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Multivisceral central pancreatectomy for pancreatic neuroendocrine tumor: A case report on a novel surgical technique

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ABSTRACT

INTRODUCTION: Central pancreatectomy (CP) is considered a viable alternative to subtotal distal pancreatectomy, for lesions involving the neck or proximal pancreatic body. Multivisceral central pancreatectomy (MVCP) for locally advanced tumors of the pancreatic body remains unreported.

PRESENTATION OF CASE: We hereby report a case of locally advanced pancreatic neuroendocrine tumor (NET) with gastric involvement. The patient underwent successful central pancreatectomy with subtotal gastrectomy for locally advanced NET of the pancreas. In the follow up period, relevant complications like pancreatic insufficiency or pancreatic fistula were not encountered. The patient is doing well more than ten months after resection.

DISCUSSION: A MVCP can be considered in patients with limited pancreatic involvement, as long as sufficient pancreatic parenchyma can be preserved. Additional organ involvement mandating resection should not be considered a contra indication to this procedure. With careful surgical planning and meticulous technique, risk of post operative complications after MVCP can be minimized with added benefit of long term endocrine and exocrine integrity.

CONCLUSIONS: CP is a viable alternative and can be performed with adjacent organ resection, with acceptable post operative outcomes.

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1. Introduction

Pancreatic resection remains a well established treatment modality for patients with benign and malignant pathologies involving the pancreas. While pancreaticoduodenectomy (PD) and distal pancreatectomy (DP) have well defined indications, clinical utility of central pancreatectomy (CP) for tumors involving the pancreatic body remains less well defined [1]. Broadly speaking, CP is indicated for small (<5 cm), benign tumors, located in the neck or proximal pancreatic body [2,3]. Adjacent organ involvement, large size and malignancy are considered contraindications for CP [1,3,4]. Operative morbidity, particularly post operative pancreatic fistula (POPF) rates, continue to be the Achilles heel of CP. In a recently conducted meta analysis, CP had lower risk of endocrine (OR = 0.14, P < 0.001) and exocrine insufficiency (OR = 0.14, P < 0.001) but high

rates of post operative pancreatic fistula (POPF) (OR = 1.6, P = 0.01) [1]. Improvements in surgical techniques and enhanced territorial familiarity have greatly improved outcomes of complex pancreatic resections [5–8]. In line with this, attempts have been made to broaden the indications for CP. In fact CP has been performed occasionally for large (tumor size >5 cm), benign tumors and small pancreatic adenocarcinoma [9,10].

We hereby share our experience with a patient diagnosed with locally advanced well differentiated neuroendocrine tumor of the pancreatic body with gastric involvement who underwent multivisceral central pancreatectomy (MVCP). The aim of the present work is to demonstrate the clinical utility of central pancreatectomy with adjacent organ resection in pancreatic neck/body tumors. The work has been reported in line with the SCARE criteria [11].

2. Case report

A 29 years old, Male was seen in the clinic in January, 2020 with past history of abdominal pain, hematemesis, and melena. At presentation, his hemoglobin was 7.1 mg/dl, platelet count was 375,000/ul, and WBC count was 7800/ul. His liver and renal

