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Pancreas-sparing and superior mesenteric artery first approach in duodenal adenocarcinoma of the fourth portion of duodenum: A case report

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ABSTRACT

INTRODUCTION: Perioperative assessment of resectability in pancreas-sparing duodenectomy for distal duodenal (D3–D4) adenocarcinoma is challenging for surgeons.

PRESENTATION OF CASE: We report a 68-year-old man with biopsy-proven adenocarcinoma of the fourth portion of duodenum which had been diagnosed with upper endoscopy and CT. A pancreas-sparing duodenectomy with loco-regional lymph node resection using the superior mesenteric artery first approach was performed.

DISCUSSION: Adenocarcinoma of the fourth portion of duodenum is rare. It has non-specific symptoms. The diagnosis is difficult and is frequently delayed. Surgery is the only chance of cure. After perioperative assessment of resectability, with intraoperative ultrasound, complete exposition of the duodenum and entire dissection of the superior mesenteric artery (SMA) using the artery-first approach technique should be done to assess for tumor resectability, which should include the possibility of complete lymphadenectomy of the mesenteric root. If technically feasible, a pancreas-sparing resection should be preferred to avoid pancreatotomy-related morbi-mortality. The aim of the surgery is a R0 resection which has a 5-year survival rate between 25% and 75%.

CONCLUSION: Artery-first approach of the SMA should be considered by surgeons in adenocarcinoma of the distal duodenum to identify any contra-indications to proceed further.

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1. Introduction

Perioperative assessment of resectability in pancreas-sparing duodenectomy for distal duodenal (D3–D4) adenocarcinoma is a challenging task for surgeons. Duodenal adenocarcinoma is a rare lesion that represents 0.3% of all malignant tumors of the gastrointestinal tract [1,2]. Surgery is the only chance of cure. The lesion usually occurs in patients older than 65 [1,3]. The third and the fourth portions of the duodenum are frequently involved [1,2,4]. As symptoms are uncommon, the diagnosis is generally delayed [3,4]. The prognosis is very poor, regardless of the stage of the disease. The 5-year survival can be as low as 14% for unresectable lesions but can reach to 75% if a complete resection is carried out [4,5]. Here we report a patient who underwent pancreas-sparing duodenectomy of the third and fourth portions of duodenum for a duodenal adenocarcinoma of the fourth portion of duodenum using the superior mesenteric artery (SMA) first approach. The article has been

reported in line with the SCARE criteria [6] and PROCESS criteria [7].

2. Presentation of case

A 68-year-old man who suffered from intermittent abdominal pain, nausea, diarrhea and weight loss of 10 kg for 3 months was hospitalized at our University. A fecal occult blood test and abdominal ultrasound previously requested by a general practitioner were normal. On admission, blood tests were within normal ranges. An abdominal computed tomography with intravenous contrast enhancement was then carried out which revealed a 4 cm lesion located between the third and the fourth portions of the duodenum. There was proximal distention of the duodenum and the stomach (Fig. 1).

Upper gastrointestinal endoscopy and histopathology of the biopsied specimens demonstrated a high grade dysplastic tubulovillous adenoma with focal development of adenocarcinoma which had invaded the mucosa. The tumor marker carbohydrate antigen 19-9 (CA 19-9) was slightly increased (52.8 kU/l, normal range lower than 37 kU/l) whereas the carcinoembryonic antigen (CEA) was within the normal range (2.8 µg/l). 18-FDG PET-CT showed

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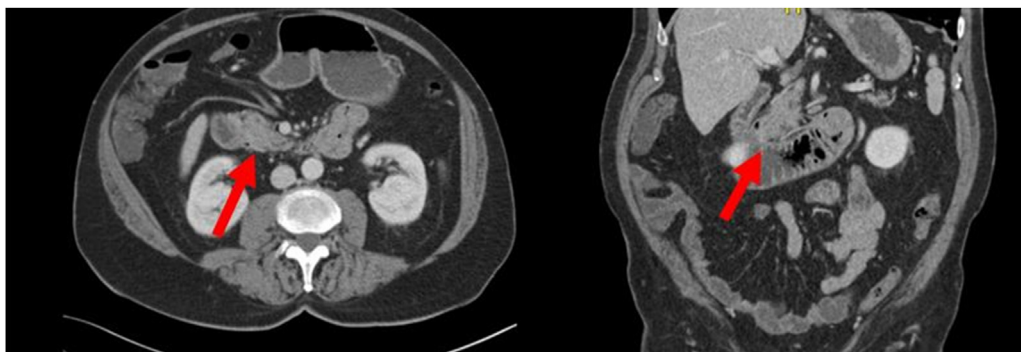


Fig. 1. Portal contrast enhancement abdominal CT revealing a duodenal neoplasia (red arrow).

