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Robot-assisted pyeloplasty and pyelolithotomy in patient with osteogenesis imperfecta

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Abstract

Robot-assisted pyeloplasty is currently the technique of choice for cases of pyelo-ureteral junction obstruction (UPJO). It may be accompanied by pyelolithotomy in cases of associated lithiasis. The presence of body abnormalities, as in the rare case of osteogenesis imperfecta, can complicate the procedure, starting from a different way of positioning the robotic ports and the number of them. Therefore, we present a case report with an accompanying video that can serve as a guide for similar cases.
Keywords: Robotic-assisted pyeloplasty, pyelolithotomy, osteogenesis imperfecta

Introduction

The pyelo-ureteral junction obstruction is a condition that includes several anomalies that cause hydronephrosis due to a defect in the passage of urine at the junction between the renal pelvis and the ureter [1]. Urinary stone formation is a common complication [2]. Indications for surgery include decreased split renal function, poor voiding function after furosemide administration, increased anteroposterior diameter on ultrasound, and grade III and IV dilatation.
The advantages of conventional laparoscopy over open surgery are shorter hospital stay, better aesthetics, less postoperative pain, and faster recovery [3]. Robotic-assisted laparoscopic pyeloplasty has the same advantages as laparoscopic pyeloplasty, but it is also easier to perform, resulting in shorter operating times [4].
Osteogenesis imperfecta is a condition consisting of bone fragility and malformations accompanied by short height [5]. We present the case of a patient with osteogenesis imperfecta and pyeloureteral junction obstruction complicated by urinary stone formation who was successfully treated with robotic-assisted pyeloplasty and pyelolithotomy.

Case presentation

The patient was 42 years old, 110 cm tall, and weighed 34 kg. He had a form of osteogenesis imperfecta with pronounced kyphoscoliosis and barrel chest. After right-sided abdominal pain and ultrasound findings of consensual hydronephrosis, he underwent abdominal CT urography, which revealed hydronephrosis and multiple lithiasis of the renal pelvis (Supplemental Video). Because of the suspicion of pyelo-ureteral junction obstruction, he underwent a MAG3 renogram scan, which showed a defect in the emptying of the right renal pelvis even after diuretic stimulation, but preserved right renal function.
A DJ stent was placed due to the presence of stones and flank pain. As several months had passed since the placement of the stent, it was necessary to replace it with a new analog device. After an unsuccessful attempt to replace the DJ stent, probably due to the presence of stones, a percutaneous nephrostomy was performed.
After approximately 3 months, the patient underwent robotic pyeloplasty and pyelolithotomy as described below: Patient in lateral decubitus position on the left side. Suprumbilical incision in the right pararectal, open access to the peritoneal cavity, insertion of a trocar for air seal and induction of pneumoperitoneum at 12 mmHg;

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placement of only three 8 mm robotic ports in the right pararectal line at a distance of 5-6 cm between them for anatomical deformities and small abdomen; placement of two 5 mm service accessory ports in the pararectal line at the suprumbilical and subxiphoid level; docking of the DaVinci system. Incision of the right parietocolic junction, medialization of the colon and duodenum; placement of a grasper anchored to the abdominal wall to lift the liver; identification of the ureter and isolation of the ureter in the subjunctional portion; isolation of the right renal pelvis, which appears very dilated; Dissection of the stenotic junction tract of the ureter, which is placed in the endobag together with about 10 stones (about 4-5 mm diameter each) removed from the renal pelvis; placement of a ureteral stent 16 cm × 6 ch on a guidewire; pyeloplasty suture with detached monofilament 3-0 tips; control of the anastomotic seal with injection of saline from the nephrostomy; a laminar drainage was placed in the anterior seat through the most caudal robotic port (Supplemental Video).

The duration of surgery was 130 minutes. With the exception of hyperpyrexia, which was successfully treated with antibiotic therapy, the clinical postoperative course was normal. The patient was discharged after removal of the nephrostomy tube. The ureteral stent was removed approximately 1 month after surgery. At 6 months after surgery, the patient was in good condition, without flank pain, with normal renal function and urinalysis.

Discussion

Robot-assisted pyeloplasty is the surgical management of uretero-pelvic junction (UPJ) syndrome and may be simultaneous accompanied by pyelolithotomy in cases of stone formation [6].

The robotic surgical approach typically involves the use of multiple robotic ports. In general, when using the Da Vinci system, the robotic ports should be positioned approximately 8 cm apart, but in this case, the anatomical abnormalities led us to reduce this distance and the number of ports due to lack of sufficient abdominal space. In addition, when performing the right UPJ pyeloplasty, the presence of the liver can make the procedure more difficult, so you can facilitate the surgery by using a laparoscopic grasper clamp positioned under the liver, which can pull the liver upward away from the kidney [7]. This was the case in our procedure where it was necessary to use this clamp to avoid using one of the only two robotic arms. Robot-assisted laparoscopic pyeloplasty is the procedure of choice because of its better safety profile than open surgery [8].

We have also been able to perform simultaneous treatment of kidney stones, reducing the morbidity associated with double surgical treatment. The anatomical abnormalities associated with osteogenesis imperfecta are such that the use of standard approaches and surgical findings are difficult [5, 9]. The feasibility of this procedure even in a patient with these anatomical abnormalities allows it to be a first choice approach even in these conditions.

Conclusions

No similar cases have been reported in patients with osteogenesis imperfecta treated as described above. We recommend that similar surgical cases be performed by surgeons experienced in treating the UPJO with robotic surgical systems using a reduced number of robotic ports (three in this case) and therefore a reduced number of robotic instruments to avoid conflict between the EndoWirst instruments. We recommend a minimum distance of 5 cm and a maximum distance of 7 cm between the robotic ports. As shown previously, the specific robotic technique was adapted to the patient's case due to his anatomical deformities. As described and shown in the video, this case is a good model for robotic surgical management.

Declarations

Availability of data and materials: The data used during the current study available from the corresponding author on reasonable request.

Financial support and sponsorship: None.

Conflict of interest: Not applicable.

Ethical Approval and Informed consent: The patient has provided an informed consent for publication of images and information in this study.

Consent for publication: Not applicable.

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