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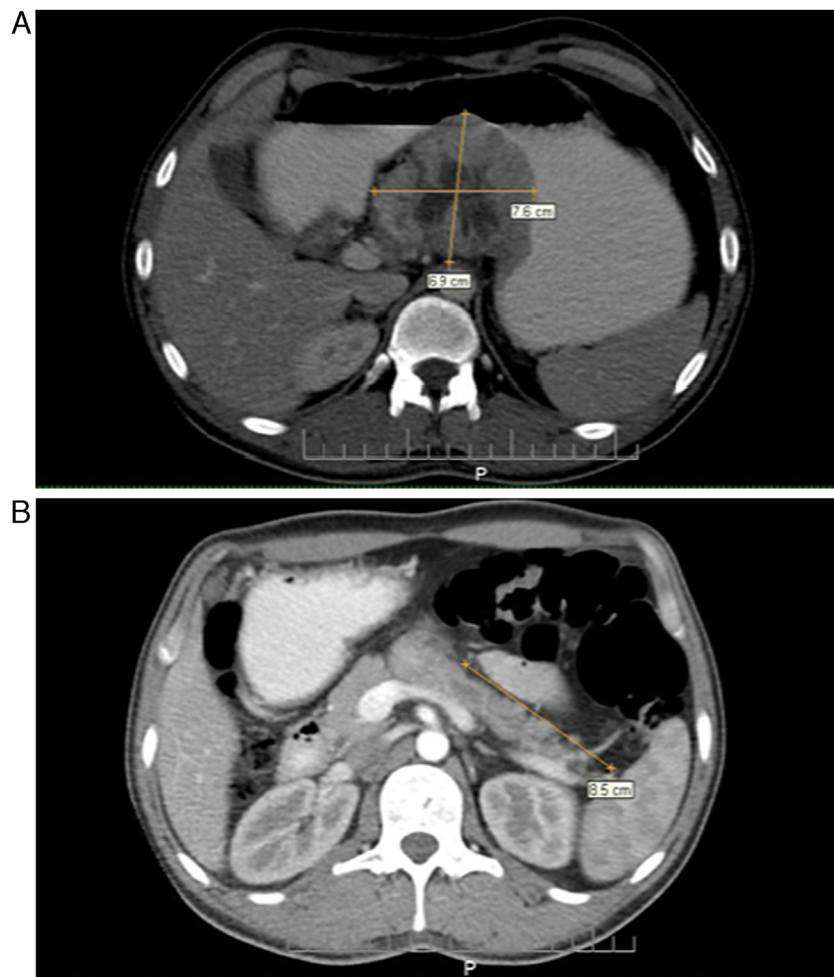


Fig. 1. a Heterogeneous solid mass originating from the neck and body of the pancreas b: Cross sectional imaging showing adequate distal pancreatic remnant.

function tests, amylase and lipase were normal. His past history was significant for acute pancreatitis 4 months ago for which he required hospital admission. There was no relevant drug history, family history or psychosocial history. A multiphase CT scan showed a 7.6 cm heterogeneous solid mass originating from the neck and body of the pancreas with good distal pancreatic remnant (Fig. 1a and b). On esophago gastro duodenoscopy, compression of the posterior wall of the stomach near the lesser curvature was noted, with a giant ulcer. Endoscopic ultrasound (EUS) showed a solid cystic lesion arising from the pancreas. Biopsy was performed and fluid sent for amylase and carcinoembryonic antigen (CEA). The fluid CEA was 1.5 ng/mL, amylase was 40 U/L and glucose was 77 mg/dl. His serum CA 19-9 was 7.7 U/mL. EUS guided biopsy confirmed a neoplasm with differentials including pancreatic neuroendocrine tumor and acinar cell carcinoma. The patient was discussed in multi disciplinary team meeting and was planned for pancreatic resection +/- partial gastric resection. The surgery was performed by AHB. The primary surgeon has a clinical experience of more than 200 pancreatic resections and more than 800 liver transplant procedures. Intra operative findings included a large tumor arising from the pancreatic body predominantly involving the lesser curvature of the stomach. Keeping in mind, the patient's history of pancreatitis, limited neoplastic involvement of the pancreatic body, and sizeable distal pancreatic remnant, the surgeon (AHB) decided to proceed with central pancreatectomy and subtotal gastrectomy (Fig. 2). Reconstruction was performed with end to side gastrojejunostomy and distal pancreaticojejunostomy over a Roux loop. The proximal transected

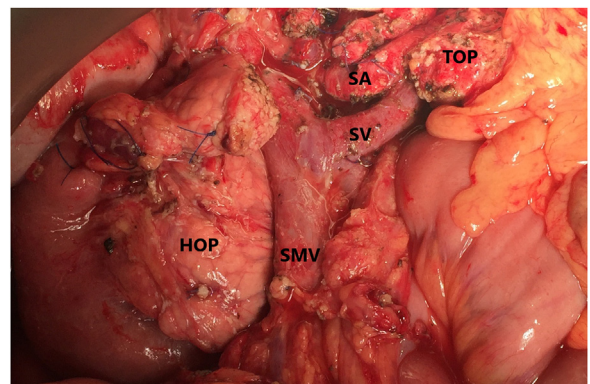


Fig. 2. Intra operative picture after central pancreatectomy. HOP head of pancreas; SA splenic artery; SMV superior mesenteric vein; SV splenic vein; TOP tail of pancreas.

