Case Report

Pancreaticoduodenectomy in the Huge Pancreatic Neuroendocrine Carcinoma of Infancy: A Case Report

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Pancreatic neuroendocrine carcinoma is extremely rare in pediatric population. Huge abdominal mass is one of the most common presenting symptoms of malignant tumor in infants. Surgical resection is demonstrated as the best treatment for survival of neuroendocrine tumors. We presented a nine month-old infant with huge right abdominal mass. MRI revealed an abnormal, large well-defined mixed solid-cystic lesion at right retroperitoneal region, measured as 8.9x8.8x9.7 cm in size. We had performed a pyloric-preserving pancreaticoduodenectomy by using modified Blumgart's pancreaticojejunostomy anastomosis. A duct-to-mucosa was constructed under internal pancreatic duct stent without suture by using a cut ETFE sheath of the SAFELET CATH™ 24G. The pathology revealed pancreatic neuroendocrine carcinoma with a Ki-67 index of 80%. Immunostaining for chromogranin A and synaptophysin were positive, whereas CK7 and CK20 were negative. Post-operative care was uneventful. He received combined etoposide and cisplatin for adjuvant chemotherapy. After chemotherapy, an MRI revealed no evidence of tumor recurrence. Pancreaticoduodenectomy is a feasible and safe surgical method for the radical treatment of PNEC in infant. Modified Blumgart's pancreaticojejunostomy with duct-to-mucosa constructed under internal pancreatic duct stent without sutured is feasible for a very small pancreatic duct.

Keywords: *Neuroendocrine tumor, Pancreaticoduodenectomy, Pancreas*

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Pancreatic neuroendocrine carcinoma (PNEC) has been identified as the worst prognostic factor of neuroendocrine tumors (NETs)[1-3], which is extremely rare in pediatric population[4,5]. Pain and emesis are the common presentation of pancreatic tumors in the children[5], but in infants it is difficult to detected. Huge abdominal mass more commonly presents symptoms of a malignant tumor in infants. Surgical resection is demonstrated as the best survival for treatment of NETs[1,2]. We reported the pancreaticoduodenectomy in a huge PNEC of head of pancreas in an infant.

Case Report

A 9 month-old infant presented with progressive abdominal distension for two months, frequent flatulence and loss 1-kg weight in one month. Physical examination showed a huge right abdominal mass, fixed to retroperitoneal structure. Ultrasonography demonstrated a large right abdominal heteroechoic mass of 9 cm in width, suspected as large neuroblastoma of right adrenal gland. His pre-operative level of alpha- 1-fetoprotein (AFP) was 6.22 ng/ml (normal ranged <10 ng/ ml).

Magnetic resonance imaging (MRI) revealed a large well-defined mixed solid-cystic lesion in retroperitoneal region crossing midline of the abdomen, measuring 8.9x8.8x9.7 cm in size. The lesion exhibited iso-signal intensity on T1W (Fig. 1A), slightly hyper-signal intensity on T2W (Fig. 1B), restricted diffusion with heterogeneous enhancement and caused pressure effects to IVC, main portal vein, splenic vein and SMV. The outline of pancreatic head was ill-defined, suspecting tumor originated from pancreatic head. The pre-operative diagnosis was pancreatoblastoma.

We had performed a pyloric-preserving pancreaticoduodenectomy (PPPD). First, the hepatic flexure colon and duodenum were mobilized in order to visualize inferior vena cava (IVC) and aorta. Next, the mesentery of the jejunum was incised at the line between the Treiz ligament and the third portion of the duodenum to identify the superior mesenteric vein (SMV) and superior mesenteric artery (SMA) which

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were just below the pancreatic neck. The J1 arteries and the inferior pancreaticoduodenal artery (IPDA) were also identified. IPDA was ligated and divided just below the J1 artery, and the posterior tissues of the SMA and SMV were dissected completely. After the first part of duodenum was transected, the regional lymph nodes were dissected. The bile duct and pancreas were transected and the specimen was removed (Fig. 2A).

Pancreaticojejunostomy (PJ) was performed by using modified Blumgart's anastomosis[6]. Four stitches of the transpancreatic U-suture to posterior seromuscular layer of jejunum were placed interrupted (PDS™ 4/0, RB-1 needle, Ethicon) (Fig. 2B). After opening a small hole in jejunum, a duct-to-mucosa was constructed under internal pancreatic duct stent without suture by using a cut ETFE sheath of the SAFELET CATH™ 24G, Nipro (Thailand) due to pancreatic duct diameter less than 1 mm (Fig. 2C). There interrupted sutures of the pancreas-to-seromuscular layer of jejunum (PDS™ 4/0, RB-1 needle, Ethicon) were then created for closure anterior anastomosis.

