



# Combined robot assisted right partial nephrectomy and cholecystectomy with single docking

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## Abstract

We report the first case of robot-assisted partial nephrectomy (RARN) and Robot assisted cholecystectomy in a 66 years old female overweight patient with organ-confined right kidney tumor identified on the investigation of gastrointestinal symptoms with a single docking. A modified position of the patient and a slight altered placement of the trocars made feasible the concomitant performance of the two operations. Total blood loss was 80 ml, operation time was 253 min and console time 187 min. The drain was removed on second post-operative day and the patient was discharged at the 3rd post-operative day. Using a single docking of the da Vinci S system, intraoperative time and cost are minimized in patients with both organ-confined kidney tumors and gall bladder stones.

**Keywords** Robot assisted partial nephrectomy · Robot assisted cholecystectomy · Concomitant robotic operations

## Introduction

Incidental kidney tumors represent the majority of renal malignancies due to the frequent use of ultrasound (US), whereas acute cholecystitis is a common diagnosis affecting

5–38% of general population [1]. The presence of both conditions would be, therefore, not uncommon. However, combined operations are not often performed. We present the first combined case of a robot-assisted partial nephrectomy (RARN) with a robotic assisted cholecystectomy in a single patient with organ-confined right kidney tumor performed with a single docking.

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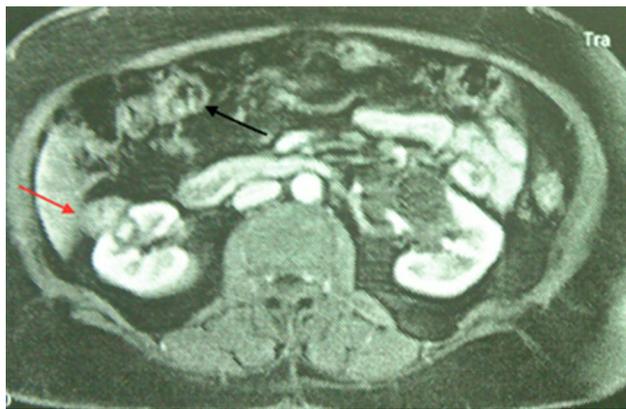
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## Case report

A 66-year old, overweight (BMI = 27), female patient with atypical gastrointestinal symptoms, was submitted to an abdominal ultrasonography which revealed multiple gall bladder stones and a 3.2 cm exophytic renal mass on the anterior surface of the right kidney. A contrast CT-scan confirmed the presence of an enhancing tumor (Fig. 1). R.E.N.A.L. score was 7a and PADUA score was 9, which classified it as an intermediate nephrometry score-tumor for both scoring systems. Gall bladder stones with no further obstruction of the common bile and pancreatic ducts were also confirmed. Patient was not suffering from acute cholecystitis and was opted for an elective cholecystectomy as most of her chronic complains were attributed to the gall-bladder stones. (Typical biliary symptoms and gallstones on imaging studies with no evidence of complications). The

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**Fig. 1** Preoperative CT scan depicting the renal tumor and the gall bladder stones



**Fig. 2** The actual docking of the robot

further imaging investigation revealed no metastases in the lungs or the abdomen.

## Surgical technique

The da Vinci S surgical system (Intuitive Surgical, Sunnyvale, CA, USA), in a three-arm standard setting was used, with a 0° scope, monopolar scissors and Maryland forceps. As first described by Spinoit et al. [2], a modified position of the patient was chosen, with the patient placed in a flank position of 40° (Fig. 2).

The position of the trocars was slightly altered, compared to the setting for a standard transperitoneal RAPN (Fig. 2). Using Hasson technique, a point at the lateral border of the rectus abdominal muscle and one inch above the level of the umbilicus was chosen for the camera trocar. After the establishment of pneumoperitoneum and in a 30° anti-Trendelenburg position, the rest of the trocars were placed under direct vision. The right robotic trocar was placed two inches

above the umbilicus along the midline, and the left robotic trocar three inches above the anterior superior iliac spine, making the triangulation pointing at an angle between the gall bladder and the renal hilum. A 5 mm trocar was inserted at the midline and below the xiphoid process for the liver retraction. A 12 mm trocar was placed subcostally, lateral to the camera trocar just under the gall bladder, to use it alternatively in case of a need to redock for the gall bladder excision. The 12 mm trocar has been finally used only for suction, irrigation and clip application. A modified docking position was used, over the patient's shoulder to achieve access to both the gall bladder and the renal hilum.

Initially the right colon was mobilized and reflected medially. The duodenum was retracted with a Kocher manoeuvre. After exposure of the spermatic vessels and the right ureter, the renal hilum was meticulously dissected to gain access to the renal vessels. A once-folded vascular loop threaded through a 2 cm—feeding tube, with Hem-o-Lok next to the exposed end of the tube on the vessel loop, was used for creating a vascular tourniquet [3]. The perirenal fat was removed until access to the tumor was achieved. At the time of tumor excision the pneumoperitoneum pressure was increased from 15 to 20 mm Hg. The tumor was finally radically excised at a free surgical margin. Internal renorrhaphy was performed with a running 3-0 PDS suture, secured with the Hem-o-Lok clip at the renal capsule and again with a second Hem-o-Lok clip over it. External renorrhaphy was performed using the same 3-0 PDS suture and a sliding clip-technique again, with the use of Hem-o-Lok clips to apply tension on all ends of the suture. The tourniquet was removed and the perirenal fat as well as the Gerota fascia were brought together over the renorrhaphy. It is important to mention that even though the use of mannitol during warm ischemia time has been introduced to partial nephrectomies from clinical experience in renal transplantation, there has been increasing evidence in the literature that is not beneficial for patient undergoing partial nephrectomy and normal renal function preoperatively and, therefore, we omit mannitol administration in our open and robotic cases. The specimen was placed into a retrieval bag and the cholecystectomy was then performed by the surgical team. Using the monopolar scissors the gall bladder was freed from scar tissue around it, while the Maryland forceps were used for traction and after retraction of the liver through the 5 mm port by the assistant. The cystic duct was identified, dissected and finally metal clips were placed. The same was performed for the cystic artery and both were finally transected. The hepatic duct was also identified and remained intact. Finally, the gall bladder was placed in a second retrieval bag. The tumor and the gall bladder were removed from a small extension of the incision of the 12 mm trocar port and a drain was placed. Intraoperative blood loss was 80 cc. The drain was removed at second postop day and the

