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NEW TECHNIQUES AND TECHNOLOGIES

Radical robot-assisted laparoscopic nephrectomy with thrombectomy in the vena cava☆

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Abstract

Background: Renal cell carcinoma has a natural tendency to extend through the renal vein. When the thrombus reaches the vena cava, thrombectomy and the necessary reconstruction of the vena cava are typically performed by open pathway. Robot-assisted technology provides advantages for performing this complex technique, using a minimally invasive access.

Material and methods: We present the technique we employed in the first case performed in our department. After performing renal artery embolization, we conducted the surgery with the Vinci S robotic system. The main steps of the surgery are as follows: detachment and Kocher maneuver; release of the lower renal pole; clamping and sectioning of the renal artery; endocavitary ultrasound to locate the thrombus; placement of tourniquets in the vena cava below and above the renal veins and in the left renal vein; closure of the 3 tourniquets; opening of the vena cava; resection and extraction of the thrombus; suture of the vena cava; opening of the tourniquets; complete release of the kidney; bagging and extraction of the specimen.

Results: The surgery was performed without complications. The patient required a transfusion of 2 units of packed red blood cells and was discharged with modest renal failure (creatinine level of 1.60 mg/dl).

Conclusions: Radical nephrectomy with thrombectomy in the vena cava is a technique susceptible to severe complications and has, to date, been performed in few centers. We believe that the technique is reproducible and has clear advantages for our patients.

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Nefrectomía radical laparoscópica asistida por robot con trombectomía en vena cava

Resumen

Introducción: El carcinoma de células renales tiene una tendencia natural a extenderse a través de la vena renal. Cuando el trombo alcanza la vena cava, la trombectomía y la necesaria reconstrucción de la vena cava se realiza habitualmente por vía abierta. La tecnología robótica proporciona ventajas para poder realizar esta técnica compleja mediante acceso mínimamente invasivo.

Material y métodos: Presentamos la técnica que hemos utilizado en el primer caso operado en nuestro servicio. Previa embolización renal, se realiza la intervención con sistema robótico Da Vinci® Si. Los principales pasos de la intervención son: decolación y maniobra de Kocher; liberación de polo inferior renal; clipaje y sección de arteria renal; ecografía endocavitaria para localizar el trombo; colocación de torniquetes en cava por debajo y por encima de las venas renales, y en la vena renal izquierda; cierre de los 3 torniquetes; apertura de la vena cava; resección y extracción del trombo; sutura de la vena cava; apertura de los torniquetes; se completa la liberación del riñón; embolsado y extracción de la pieza.

Resultados: La intervención se realizó sin complicaciones. Fue necesario transfundir 2 concentrados de hematíes y fue dada de alta con una discreta insuficiencia renal (creatinina de 1,60 mg/dl).

Conclusiones: La nefrectomía radical con trombectomía en vena cava es una técnica susceptible de complicaciones graves, que hasta ahora se ha realizado en pocos centros. Pensamos que es una técnica reproducible y con evidentes ventajas para nuestros pacientes.

Introduction

Renal cell carcinoma has a natural tendency to spread through the renal vein, reaching the vena cava between 4 and 36% of cases.[1] In 1972 Skinner described radical nephrectomy with tumor thrombectomy.

Usually thrombectomy and the necessary reconstruction of the vena cava have been done by open pathway. During the first years of the development of laparoscopic nephrectomy, the existence of a vena cava tumor thrombus was a contraindication to perform laparoscopic nephrectomy. Sundaram et al.[2] in 2002 were the first to describe a laparoscopic hand-assisted nephrectomy with thrombectomy, placing a Satinsky clamp.

Subsequently, some series were presented with a mixed procedure: the renal mass was released laparoscopically, but the thrombectomy was performed with conventional technique. This resulted in a decrease in the size of the incision.

Robotic technology adds advantages over the pure laparoscopic technique that includes a 3-dimensional vision handled by the surgeon, articulated instruments, scaled movements, elimination of trembling, and an ergonomic position of the surgeon. All this helps to perform complex laparoscopic techniques. However, it has taken almost a decade to see published the first series of 5 cases of vena cava thrombectomy.

Possibly this is due to the dangerous maneuvers that must be performed to isolate the cava before performing the cavotomy.

We present the technique that we have used in the first case operated in our department.

Material and methods

A 66-year-old patient studied in our department for a casual finding of a renal mass.

In the CT scan, a minimal dilation of the intrahepatic bile duct is observed. In the lower pole of the right kidney, a heterogeneous, hypervascular solid mass is observed in the arterial phase of 55 mm × 65 mm × 75 mm (CC × AP × transversal) in size with curvilinear calcifications and invasion of the renal vein until its entry into the inferior vena cava. Suggestive of renal neoplasia. Cortical scar in the lower pole of the left kidney, suggestive of change of chronic pyelonephritis. Rest normal.

It is programmed to perform a laparoscopic radical nephrectomy assisted with robot and inferior cava thrombectomy.

Surgical technique

The patient is admitted to our hospital 24 h before the intervention in order to perform an embolization of the right renal artery. Prior to the radiological procedure, an epidural catheter is placed to control the post-embolization analgesia.

On the day of the operation, and under general anesthesia, the patient is placed in the left lateral decubitus position. We perform the pneumoperitoneum with minilaparotomy according to the Hasson technique. We place the first trocar for the 4 cm lens above the navel. We place 2 robot trocars in the mammary line, one subcostal and the other in the right iliac fossa. Then we insert a trocar of 12 mm for the assistant, between the trocar of the lens and