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ROBOTIC DISTAL PANCREATECTOMY FOR PANCREATIC LEIOMYOSARCOMA

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ABSTRACT – *Objective:* *Primary leiomyosarcoma of the pancreas (PLMS) is an extremely rare tumour. Herein we report the first case of robotic distal pancreatectomy (DP) ever performed so far.*

Patiens and Methods: *A 73-year-old woman was referred to our Institution after a diagnosis of pancreatic neoplasm was made. She underwent robotic assisted DP.*

Results: *The patient was discharged to home in the fourth post-operative day. Immunohistochemical staining was positive for smooth muscle markers, with negative expression of epithelial and neural markers, thus confirming the diagnosis of high grade PLMS.*

Conclusions: *Robotic DP combined good oncological results together with the advantages of minimally access surgery.*

KEY WORDS: *Pancreatic resection, Robotic surgery, Primary leiomyosarcoma.*

INTRODUCTION

Primary leiomyosarcoma of the pancreas (PLMS) is an extremely rare tumour accounting for 0.1% of pancreatic malignancies[1]. In considering malignant non-epithelial tumours it can be more often found in soft tissues, uterus, and gastrointestinal tract. A total number of 73 cases have been reported in literature and the only treatment for this rare neoplasm is surgical resection and without a radical procedure the prognosis has been found to be poor[2].

The use of minimally invasive approaches for pancreaticobiliary surgery has recently developed. However, the introduction of the laparoscopic approach in the pancreatic surgery field was much slower when compared to other fields. The difficult acceptance of this procedure among surgeons can be related to several reasons. The gland position itself with the retroperitoneal location of the pancreas in proximity to large vascular structures may lead to the risk of difficult to control bleeding and to the fear of unsuccessful oncologic results[3]. On the other hand many raised strong concerns secondary to the limits of the laparoscopic surgery as limited degrees of movement, two-dimensional imaging adaptation and necessary slow learning curve so as to reach advanced laparoscopic skills, thus discouraging many surgeons[4].

The introduction of robotic surgery allowed to overcome this well-known recognized limits of laparoscopy: removal of physiological tremor by real-time compensation[5], addition of motion scaling[6], image enhancement through 3-dimensional vision[7], introduction of EndoWrist technology allowing maximum responsiveness, rapid and precise suturing, dissection and tissue manipulation providing a natural dexterity with seven degrees of

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freedom[8], and finally ergonomic positions of the surgeon that reduces hard work-effort. The better technical capabilities of robot assistance compared with conventional laparoscopy seem to have helped surgeons to reproduce complex open procedures.

Herein we want to report the first totally robotic DP for PLMS ever reported in worldwide literature to our knowledge so far, describing the surgical technique, clinicopathological characteristics and outcome.

PATIENT AND METHODS

A 73-year-old woman was referred to our Institution after a diagnosis of pancreatic neoplasm was made. Her medical history revealed a previous istero-ovariectomy for an adenocarcinoma of the uterus with open approach. The patient was overweight (BMI: 28.7), with unremarkable physical findings. All laboratories values were normal. She underwent a computed tomography (CT) during the imaging follow up because of her previous neoplasm, that revealed the presence of a irregular lobular mass, 6 cm in diameter, located in the tail of the pancreas, encircled by the splenic artery. CT showed the mass as low-density lesion exhibiting slight peripheral enhancement only in the portal phase (Figure 1). Whole body (18F)-fluoro-deoxy glucose positron emission tomography (PET) showed slight glucidic metabolic uptake (SUV max 2.1) located in the tail of the pancreas.

The patient was then scheduled for robotic assisted DP with splenectomy.

The patient was placed supine in a 20° reverse Trendelenburg position with the operating table tilted slightly to the right side with legs abduced.

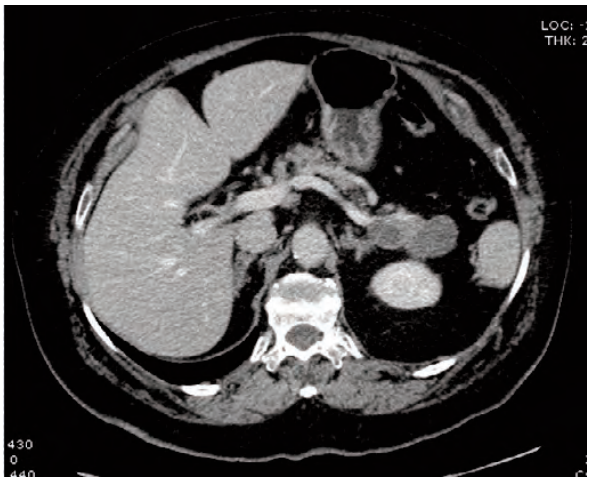

Figure 1. CT scan in portal phase shows the presence of an irregular lobular mass, 6 cm in diameter, located in the tail of the pancreas.