patient was discharged at day three postoperatively with no significant complications. Warm ischemia time was 24 min. The patient received a single dose antibiotic prophylaxis of 2nd generation cephalosporin, mostly due to the RAPN since she was not treated for an acute cholecystitis Patient received one dose of tramadol immediately postoperatively. Pain was well tolerated and controlled with on demand paracetamol on the first post operative day. Patient received no analgesic after hospital discharge. 2 years after the operation the patient in the oncology follow up had no signs of recurrence in CT scans performed.

## Discussion

Combined robotic operations including kidney sparing operation have been previously reported to the literature [4–6]. Da Vinci robotic system facilitates the performance of combined procedures providing 3D-resolution, precision and less limitations on movements. In case of need for concomitant operations the effort to succeed this in one session and especially in a minimal invasive way with the robotic system is ideal for the patient, since he is submitted once to the procedure (preoperative evaluation, anesthesia, operation, postoperative course) and most importantly a large incision is avoided that is usually performed in combined open operations [4–8]. Unusual complications during the postoperative period as well as technical considerations possibly make combined procedures being scarcely performed [7, 8]. Moreover, combined laparoscopic procedures would probably represent an even greater challenge for surgeons. The need to reposition the patient, as well as the positioning of the ports during anesthesia to complete both laparoscopic radical nephrectomy and cholecystectomy, make the procedure even more challenging [9]. However, the placement of the trocars in a slight modified position make both the right kidney and the gall bladder anatomically accessible constituting feasible the operation without the need of additional trocars or for further extending the duration of the operation by Re-Docking for the second part of the surgery [2]. The anatomical vicinity of the right kidney and the gall bladder constitute feasible the concomitant performance of a RAPN and a robotic assisted cholecystectomy sparing the need of a second surgery. Cost is a primary issue in every health-care system, the ability to perform combined procedures especially in a minimal invasive robotic way is both cost

effective and medical ideal for the operative management of the patient.

To the best of our knowledge, just one case of joint robotic cholecystectomy and RAN has been reported so far [2].

## Compliance with ethical standards

**Conflict of interest** K. Stravodimos, I. Katafigiotis, C. Pournaras, D. Dimitroulis, G. Kousournas, E. Fragkiadis, C. Constantinides declare that they have no conflict of interest.

**Informed consent** Written informed consent was obtained from the patient for the publication of this Case Report/any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

## References

1. Gunn A (1981) Acute cholecystitis. *Practitioner* 225(1354):491–497
2. Spinoit AF, Stravodimos K, Nikiteas N, Ploumidis A, Lumen N, Ploumidis A (2015) Sequential robot-assisted radical right nephrectomy and cholecystectomy: a safe combined procedure. *Int J Med Robot Comput Assist Surg Int J Med Robot* 11(2):130–134
3. Ho HS, Peschel R, Neururer R, Steiner H, Schwentner C, Bartsch G (2008) Another novel application of Hem-o-Lok clips for transient vascular occlusion in robot-assisted laparoscopic partial nephrectomy: an alternative to laparoscopic bulldog and Satinsky clamps. *J Endourol* 22(8):1677–1680
4. Ong KH, Huang SK, Yen CS, Tian YF, Sun DP (2016) Simultaneous retroperitoneal robotic partial nephrectomy and hepatectomy for synchronous renal-cell carcinoma and hepatocellular carcinoma in a cirrhotic patient. *J Endourol Case Rep* 2(1):215–217
5. Raheem AA, Santok GD, Kim DK et al (2016) Simultaneous Retzius-sparing robot-assisted radical prostatectomy and partial nephrectomy. *Investig Clin Urol* 57(2):146–149
6. Patel MN, Eun D, Menon M, Rogers CG (2009) Combined robotic-assisted laparoscopic partial nephrectomy and radical prostatectomy. *JSLJ Soc Laparoendosc Surg Soc Laparoendosc Surg* 13(2):229–232
7. Suh BJ, Oh SJ, Shin JY, Ku DH, Bae DS, Park JK (2017) Simultaneous robotic subtotal gastrectomy and right hemicolectomy for synchronous adenocarcinoma of stomach and colon. *J Robot Surg* 11(3):377–380
8. Park M, Kim SC, Chung JS et al (2016) Simultaneous robotic low anterior resection and prostatectomy for adenocarcinoma of rectum and prostate: initial case report. *Springerplus* 5(1):1768
9. Tsivian A, Konstantinovskiy A, Tsivian M et al (2009) Concomitant laparoscopic renal surgery and cholecystectomy: outcomes and technical considerations. *J Endourol Endourol Soc* 23(11):1839–1842