CASE REPORT JSLS

Laparoscopic Enucleation of a Nonfunctioning Neuroendocrine Tumor at the Head of the Pancreas

Nikhil Singh, MS (Ind), PDC, Chung-Yau Lo, MS (HK), FRCS (Edin), Wai-Fan Chan, FRCS (Edin)

ABSTRACT

Objective: Laparoscopy is a safe, feasible technique for benign pancreatic pathologies and has been increasingly reported for neuroendocrine tumors located at the body and tail of the pancreas. We report a case of successful enucleation of a nonfunctioning neuroendocrine tumor located at the head of the pancreas, in a patient with multiple endocrine neoplasia type I.

Methods: A 5-cm nonfunctioning neuroendocrine tumor at the pancreatic head was identified by computerized tomography scan. Laparoscopic ultrasound did not reveal additional tumors on any other part of the pancreas.

Results: Enucleation was successfully performed for this solitary tumor because of its favorable position. Histology revealed an islet cell tumor. No postoperative complications occurred and recovery was rapid.

Conclusion: Laparoscopic enucleation of neuroendocrine tumor at the pancreatic head is safe and feasible for select patients.

Key Words: Pancreatic neuroendocrine tumor, Laparoscopy, Enucleation, Pancreatic head, Multiple endocrine neoplasia type I, Outcome.

INTRODUCTION

Laparoscopic resection of the pancreas has been increasingly reported for benign pancreatic pathologies. Most of these reports have described the safety and feasibility of laparoscopic pancreatic resection for benign pancreatic lesions including neuroendocrine tumors located at the body or tail of pancreas.[1–5] Enucleation was preferred to resection for neuroendocrine tumors located at the pancreatic head, because of the commonly benign nature of the tumor and the need to preserve pancreatic function. However, attempts at laparoscopic resection of neuroendocrine tumors located at the head of the pancreas were not infrequently converted to an open procedure due to technical difficulties or the inability to localize the tumor during laparoscopy.[1,6]

We report a case of successful laparoscopic enucleation of a nonfunctioning neuroendocrine tumor located at the head of the pancreas, in a patient with multiple endocrine neoplasia type I (MEN I) syndrome. To our knowledge, only 2 previous reports exist on successful laparoscopic enucleation of insulinoma at the head of the pancreas[1,5] but none on nonfunctioning neuroendocrine tumors.

CASE REPORT

A 26-year-old Chinese woman was diagnosed with MEN I syndrome based on a positive family history and the presence of associated endocrinopathies. She had hyperprolactinemia due to a pituitary micro-adenoma and had also undergone a subtotal parathyroidectomy for parathyroid hyperplasia. She presented with a ruptured left ovarian cyst. A right ovarian cystectomy and a left salpingo-oophorectomy were performed. A histological examination showed a teratoma with a small carcinoid component in the left ovary. Postoperative computed tomography revealed an incidental mass lesion located at the pancreatic head **(Figure 1)**.

The patient's subsequent workup indicated normal hematology and clinical chemistry. Her hormonal profile revealed a mildly elevated chromogranin A level of 21 U/L (normal 2 U/L to 18 U/L) but normal fasting levels of insulin, gastrin, glucagon, somatostatin, and neuron-specific enolase. Urine for 5-hyroxyindole acetic acid (HIAA) was within normal limits. Preoperative endoscopic

Department of Surgery, University of Hong Kong Medical Centre, Queen Mary Hospital, Pokfulam, Hong Kong, China (all authors).

Address reprints request to: Chung-Yau Lo MS (HK), FRCS (Edin), Division of Endocrine Surgery, Department of Surgery, University of Hong Kong Medical Centre, Queen Mary Hospital, Pokfulam, Hong Kong, China. Telephone: 852 28554760, Fax: 852 28172291, E-mail: cylo@hkucc.hku.hk

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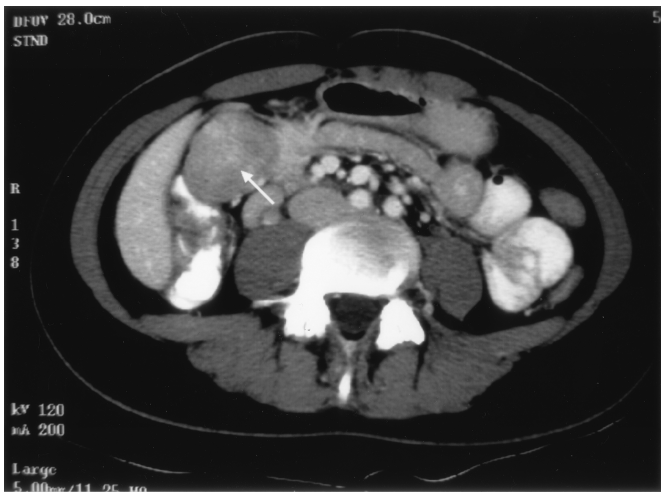

Figure 1. Computed tomographic scan showing a neuroendocrine tumor at the head of the pancreas in the patient.

