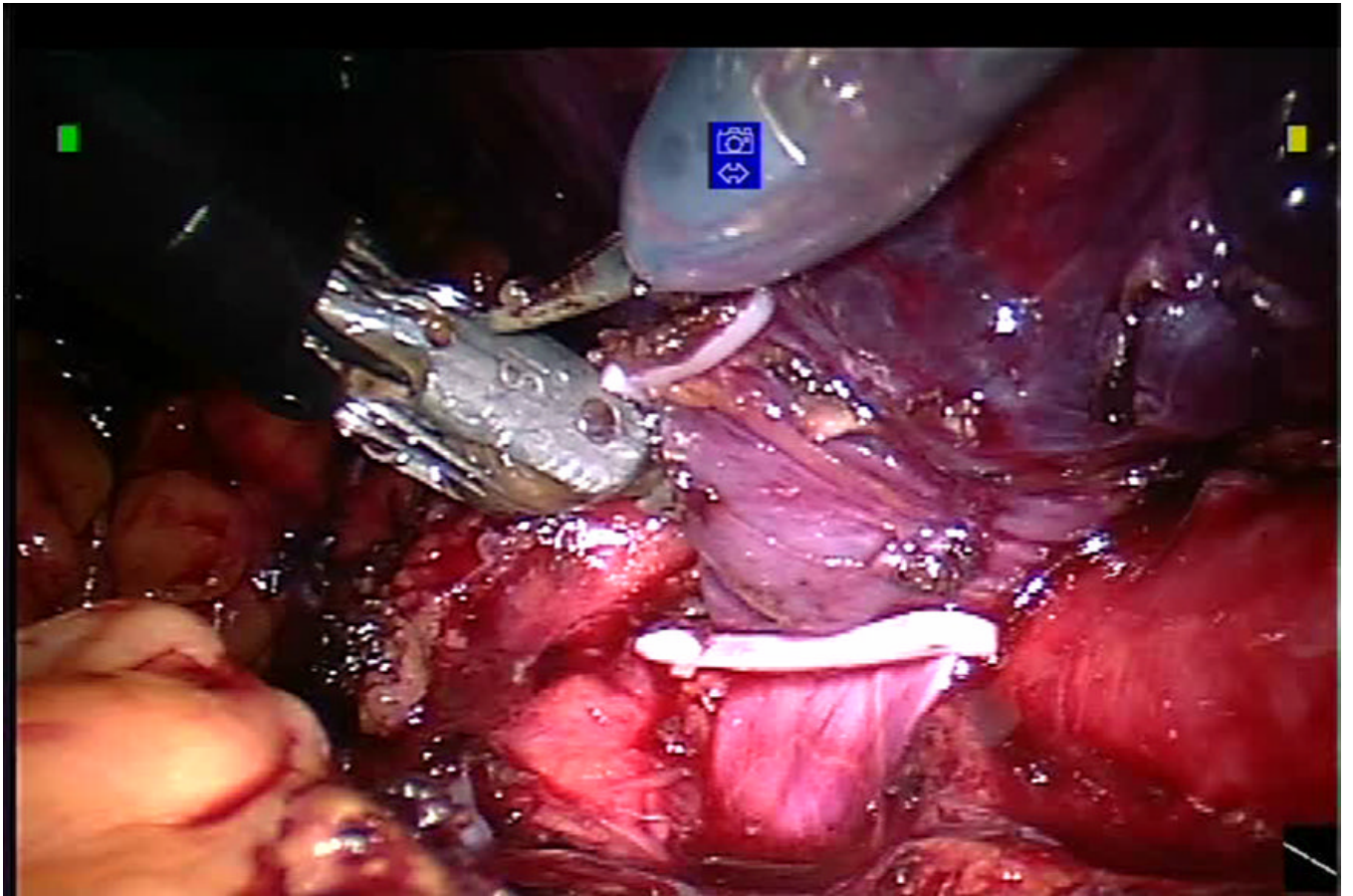


Fig 1. Preoperative abdominal MRI demonstrating an 11 cm upper pole mass (dashed arrow) in the left moiety of a horseshoe kidney with a left renal vein thrombus (straight arrow) extending to the confluence of the IVC.