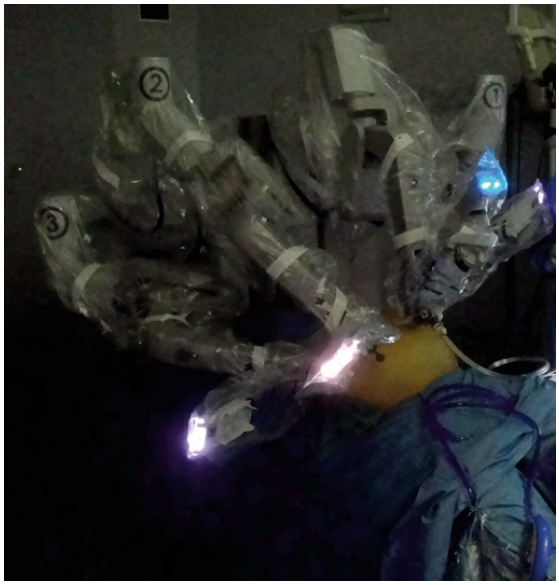

Figure 2. Robot docking.

Pneumoperitoneum was achieved through a Veress needle in the left hypochondria to insufflate the abdomen to 12 mm Hg with carbon dioxide. A laparoscope was inserted into the abdominal cavity, 8 cm to left of the umbilicus, so as to determine whether there were contraindications to the surgical method, thus excluding local metastases or dense adhesions from the previous surgery. Then 3 robotic ports were placed; 8-mm trocar for the right operating arm in the left ipocondria, 8-mm trocar for the left operating arm 8 cm to the right of the umbilicus, and a 8-mm trocar for the fourth robotic arm in right hypochondria 12-mm laparoscopic port for the assistant was placed in the umbilical area. The robotic surgical system's patient cart is placed between the patient's head and

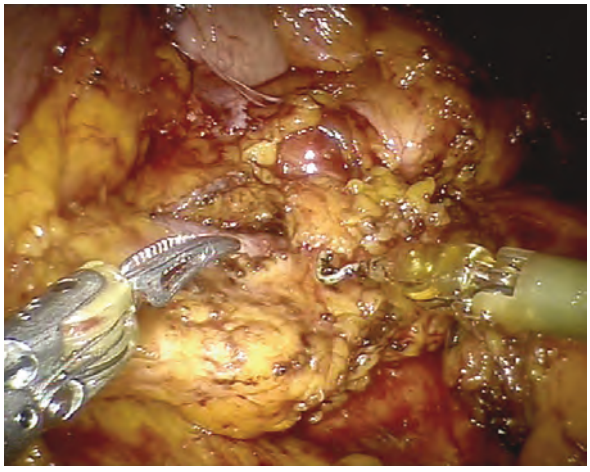

Figure 3. Intraoperative vision of the pancreatic lesion.

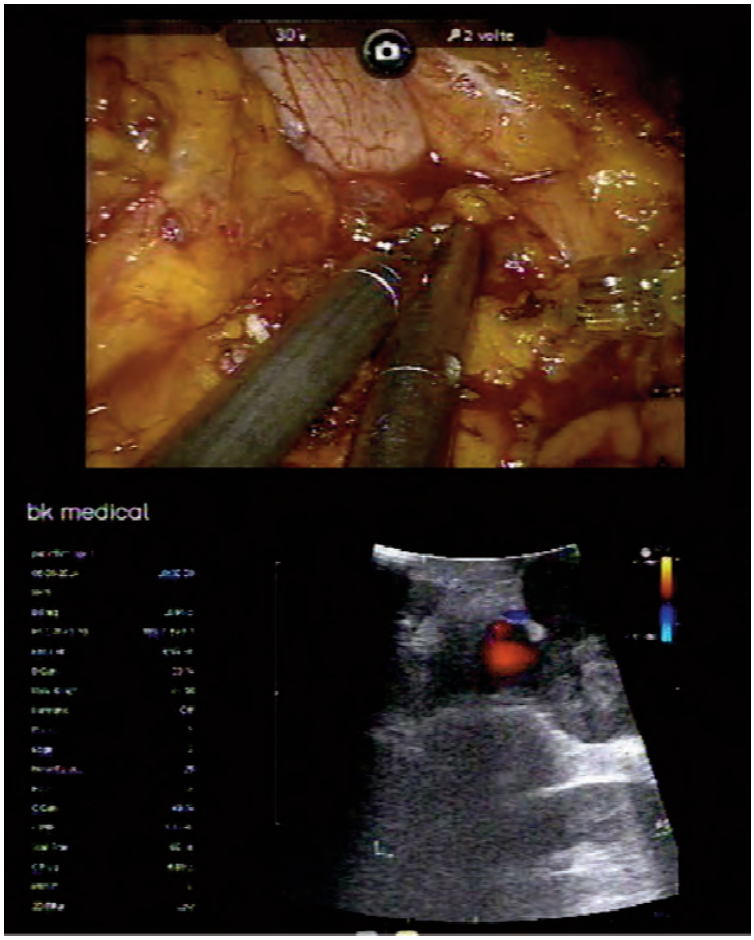

Figure 4. Intraoperative US showing the limits of the resection plane.

