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# Renal cavernous hemangioma: robot-assisted partial nephrectomy with selective warm ischemia. Case report and review of the literature

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SUMMARY: **Renal cavernous hemangioma: robot-assisted partial nephrectomy with selective warm ischemia. Case report and review of the literature.**

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*Renal hemangioma is a relatively rare benign tumor with a wide range of clinical and radiological presentation, not easy to differentiate preoperatively from a renal cancer. Due to its benign nature complete surgical resection is the recommended therapy and is considered curative.*

*A 73-year old male patient followed-up for a lung carcinoma and a chronic renal failure underwent a CT scan showing a 35-mm mass of the inferior pole of the left kidney.*

*The patient underwent robot-assisted partial nephrectomy with left inferior pole selective warm ischemia. The outcome was favorable and no repercussions on the renal reserve were observed postoperatively.*

*Histopathological characteristics of the surgical specimen were consistent with renal cavernous hemangioma.*

*A robot-assisted operation allows the fine dissection required to carry out a bloodless nephron-sparing surgery without a complete warm ischemia. The use of robot could be noteworthy for nephron-sparing surgery in cases of concomitant chronic renal failure.*

KEY WORDS: Cavernous hemangioma - Renal cancer - Kidney - Robot - Nephrectomy - Nephron-sparing - Laparoscopy - Selective ischemia - Nephron sparing surgery - Robotic surgery.

## Introduction

Incidental diagnosis of small renal masses (SRM) is increasing due to wide diffusion of medical imaging. A significant number of SRM are benign, and the majority of malignant SRMs are low-stage and low-grade neoplasms with a good prognosis albeit treated by nephron-sparing resection (1).Renal cavernous hemangioma (RCH) is rare, and most cases of renal hemangioma tend to be small, with a peak incidence between 30 and 40 years of age (2). Generally it is difficult to diagnose a cavernous hemangioma of the kidney preoperatively (3). Nephron-Sparing Surgery (NSS) is indicated especially in patients with chronic renal failure (CRF) due to a significant risk of postoperative acute renal failure and worsening of CRF, and obviously in solitary kidney. Another important indication is the possibility of benign diagnosis, about 25% for small renal masses (lesions < 4 cm, pT1a).

Technical risks related to NSS is the warm ischemia time, preferably not exceed 20-30 minutes to avoid a following renal damage (4).

Laparoscopy and more recently robot-assisted surgery have been evaluated as alternative approaches to carry out NSS. Preliminary results point out that the minimally invasive procedures (especially robotic technique) allow better intra-operative anatomic vascular control with a less bleeding and safer technique especially in patient with a CRF, as ischemia time is reduced or limited for selected parenchymal areas, providing new perspectives for the treatment of SRM (5, 6).

We report a case of robot-assisted partial kidney resection for a RCH with a preoperative suspect of renal cell carcinoma (RCC), in a patient with CRF secondary to polycystic renal disease. A selective vascular clamping (inferior renal branch) was performed in order to obtain a blood-less resection avoiding the detrimental effects of pedicle clamping on renal function.

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## Case report

A 73-year old man was referred to our institution for a history of hematuria and the finding on CT of a 35mm renal endophytic mass of the inferior pole of the left kidney (Figure 1a).

His oncologic history dates back to 2 years ago when he underwent partial right lung resection followed by adjuvant chemotherapy for squamous cell carcinoma. At the routine follow-up a CT scan showed a SRM associated with acquired bilateral polycystic kidney disease that determined a CRF with creatinine levels of 1.6 mg/dl.

Following multidisciplinary evaluation, in according to the European and Japanese guidelines (7, 8) the patient was scheduled for a robot-assisted NSS with the suspect of RCC or renal metastasis of lung cancer. Informed consent was obtained and the patient was warned of the uncertain diagnosis and the possibility of a subsequent total nephrectomy in case of positive margins at the definitive histology. A total of 4 trocars were used (Figure 1b).

The robotic cart of the four-arm Da Vinci System was docked on the patient left side.

The colon splenic flexure was fully mobilized to identify the kidney, ureter and renal hilum. Two benign renal cysts of the inferior pole of 4 cm and 2 cm respectively were the anatomic landmarks used to identify the tumor as showed by preoperative CT.

The left kidney was mobilized avoiding to dissect the fatty tissue around the tumor. The renal hilum was identified and the renal artery isolated and encircled with a vessel loop as well as its inferior branch (Figure 1c). The latter was temporary occluded with a bulldog clamp for a total time of 12 minutes.