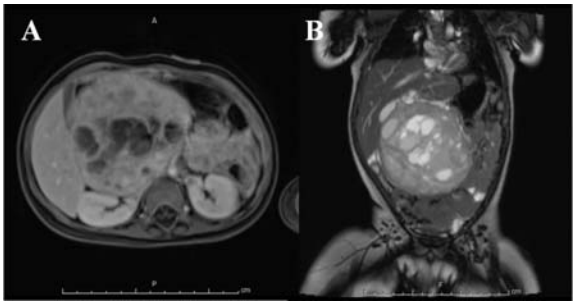

Fig. 1 Magnetic Resonance Imaging revealed post gadolinium T1W axial view (A), and T2W coronal view (B).

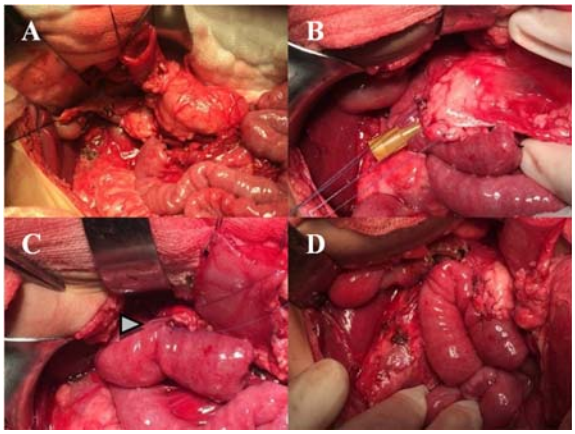

Fig. 2 Post pancreaticoduodectomy (A), pancreaticoje junostomy was performed by using modified Blumgart's anastomosis (B, C), with a cut ETFE sheath of the SAFELET CATH™ 24G (arrow), and post pancreaticojejunostomy and hepaticodochojejunosotmy (D).

Hepaticodocholjejunostomy (HDJ) was constructed under interrupted fashion (PDS™ 4/0, RB-1 needle, Ethicon). Duodenojejunostomy was performed using continuous running suture (PDS™ 4/0, RB-1 needle, ETHICON) (Fig. 2D).

The resected specimen showed a tan-red lobulated mass of head of the pancreas, measuring 12x12x8 cm. The cut surface of the mass revealed dark brown tissue with hemorrhage. Two peripancreatic lymph nodes and one hepatoduodenal lymph node were presented. Microscopy of the tumor demonstrated malignant pancreatic endocrine carcinoma (PNET, grade 3) with lymphovascular invasion. The tumor extended to serosal layer of the duodenum, but the margin of pancreas, bile duct and small intestine were free of tumors. Two peripancreatic lymph nodes were presented metastatic tumor and one hepatoduodenal lymph node were unremarkable. Immuno-histochemistry resulted in positive staining for chromogranin A, synaptophysin, and Ki-67 index of 80 to 90%, whereas negative straining for CK7 and CK20 were found.

Postoperative pancreaticoduodenectomy (PD) was uneventful. Drain was removed on the 7th postoperative day without pancreatic leakage. The patient received 6 cycles of complete dose of combined etoposide and cisplatin for postoperative adjuvant chemotherapy. After chemotherapy, four consecutive MRI and CT scans showed no definite evidence of tumor recurrence within 1 year and 3 months after the surgery. The patient's post-operative weight and height were in 50th percentile of the growth chart with normal milestones.

Discussion

Pancreatic tumor in children is extremely rare, according to TREP project in Italy, they estimated annual incidence for pancreatic cancers of 0.17 per million populations in the age of less than 18 years[4]. Pancreatoblastoma, pancreatic carcinoma and pancreatic neuroendocrine tumor are the three common tumors in children, whereas the most common tumor seen in adolescence is solid pseudopapillary tumor[4]. Pancreatic neuroendocrine tumor has been classified into G1, G2 and G3 or neuroendocrine carcinoma (NEC), which is based on mitotic activity and Ki-67 proliferation

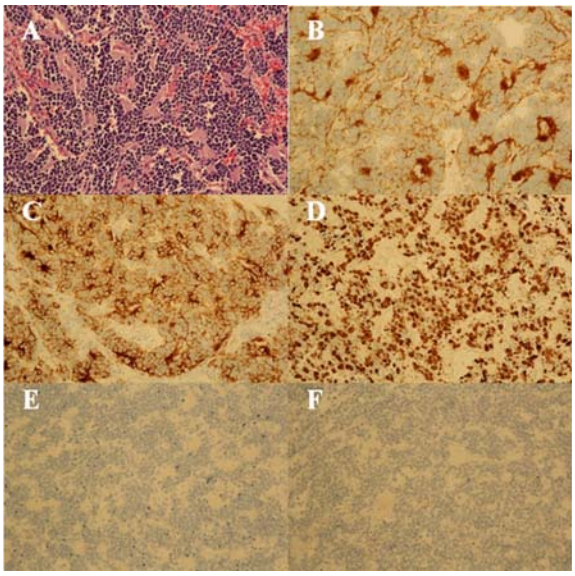

Fig. 3 Tumor cells showed small cell feature with nuclear molding and arranged in organoid pattern and rich fibrovascular meshwork on high power view of H&E staining (A), granular cytoplasmic Chromogranin A staining in tumor cells (B), intense granular cytoplasmic Synaptophysin staining (C), Ki67 (proliferative index) Positive intense nuclear staining in approximately 80 to 90% of tumor cells (suggested for G3 NET) (D), negative staining of Cytokeratin 7 (E) and Cytokeratin 20 (F).

index.

