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

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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 pancreas1,5 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-hydroxyindole acetic acid (HIAA) was within normal limits. Preoperative endoscopic
ultrasonography failed to confirm the location of the pancreatic head lesion. Laparoscopy with the aim of pancreatic resection 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 1. Computed tomographic scan showing a neuroendocrine tumor at the head of the pancreas in the patient.

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

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).

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 re-
moved on postoperative day 3, and the patient was dis-
charged on the same evening. The histopathology re-
vealed an islet cell tumor with no vascular invasion and
the margins were clear of tumor. Immunophenotyping
was strongly positive for chromogranin, with focal posi-
tivity 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 clas-
sified 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 non-
functioning neuroendocrine tumors of the pancreas in
MEN 1 patients, controversy exists as to the optimal treat-
ment, and a conservative single or multiple enucleation
competes with a more radical resection or partial pancre-
atomy.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 pancreatic
tomy 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 laparo-
scopic partial pancreatectomy and enucleation for PET.1–6
With the advancement in better preoperative imaging
techniques and intraoperative localization with laparo-
scopic ultrasound, open exploration with bimanual pal-
pation 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 local-
izing and outlining the margins of pancreatic tumors.3–6
This has enabled the surgeon to apply a more focused
approach based on the intraoperative findings guided by
laparoscopic ultrasound. Although laparoscopic ultra-
sonography 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 lo-
cated 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, fol-
low-up surveillance with imaging and endoscopic ultra-
sonography 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 ben-
efits of minimally invasive surgery when it can be success-
fully performed.

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