The 4 cm cyst adjacent to the tumor was opened and the mass easily identified. Parenchymal dissection preceded close to the tumor surface using monopolar scissors and bipolar forceps on the right and the left arm of the robot respectively (Gyrus Plasma Trissector, Gyrus Group PLC, Gyrus International, Ltd.UK).

Definitive hemostasis was achieved after declamping with an interrupted suture and applying fibrin sealant (Quixil® fibrin glue, Ethicon, Cincinnati, USA). The specimen was extracted through the umbilical port (9).

A suction drain was left in place and removed after 24 hours. The operative time was 110 minutes including robot draping and docking. Blood-loss was 30ml.

The postoperative period was uneventful and the patient was discharged on post-operative day 3. Creatinine blood levels were assessed the day before (1.60 mg/dl), the day of surgery (1.58 mg/dl), and before discharge form the hospital (1.62 mg/dl). The values showed no significant differences.

Definitive histology revealed that the mass was a cavernous hemangioma of 35mm (Figures 2 a, b, c); the R.E.N.A.L. Nephrometry Score was 1+3+2+X+1=7 X (10).

The patient was monitored monthly for 6 months after the operation with blood, clinical and ultrasonographic examinations. No elevation of the creatinine levels was recorded at follow-up controls. One year after surgery a lung recurrence of the squamous cell carcinoma occurred, requiring partial lung resection and adjuvant chemotherapy.

At the fourteen-month follow-up the patient results to be disease-free at the total-body CT scan.

## Discussion

NSS is considered the treatment of choice for SRM (7, 8) but it is associated with a risk of acute and chronic renal failure due to the effects on healthy parenchyma of pedicle clamping (4).

Moreover, when NSS is performed through an ab-

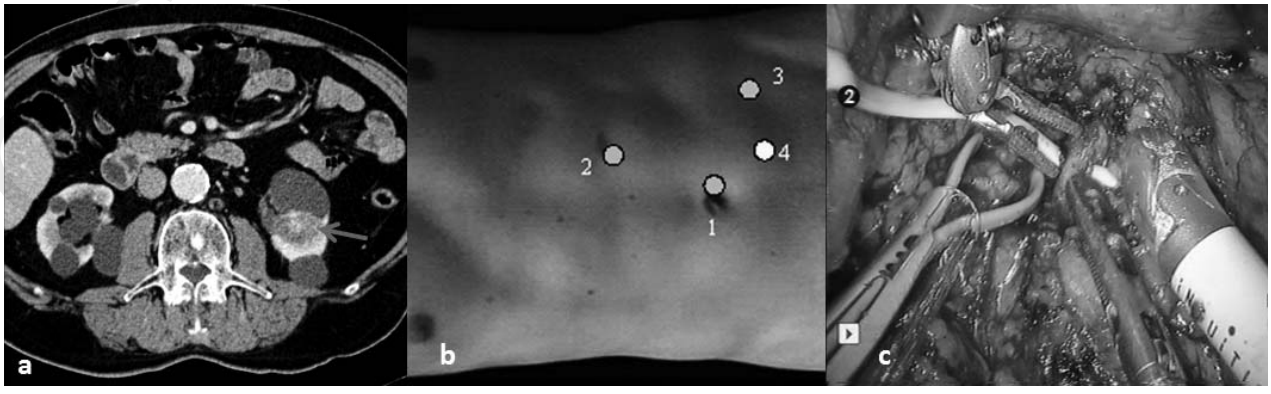


**Fig. 1 - a) Preoperative CT scan showing the left kidney mass and bilateral renal cysts. b) Trocar position (1-2-3 robotic and 4th assistant port). c) Intraoperative picture showing the left main renal artery and the inferior polar artery encircled with a blu (dark grey) and yellow (light grey)vessel-loop respectively. The latter is clamped with a bull-dog clamp.**