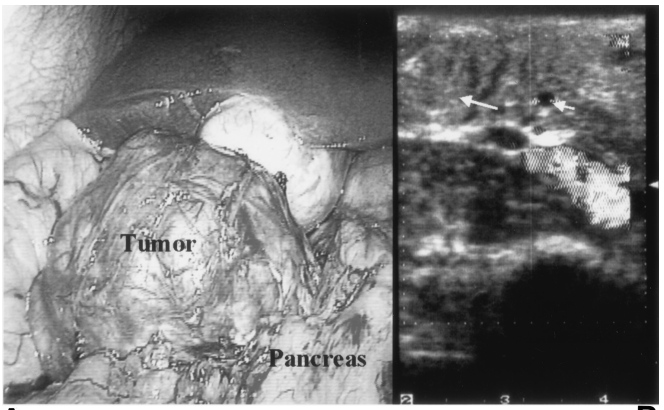

Figure 3. Intraoperative photo of the tumor located at the head of the pancreas (A) and the laparoscopic ultrasonographic appearance of the tumor as pointed out by big arrow and its relationship to the pancreatic duct as shown by the small arrow (B).

ultrasonography failed to confirm the location of the pancreatic head lesion. Laparoscopy with the aim of pancreatectomy was planned. Laparoscopy was performed using four 11-mm ports with the patient in the supine position **(Figure 2)**. A 5x4-cm tumor was found located at the anteroinferior surface of the head of the pancreas medial to the gastroduodenal artery **(Figure 3)**. A laparoscopic ultrasound probe 10 mm in diameter with a frequency of 8 MHz (Sharplan, Honey–Vclave Medical, NJ, USA) was performed to delineate the location of the tumor in relation to the pancreatic duct, and to detect any additional tumors located on the body and tail of pancreas **(Figure 3)**. Enucleation under laparoscopy was chosen because of the favorable anatomic position of the tumor and the absence of multiple tumors on the body and tail of the pancreas. With the combined use of hook cautery and ultrasonic dissector (Olympus Sonosurg, Olympus Optical Company Limited, Tokyo, Japan), the tumor was enucleated uneventfully **(Figure 4)**. Fibrin glue (Tissel/Tissucol TM, Immuno AG, Vienna) was sprayed to the enucleated surface of the pancreas, and an omental patch was used to reinforce the enucleated site. The operative time was 165 minutes with an estimated blood loss of 50 mL. A silicone closed-suction drain was inserted next to the enucleated pancreatic bed. Postoperative recovery was uneventful

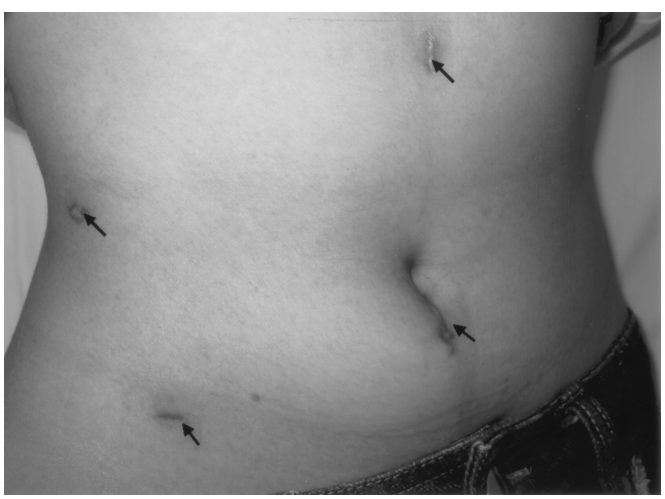

Figure 2. Postoperative photograph taken at one month after the operation to illustrate the position of the port sites (illustrated by arrows).