her left shoulder for the docking phase (Figure 2). After the gastrocolic ligament was opened and the lesser sac was entered in, the anterior surface of the pancreas was exposed (Figure 3). The inferior short gastric vessels were divided and the intraoperative ultrasound was performed in order to guide the pancreatic resection margin and to assure no direct relationship with Wirsung duct (Figure 4). At this time isolation of both splenic artery and vein was performed and their section was made prior of clipping with Hem-o-lok (Teleflex®). Pancreatic resection was made with ultrasound shears - Harmonic scalpel (Intuitive Surgical, Sunnyvale, CA, USA) and the Wirsung duct was isolated and cut, the stump was then sutured with non-absorbable suture (Prolene 5-0; Ethicon, New Brunswick, NJ, USA) and the remnant pancreas was covered with an haemostatic fibrin glue (Tisseel, Baxter®). The tail of the pancreas was detached with a medial-to-lateral approach towards the spleen. The spleen was dissected free from its ligaments and the specimen placed in a 15-mm laparoscopic endo-bag and extracted through a small lower middle-line incision on the scar of the previous laparotomy. A drain was put in proximity of the pancreatic stump.

RESULTS

The operative time was 320 min and the estimated blood loss of 300 ml, without necessity of blood transfusion. The postoperative course was uneventful except for a left pleural effusion medically treated. The dosage of amylase form the drain performed in the first and third post-operative day was negative. The patient was discharged to home in the fourth post-operative day without the drain.

The specimen was sagittally sectioned soon after resection a showed macroscopically a well-delimitated polilobular greyish mass of 6.5 cm in diameter with some cystic changes and hemorrhagic areas (Figure 5). The cut margin was 2 cm from the neoplasm. The tumour replaced almost entirely the tail of the pancreas and it excluded the pancteatic duct. Histopathological analysis revealed well-formed fascicles of spindle-shaped cells with eosinophilic cytoplasm, blunt-ended nuclei with a high-grade pleomorfism, and several number of mitosis. Foci of necrosis were observed, too (Figure 6). All resected lymph nodes were ruled out to be metastatic, and neither invasion to vessel nor to adjacent organs was observed. The surgical margin were free from neoplasm histologically.

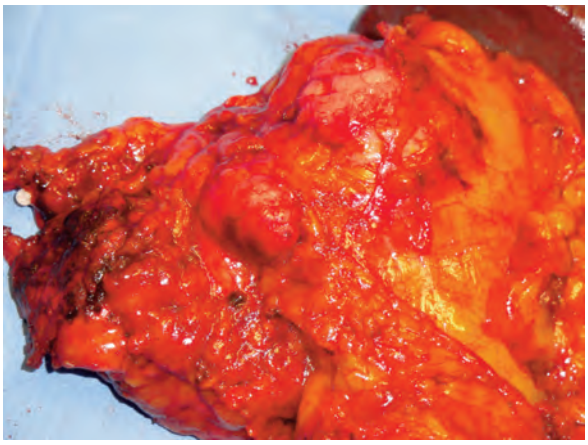

Figure 5. Surgical specimen showing the lesion surrounded by pancreatic parenchyma.

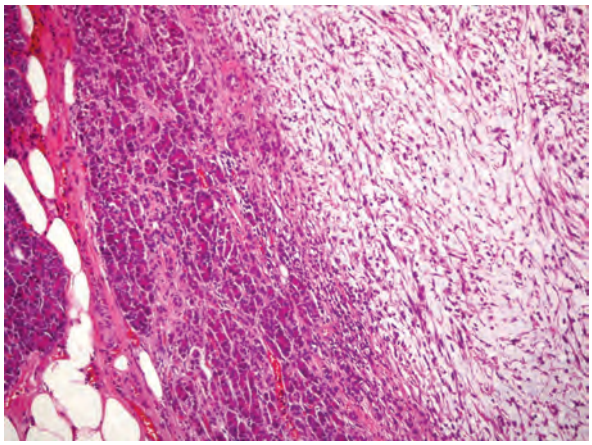

Figure 6. Hematoxylin-Eosin (x15).