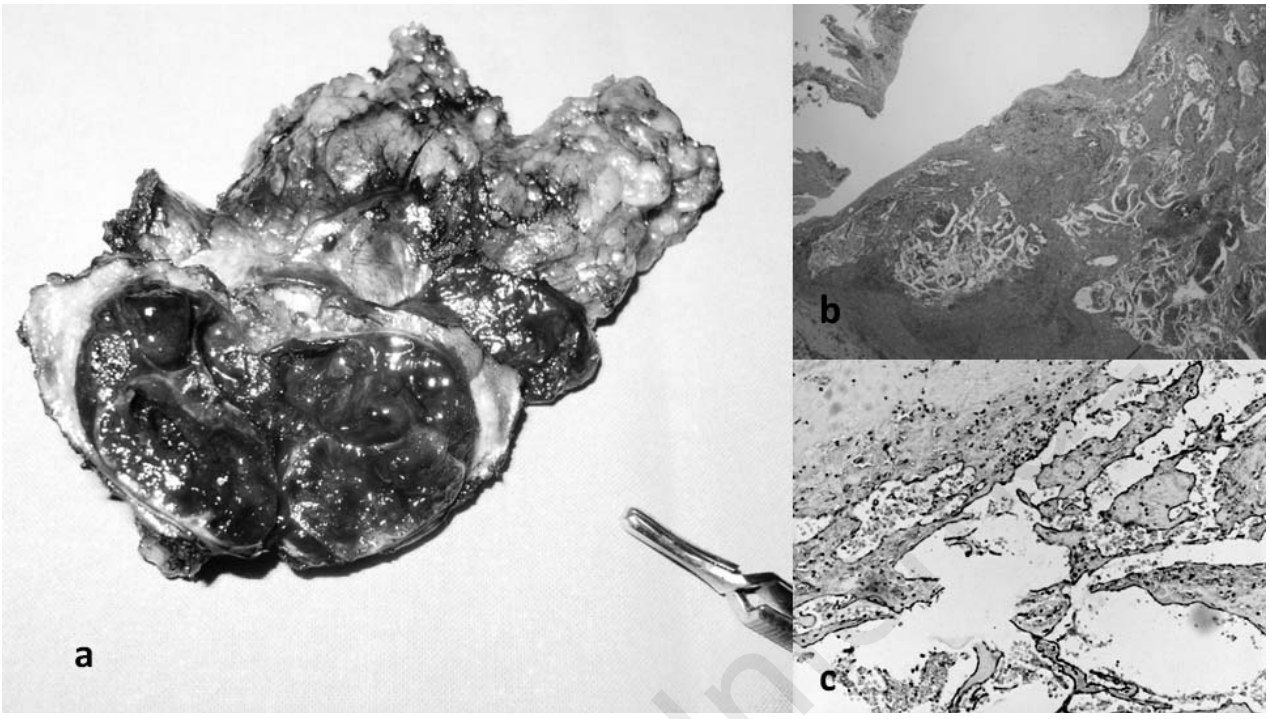


**Fig. 2 - a) Gross appearance of the tumor. The tumor was removed en-bloc with its perirenal fat. b, c) Microscopic view of the tumor showing the large vascular cavities formed by endothelial cells (immunohistochemistry, CD31, x100).**

dominal or lumbar incision the postoperative period is sometimes complicated by difficult pain control and long-term abdominal wall complications such as infection and incisional hernia.

A laparoscopic approach can improve the early post-operative course but NSS remains a challenging procedure even in experienced hands (6). Robotics could facilitate laparoscopic NSS, allowing a greater number of surgeons to perform this surgery.

To date, more commonly, incidental-type tumors are discovered on imaging for an unrelated medical issue. The decision to consider NSS would be based on tumour size, location and the overall renal function. Laparoscopic skill on the part of the surgeon is a significant factor in this decision process (6).

Robotic surgery has been demonstrated to overcome intrinsic limitations of traditional laparoscopy in difficult anatomical and operative conditions (3, 11).

Wristed instruments, that allow seven degrees of freedom, tremor filtering, ability to scale motions, and stereoscopic vision improve surgeon dexterity when a fine manipulation of tissues in a close, fixed operating field or when hand-sewn sutures and knot tying are required (11).

RCH is a rare entity with only 200 cases reported in literature, so universally recognized treatment guidelines do not exist (12-14).

In this case oncologic history and the presence of a CRF have been confounding factors to achieve a preoperative diagnosis and to plan an appropriate treatment. NSS was finally indicated and carried out safely with the use of the robot, that allowed a fine hilar dissection and the identification of the arterial branch for the lower pole. In our experience we used this technique in 38 consecutive cases of renal masses from 2008 to august 2012 (15). Selective warm ischemia had the advantage to conduct the resection in a nearly bloodless fashion without postoperative renal complications. Moreover ischemia time was very short preserving the left kidney healthy parenchyma. In conclusion, robotics could have an important role in the treatment of SRMs especially in patients with CRF and a solitary kidney.

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