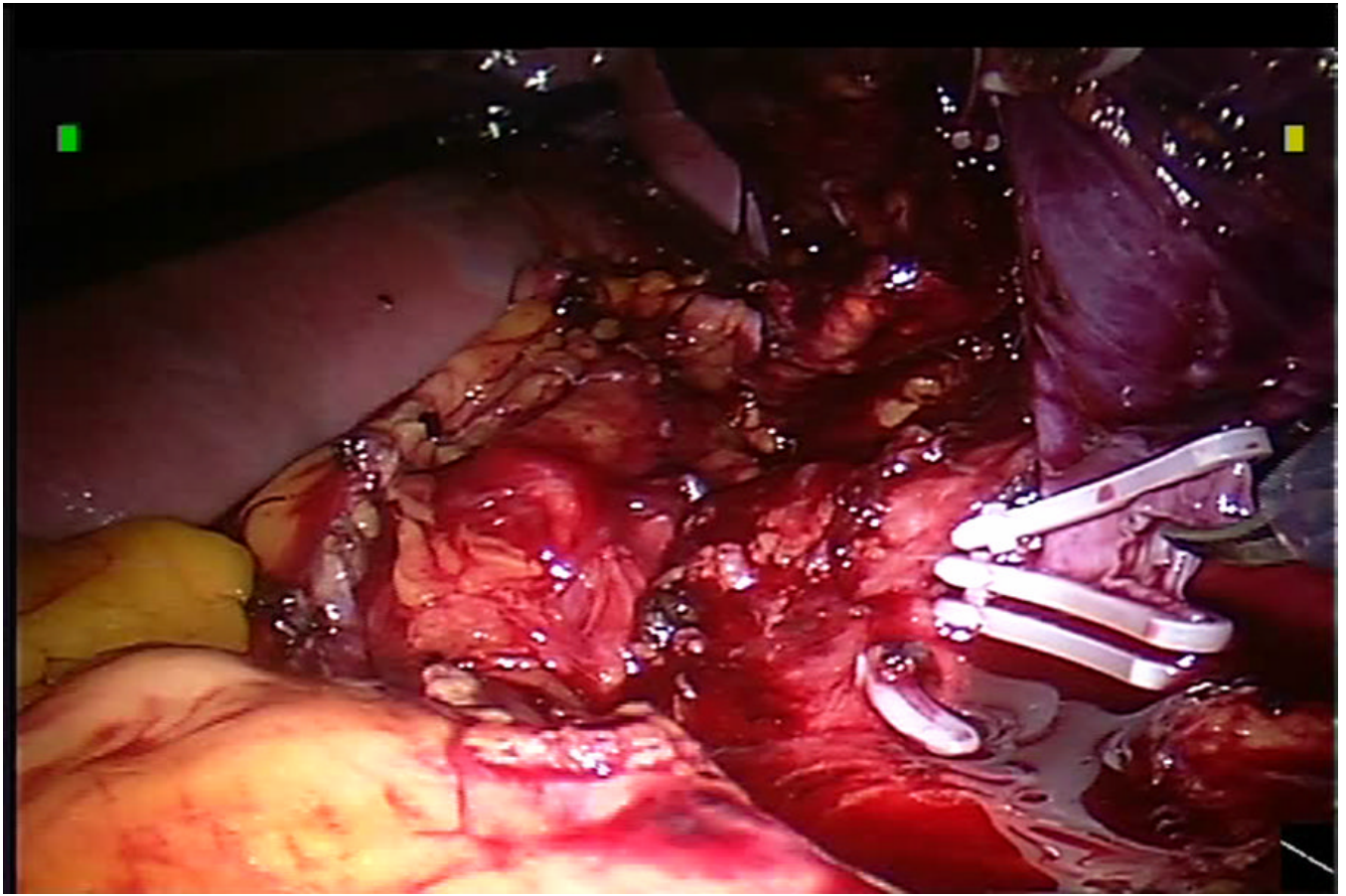


Fig 2.
Intraoperative view showing use of extra-large Weck clips to retract the renal vein thrombus (Fig 2a) and to exclude a portion of thrombus-free renal vein for resection (Fig 2b).