pancreatic margin was sutured off. Intra operative blood loss was 200 mL. The operative and post operative course was unremarkable and the patient stayed in surgical intensive care unit for one day. The patient was discharged on 6th post operative day when he was tolerating liquid diet. The histopathology confirmed the diagnosis of well differentiated neuroendocrine tumor with Ki- 67 upto 10% and strong positivity for CD56 (Fig. 3). One out of 17 lymph nodes was positive for metastasis. Post operatively, the patient received 6 cycles of Etoposide and Cisplatinium. The

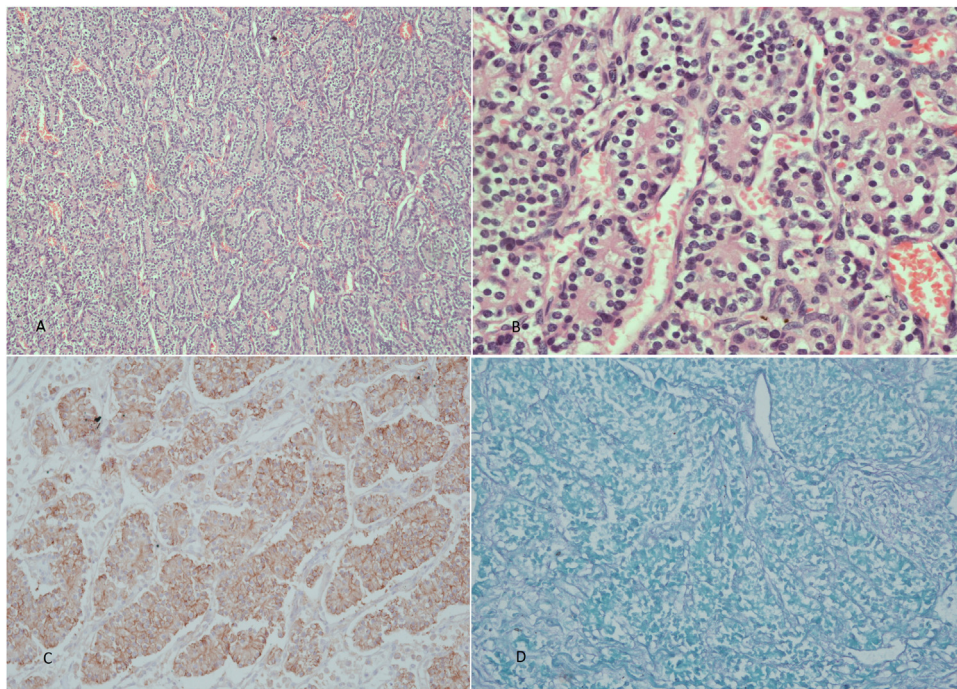


Fig. 3. a and b: Characteristic trabeculae and organoid arrangement of tumor cells with minimal nuclear atypia, c: CD56 is strongly positive, d: Periodic acid–Schiff–diastase fails to highlight intra cytoplasmic granules favoring diagnosis of NET.

Table 1
Description of previous reports on central pancreatectomy for tumors >5 cm.

Authors	Minieri et al. [9]	Dokmak et al. [14]	Celis et al. [15]
Age/Sex	17/female	24/female	Not mentioned
Diagnosis	Large solid pseudo papillary tumor of pancreas	Large solid pseudo papillary tumor of pancreas	Islet cell tumor = 3, Mucinous cystadenoma = 1
Tumor Size (cm)	10	6	9.5, 5.5, 7.0, 5.5
Adjacent organs involvement	None	Compression of the mesenterico portal and splenic veins	None
Surgical Procedure	Central Pancreatectomy	CP with resection of splenic vessels	Central Pancreatectomy
Post-operative outcomes	Uneventful	Uneventful	Uneventful
Follow-up	Remains well after 15 years	No pancreatic insufficiency or recurrence of tumor	Remain well after 17-month follow-up

patient has no complaints, enjoys a normal life and is back to work again. He remains well ten months after surgery and completion of chemotherapy.