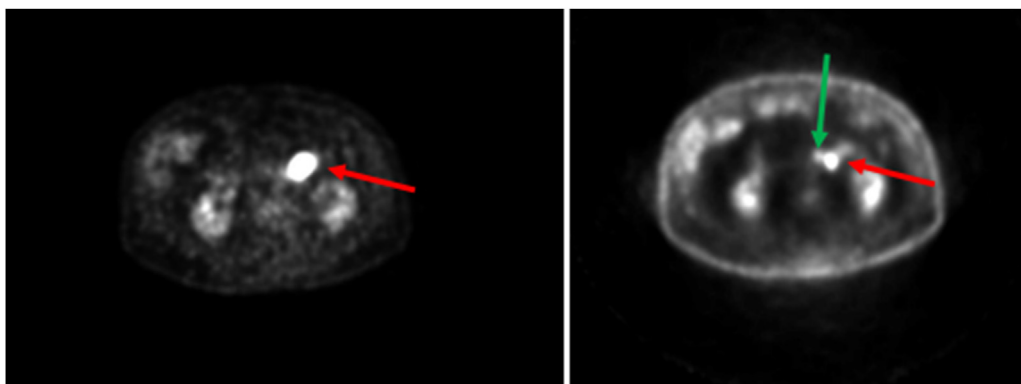


Fig. 2. PET CT showing the duodenal neoplasia (red arrow) and the mesenteric lymph node (green arrow).

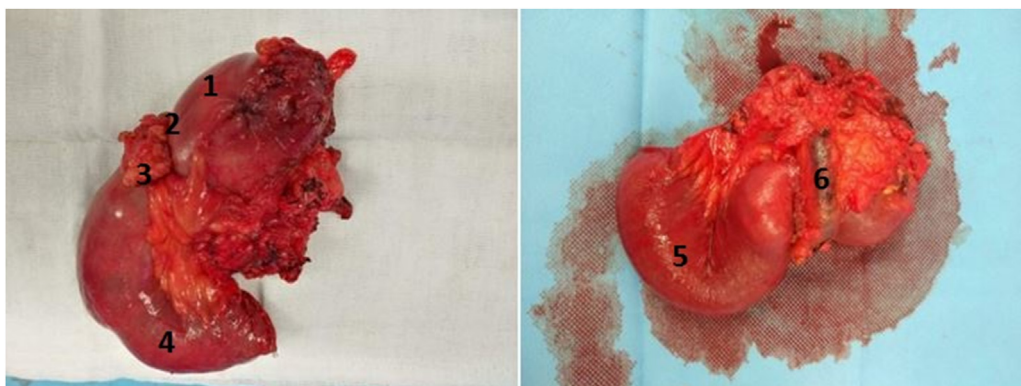


Fig. 3. Resected specimen: Distal duodenum and inferior mesenteric vein.

1: Dilatation of the second and third duodenum; 2: Duodenal lesion; 3: Fourth duodenum; 4: Jejunum; 5: Duodenum; 6: Inferior mesenteric vein.

activities at the last portion of duodenum, in one mesenteric lymph node (Fig. 2), and in two other focal points in the small intestine and the left colon.

Laparotomy was carried out. Resectability was first assessed by the absence of liver metastasis on peroperative ultrasound, followed by exposing completely the third and the fourth parts of the duodenum through a Cattell-Braasch and a Kocher maneuvers. Any SMA involvement was assessed through entire dissection of its proximal part. The serosa of the distal portion of duodenum and the inferior mesenteric vein were found to be invaded. A pancreas-sparing en-bloc resection of a part of the second, the third and fourth portions of duodenum combined with loco-regional lymph node dissection around the portal vein and superior mesenteric artery were performed (Figs. 3–4). A R0 resection were achieved after dividing the first two jejunal arteries. Excision of the lesion

was carried out after identification of the major duodenal papilla, which had previously been catheterized by a transcystic drain. The digestive continuity was restored by a side-to-side hand-sewn duodeno-jejunal anastomosis.

Histopathology demonstrated a poorly-differentiated adenocarcinoma with full-thickness invasion and extension beyond the wall with infiltration into the perivisceral fat (Fig. 5). Four of 19 lymph nodes procured were involved by tumor. The resection margins were negative (R0). According to the TNM classification, the adenocarcinoma was pT4N2 Mx.

For the two others FDG uptake lesions shown in the pre-operative PET-CT, a grade 1 neuroendocrine tumor invading the submucosal layer of the ileum and a diverticulitis of the left colon were demonstrated.