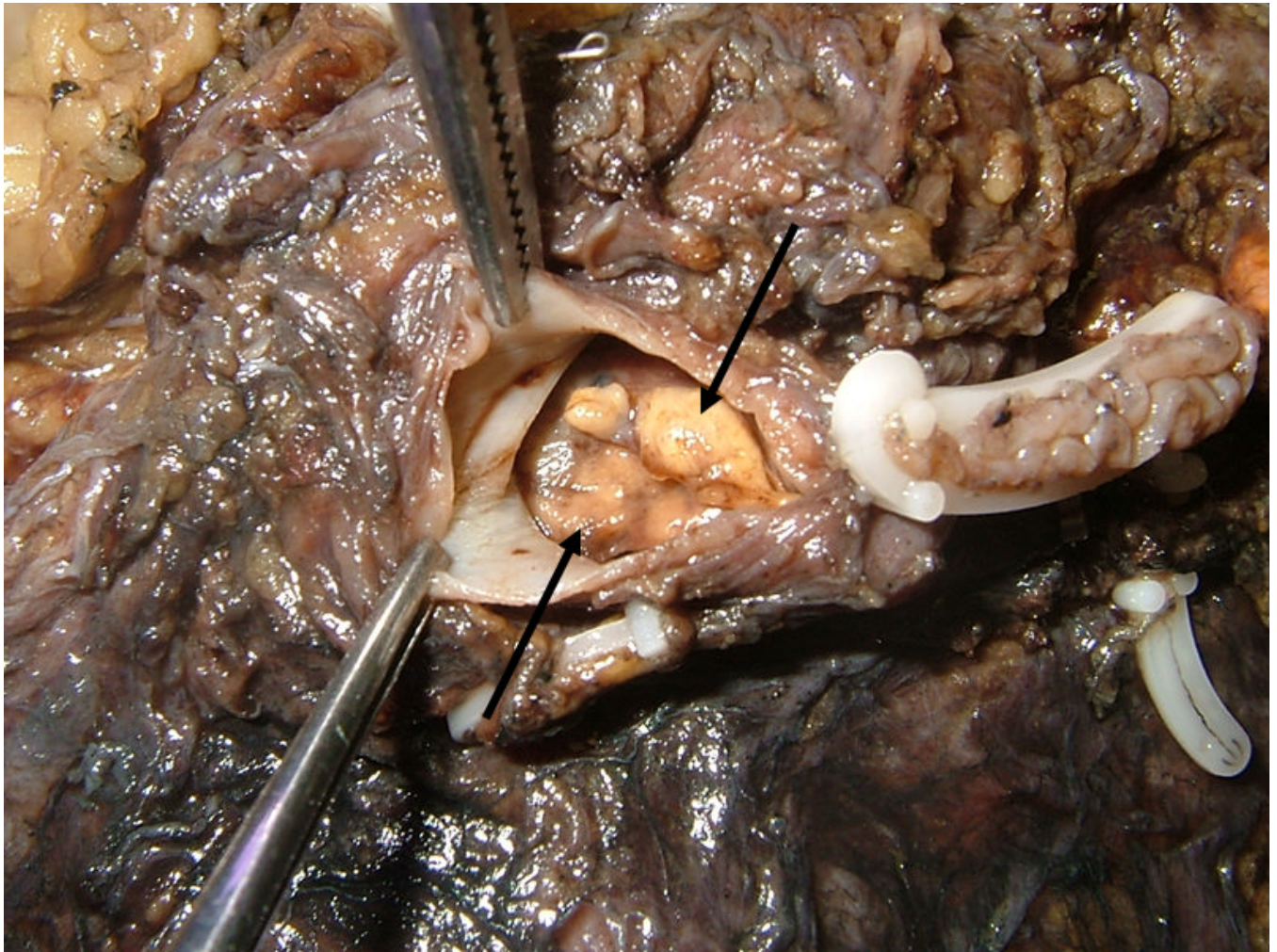


Fig 3. Intact extracted heminephrectomy specimen with intraluminal renal vein thrombus exposed after removal of hemolock clip (arrows). Venous resection margins were negative for cancer.