Currently, surgical resection is the treatment of choice for resectable pancreatic neuroendocrine tumors, which is included in the tumor stage of G3 and metastases[2]. Our report demonstrated PPPD for a huge pancreatic head mass with positive stain of Ki-67 proliferation index greater than 80%, which is used to diagnose neuroendocrine carcinoma. Although recently meta-analysis demonstrated that pancreaticogastrostomy (PG) was superior to pancreaticojejunostomy (PJ) only for reducing the incidence of the postoperative pancreatic fistula, the technique of pancreatic reconstruction is still debatable[7]. There are several RCTs, compared between duct to mucosa and invagination PJ, which have failed to demonstrate the differences in outcomes between the two techniques[8, 9]. In this present study, we performed non-suturing duct to mucosa with internal pancreatic duct stent under modified Blumgart's PJ anastomosis. Postoperative outcomes were uneventful.

Adjuvant chemotherapy after radical resection of pancreatic neuroendocrine was unclear, although NCCN guidelines for small cell lung cancer (SCLC) was recommended to be used for etoposide and cisplatin[10]. Because of locally advanced tumor and nodal metastases, we used combined etoposide and cisplatin for adjuvant chemotherapy.

Radical pancreatic resection in PNEC infancy demonstrated good oncological outcomes. Duct to mucosa pancreatic reconstruction in very small pancreatic duct can be feasible and has no clinical of pancreatic endo-exocrine insufficiency.

What is already known in this topic?

Pancreatic resection is the only potential curative treatment for pancreatic NETs.

What this study adds?

Pancreaticoduodenectomy in pancreatic NEC of infancy is feasible and demonstrated good oncological outcomes.

Acknowledgements

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Potential conflicts of interest

None.

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รายงานผู้ป่วยการผ่าตัด pancreaticoduodenectomy ในมะเร็งต่อไร้ท่อและระบบประสาทของตับอ่อนขนาดใหญ่ของทารก

ธราธิป ศรีสุข, วินัย ตันติยาสวัสดิกุล, สักการ สังฆมานนท์

มะเร็งต่อมไร้ท่อและระบบประสาทของตับอ่อนเป็นโรคที่พบน้อยมากในเด็กในเด็กทารกก้อนบริเวณท้อง ขนาดใหญ่เป็นหนึ่งในอาการที่พบบ่อยของเนื้องอก มะเร็งการผ่าตัดมะเร็งต่อมไร้ท่อและระบบประสาทเป็นการรักษาที่มีอัตรารอดชีวิตได้ยาวนานที่สุด เรานำเสนอเด็กชายอายุ 9 เดือนที่มีหน้าท้องขนาดใหญ่มาก MRI แสดงลักษณะก้อนแบบ solid-cystic ขนาดใหญ่ที่มีความผิดปกติบริเวณด้านหลัง ของช่องท้องขนาด 8.9x8.8x9.7 ซม. เราได้ทำการรักษาด้วยการผ่าตัด pancreaticoduodenectomy โดยวิธีการต่อตับอ่อนกับลำไส้เล็กได้ดัดแปลงจาก Blumgart ซึ่งไม่ได้เย็บระหว่างเยื่อบุแต่ใส่ท่อ stent โดยดัดแปลงใช้ท่อ ETFE ของ SAFELET CATHTM 24G ผลพยาธิวิทยาพบเป็นมะเร็งต่อมไร้ท่อ และระบบประสาทของตับอ่อนซึ่งดัชนี Ki-67 80% immunostaining สำหรับ chromogranin A และ synaptophysin ให้ผลเป็นบวกในขณะที่ CK7 และ CK20 มีผลเป็นลบ หลังผ่าตัดไม่มีภาวะแทรกซ้อนใด ๆ หลังผ่าตัดเขาได้รับยาเคมีบำบัด etoposideและ cisplatin เมื่อติดตามหลังจาก ได้รับเคมีบำบัดด้วย MRI ไม่พบหลักฐานการกลับเป็นซ้ำ ของมะเร็งการผ่าตัดแบบ pancreaticoduodenectomy เพื่อรักษามะเร็งต่อมไร้ท่อ และระบบประสาทของตับอ่อนในทารก สามารถทำได้และปลอดภัยวิธีการผ่าตัดต่อทางเดินอาหารกับตับอ่อนด้วยวิธีดัดแปลงจาก Blumgart และใช้ท่อค้ำระหว่างเยื่อบุของตับอ่อนโดยไม่ต้องเย็บ สามารถใช้ได้ในผู้ป่วยทารกที่ท่อตับอ่อนมีขนาดเล็กมาก