Immunohistochemical staining was positive for smooth muscle markers (α-smooth muscle actin, MSA, and desmin), with negative expression of epithelial (cytokeratin C117, EMA, and CEA) and neural (S100 protein) markers, thus confirming the diagnosis of high grade pancreatic leyomiosarcoma (Figure 7).

DISCUSSION

Primary pancreatic leiomyosarcoma is a rare malignant neoplasm. It was first reported by Ross in 1951[10] and widely described by Baylor et al[1] who reported only 5 (0.1%) leiomyosarcomas among 5,057 pancreatic malignant tumours analyzed. So far only 73 case of PLSM have been described[2,11-14] in world-wide literature, mainly as case reports.

Leyomiosarcoma can more frequently originate from the stomach, duodenum, and retroperitoneal organs and then invade the pancreas, mimicking a primary pancreatic neoplasm[2]. Therefore, so as to make a diagnosis of a primary PLMS it is mandatory to exclude the presence of a tumour arising from other surrounding organs[14]. PLMS, in fact, is considered to originate either from the smooth muscle region of the pancreatic ducts or the wall of small intra-pancreatic vessels[4]. In our case we observed the growth of the neoplasm surrounded by pancreatic parenchyma, without any infiltration of the next organs confirming the pancreas as the primary site.

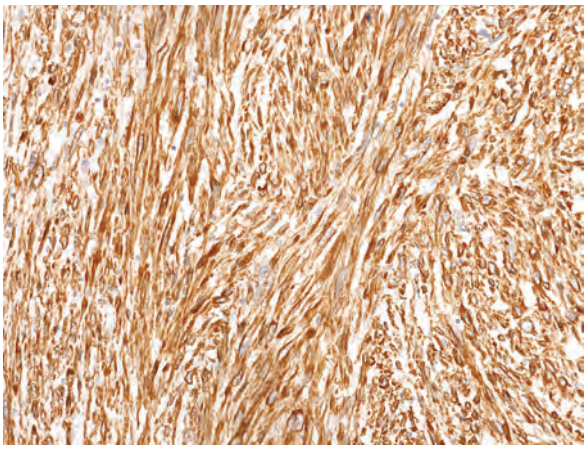

Figure 7. Immunohistochemical staining for α-smooth muscle actin (x20).

PLMS is often incidentally detected and the tumour tends to be already large at the time of the diagnosis. When symptomatic, it can determine abdominal pain, vomiting, weight loss, without however any specific symptom[2,11-14]. PLMS can be easily detected as rapid growing mass on imaging with cystic or necrotic areas due to tumour volume rapid increase[12,15]. Location within the gland is not specific with a similar incidence between head/body/tail[2] and lymphatic involvement has been proven to be rare, as reported also in our case, with a predominant local growth with distant metastasis. The only effective treatment, is complete surgical resection. When surgery is not feasible for an advanced stage prognosis is poor. As reported by Xu et al[2] 1- and 3-year survival rates for patients who underwent radical resection were respectively 80.5% and 72.2% while for those who did not 40.3% and 0%, thus clearly demonstrating that all patients affected by by PLMS should undergo curative resection with wide margins.

This is the first case of robotic DP for PLMS ever performed so far to our knowledge.

Minimally invasive pancreatic surgery has recently changed the approach to patients affected by pancreatic neoplasms, trying to address every single patient to the most suitable surgical technique case by case, once banned to a necessary wide laparotomy.

Laparoscopic DP has been well described[16-19] and the vast majority of authors agree that it is a technically challenging procedure, requiring high laparoscopic skills. On the other hand laparoscopic DP can present some limitation such as the indication on the *Achilles' heel* of a high percentage of conversion to open surgery[3]. For some authors[3,20], some concerns can be arisen regarding the oncological safety of this procedure. Robotic DP indeed is supposed to overcome this limitations: due to the high possibility of movement of the surgical equipment, the elimination of the trembling effect and 3D vision supplied by the robot, the surgeon is he facilitated in performing haemostasis, controlling big vessels such as the splenic artery, mesenteric veins as well as the entire small vascular structures surrounding the pancreas, performing a gentle, safe and accurate dissection similarly to that of open surgery[3,21]. Furthermore what is notably is that during robotic procedures surgeon is comfortably seated thus getting rid of the fatigue-effect induced by long lasting procedures, and all this advantages are supposed to reduce the rate of conversion[3].

CONCLUSIONS

We believe that robotic DP performed in our patient affected by PLSM was the best treatment ever possible combining good oncological result together with the advantages of minimally access surgery.

Conflict of Interests:
The Authors declare that they have no conflict of interests.

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