3. Discussion

Conventionally, large central tumors, tumors with high malignant potential, and ones requiring additional organ resection are not deemed amenable to CP. In these aforesaid tumors, subtotal DP has remained the modality of choice [1]. The argument in favor of DP, and one that precludes the frequent uptake of CP, draws upon the higher rates of POPF with CP. However, CP preserves the functional pancreatic remnant and thus lowers the risk of post-operative pancreatic insufficiency [3,4,12,13]. The clinical utility of CP therefore warrants due deliberation as a viable surgical modality.

Very few reports have demonstrated clinical utility of CP in patients with large (>5 cm) tumors of pancreatic body as shown in Table 1.

Dokmak and colleagues performed extended laparoscopic CP for a 6 cm solid pseudo papillary tumor (SPPT) of the pancreas. The patient had signs of portal hypertension due to compression of the mesenterico portal and splenic veins. The authors concluded that CP can be an effective treatment modality for resection of large

central tumors [14]. In another case, long term event free survival was demonstrated for a 10 cm SPPT of pancreatic body after CP [9]. Celis and colleagues reported on four patients with non-malignant tumors of the pancreatic body, ranging in size from 5.5 cm to 9 cm with no post operative complications [15].

The authors believe that in the current scenario, certain technical aspects led to the adoption of this novel technique in our patient. Firstly, with a subtotal gastrectomy, the gastric remnant was entirely dependent on short gastric arteries (SGA) originating from splenic artery (SA). Due to previous episodes of pancreatitis, there were dense adhesions between SA and pancreas with imminent risk of damage to SA. This would compromise blood supply to the gastric remnant and mandate an esophago-jejunostomy. Moreover, only 4 cm of the proximal pancreatic body appeared to be macroscopically involved with the tumor. Complete tumor extirpation was possible with negative margins confirmed on frozen section. Furthermore, with a sizeable distal pancreatic remnant, a distal subtotal pancreatectomy would sacrifice a large portion of functioning pancreatic parenchyma. We have previously demonstrated low rates of POPF after pancreatic resections comparable to high volume centers [5]. Preservation of large distal pancreatic remnant to reduce risk of future pancreatic insufficiency was prioritized over small risk of POPF. There is a room to be aggressive with CP and additional organ resection should not be a contra-indication

provided the procedure can be performed safely. Our patient had an unremarkable post-operative recovery and was discharged on the 5th post-operative day when he was able to tolerate liquid diet. The patient received Carboplatin and 5-fluorouracil as adjuvant chemotherapeutic regimen. More than six months after surgery, he continues to do well without any symptoms of pancreatic insufficiency.

4. Conclusion

In carefully selected patients, large tumors of the pancreatic body, with adjacent organ involvement, can be managed with multivisceral central pancreatectomy (MV-CP). In particular with benign or low grade tumors, where long term survival is anticipated, quality of life should be given precedence and endocrine and exocrine function should be preserved. In centers with experience, a MV-CP should be associated with low risk of operative complications and can be a useful addition in the surgical armamentarium.

Declaration of Competing Interest

The authors report no declarations of interest.

Funding

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Ethical approval

Ethical approval to report this case was obtained from the IRB and ethics committee of Shifa International Hospital (IRB # 303-1123-2020).

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

Abu Bakar Hafeez Bhatti performed the surgery and contributed to the concept, interpretation and writing.

Zujaja Hameed, Shahzad Riyaz and Talal Almas contributed to data collection and writing.

Adeel Ahmad contributed to concept and writing.

Registration of research studies

Not applicable.

Guarantor

Abu Bakar Hafeez Bhatti.

Provenance and peer review

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