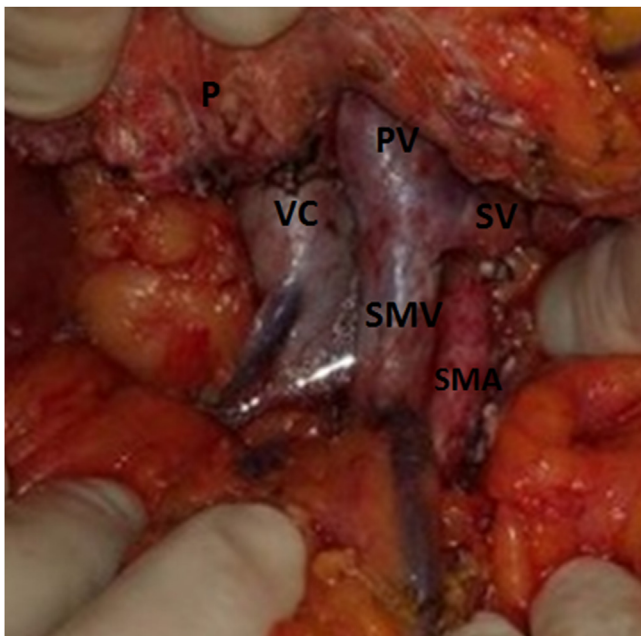


Fig. 4. Blood vessels's individualisation after locoregional lymph node resection. This picture shows the inferior vena cava (VC) on the right side, the superior mesenteric vein (SMV) and the splenomesaraic confluent (Splenic vein (SV) and the superior mesenteric vein (SMV)) followed by the portal vein (PV). The superior mesenteric artery (SMA) is on the left side. The pancreas (P) is on the upper part of the picture.



Fig. 5. Transverse cross section of the resected part of the duodenum.

The postoperative course was marked by development of a collection behind the duodeno-jejunal anastomosis. A fistula was excluded by injection of methylene blue through a gastric tube and the dye did not come out from a nearby drain. This collection was treated by interventional radiology (grade IIIa complication according the Clavien-Dindo's classification [8]).

Postoperatively, the patient was treated by adjuvant chemotherapy which consisted of folinic acid, fluorouracil and oxaliplatin (FOLFOX chemotherapy).

3. Discussion

Cancer of the small bowel is rare. It represents approximately 0.3% of all gastro-intestinal malignancies [1,2]. Adenocarcinoma and carcinoid tumor are the main histological types of small bowel

tumor but lymphomas or sarcomas can also be found [9]. Adenocarcinomas are more common in the duodenum whereas carcinoid tumors are frequently located in the ileum [10]. Of the duodenal adenocarcinomas, 45% arise from the distal portion (third (D3) and fourth parts (D4)), 40% from the second part (D2) and 15% from the first part of duodenum (D1) [1].

The diagnosis is challenging. The patients are usually asymptomatic until the tumor has reached a certain size. Symptoms are then usually non-specific: abdominal pain, weight loss, anemia or intestinal obstruction [2,3,4]. The diagnosis of duodenal adenocarcinoma with gastroscopy is difficult, especially when the tumor occurs at the level of D3 or D4 [4]. For these reasons, delay in diagnosis is frequent. As described by Solej et al., the final diagnosis is obtained from 1.8 to 8 months after onset of symptoms [4]. Videocapsule and double-balloon endoscopy are efficient and may diminish the diagnostic delay [3,5,11]. CT scan and 18-FDG-PET-CT are necessary to assess the loco-regional and distant extension of the tumor [4,5,12]. CEA and CA 19-9 have been shown to be prognostic factors for patient survival [5].

Surgical treatment is the only curative option. Surgery starts with assessment of resectability by excluding distant metastasis. The "artery-first" approach of the SMA, as used in pancreatic resection [13,14], is preferred. It allows identifying contra-indications to proceed with surgery early, such as arterial wall infiltration and/or the need to sacrifice too many jejunal arteries which leads to major intestinal resection. Finally, while a duodenopancreatectomy is a prerequisite for proximal lesions (D1 and D2) [15], the need to remove the pancreas in distal duodenal lesions (D3 or D4) depends on whether it is possible to get free resection margins and complete lymph node dissection [15,16] of the mesenteric root. Higher rates of post-operative morbidity and mortality are observed in pancreatic resection when compared with pancreas-sparing duodenectomy [16].

When a complete resection is not feasible, palliative interventions such as bowel bypass or jejunostomy [4] can be considered.

Only a few authors have studied the use of adjuvant radiotherapy or chemotherapy and these authors are not very enthusiastic [5]. The prognosis of a patient with a duodenal adenocarcinoma remains very poor, regardless of the stage of the disease. A 5-year overall survival rate between 23% and 37% has been described in the literature [17,18]. Complete resection increases the 5-year survival from 25% [19] to 75% [20]. Long-term survival is also related to the number of invaded lymph nodes [5]. No link between the type of surgery and long term survival has been described [16].

4. Conclusion

Adenocarcinoma of the distal portion of duodenum is uncommon. The prognosis is bad. The tumor has non-specific symptoms. The diagnosis is difficult and is frequently delayed. The only chance of cure is a R0 resection with complete loco-regional lymphadenectomy of the mesenteric root. The artery-first approach with entire dissection of the SMA is an early key step in deciding whether to proceed further. Pancreas-sparing distal duodenectomy should be considered per-operatively to avoid the pancreatectomy-related morbidity.

Conflict of interests

The authors declare that they do not have conflict of interests.

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We do not have any sources of funding.

Ethical approval

The case report is exempt from ethical approval.

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.

Authors contributions

MJ Lardinois took part of the surgical operation and wrote the article, N Meurisse managed the surgical operation and reviewed the manuscript.

Registration of research studies

This is not a research study.

Guarantor

MJ Lardinois is the guarantor of this work.

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