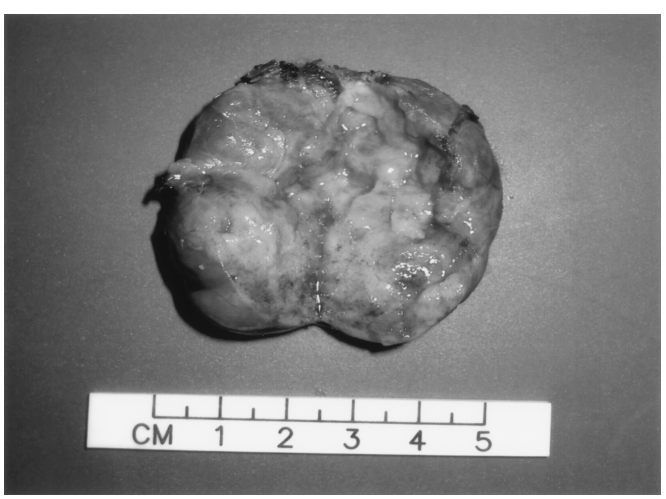

Figure 4. Photo of the resected specimen showing a 5x4x2.5-cm well-circumscribed fleshy pancreatic neuroendocrine tumor.

with minimal analgesic requirements. The drain was removed on postoperative day 3, and the patient was discharged on the same evening. The histopathology revealed an islet cell tumor with no vascular invasion and the margins were clear of tumor. Immunophenotyping was strongly positive for chromogranin, with focal positivity for insulin, somatostatin, and serotonin. The serum chromogranin A level returned to normal (8.0 U/L) at 1 month, and no evidence of recurrence was found at 6 months.

DISCUSSION

Pancreatic endocrine tumors (PET) not associated with any clinical symptom of hormone oversecretion are classified as nonfunctioning. They are rare but account for 15% to 50% of PET, and approximately 5% to 10% of MEN I patients develop nonfunctioning PETs during the course of the disease. The majority of nonfunctioning tumors arise at the head of the pancreas, and conventionally, a Whipple¡ s procedure is frequently advocated for these tumors.[7] For tumors of the endocrine pancreas, the surgical approach adopted aims at complete resection of the tumor with maximal preservation of normal pancreatic tissue.[7] Solitary benign nonfunctioning neuroendocrine tumors of the pancreas can be removed by enucleation or by pancreatic sparing surgery.[8] For multiple benign nonfunctioning neuroendocrine tumors of the pancreas in MEN 1 patients, controversy exists as to the optimal treatment, and a conservative single or multiple enucleation competes with a more radical resection or partial pancreatectomy.[2] Reports exist of open simple enucleation of multiple PET with varying degree of success in MEN 1 patients,[9,10] although controversy still exists with regard to the adoption of laparoscopy and laparoscopic pancreatectomy for PET in MEN 1 patients.

Laparoscopic resection of pancreatic islet cell tumors was first described in 1996.[3] Since then, an increasing number of reports have been published on successful laparoscopic partial pancreatectomy and enucleation for PET.[1–6] With the advancement in better preoperative imaging techniques and intraoperative localization with laparoscopic ultrasound, open exploration with bimanual palpation of the pancreas may not be absolutely necessary. Recent reports on the use of laparoscopic ultrasound have shown a success rate of 80% to 100% in efficiently localizing and outlining the margins of pancreatic tumors.[4–6] This has enabled the surgeon to apply a more focused approach based on the intraoperative findings guided by laparoscopic ultrasound. Although laparoscopic ultrasonography seems to obviate the need for exploring the entire pancreas to detect multiple tumors, its accuracy should be evaluated further.

Laparoscopic enucleation of PET located at the head of the pancreas infrequently require conversion to an open surgical procedure because of the unfavorable location of the tumor or the inability to locate the tumors.[1,6] There have only been 2 reports of successful enucleation of an insulinoma from the head of the pancreas, but the exact position of the tumor at the head of the pancreas has not been described.[2,4] On the other hand, laparoscopic pancreatic resection is safe and feasible for insulinomas located on the body and tail of the pancreas.[5] In this case, we attempted to apply this technique to a PET located at the head of the pancreas. Laparoscopic enucleation of the solitary PET was feasible in this patient because of the favorable position and solitary nature of the tumor. The use of laparoscopic ultrasound to identify the tumor and to determine its relation to the pancreatic duct has contributed to surgical success. The return of the levels of chromogranin A, which is a sensitive marker of PET in MEN I patients,[11] back to normal indirectly reflects the effectiveness of the surgical treatment. However, follow-up surveillance with imaging and endoscopic ultrasonography is necessary to monitor the development of additional tumors, especially at the body and tail of the pancreas due to the multicentric and multifocal nature of the disease process.

CONCLUSION

Laparoscopic enucleation of neuroendocrine tumors of the pancreatic head is safe and feasible for select patients. It can be applied to patients with MEN I syndrome, and this procedure can be combined with a distal subtotal pancreatectomy. This operative strategy offers all the benefits of minimally invasive surgery when it can be successfully performed.

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