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Horizontal traumatic laceration of the pancreas head: A rare case report



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ABSTRACT

INTRODUCTION: This case report is intended to inform acute care surgeons about treating rare horizontal laceration of the pancreas head caused by blunt trauma.

CASE PRESENTATION: A 57-year-old woman who sustained blunt abdominal trauma during a car crash was transported to the emergency center of our hospital with unstable vital signs due to hemorrhagic shock. Computed tomography showed transection of the pancreas head and massive intra-abdominal hemorrhage. She was referred for emergency surgery because of a transient response. Laparotomy at five hours after the accident initially revealed consistent massive bleeding from branches of the superior mesenteric artery and vein, which we resolved by suturing the vessels without damaging the main trunks. A horizontal laceration and complete transection of the pancreatic head were then confirmed but the main pancreatic duct remained intact. The lower part of the pancreatic head including the uncus with the attached part of the duodenum was resected, and the pancreatic stump remaining after transection was fixed by suturing. The jejunal limb was attached to the remnant duodenum by side-to-side functional anastomosis. Although gastric emptying was delayed for one month after surgery, the postoperative course was good and the patient recovered at three months thereafter. The embryonic border of pancreas head accompanied with pancreatic divisum was considered for this laceration without disruption of the main pancreatic duct.

DISCUSSION: Blunt pancreatic trauma usually causes vertical transection and thus, horizontal transection is considered rare. The embryological anatomical border between the ventral and dorsal pancreas due to pancreatic divisum was supposed to be transected and therefore the main pancreatic duct was not damaged.

CONCLUSION: Hemorrhagic shock and rare pancreatic head trauma were treated by appropriate intraoperative management.

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1. Introduction

Blunt trauma, such as that sustained during car accidents, can often damage the pancreas [1,2], and vertical transection usually occurs at the pancreatic body or head [3]. A precise diagnosis determined by imaging is important because pancreatic juice leaking through a fistula due to a damaged main pancreatic duct causes fatal pan-peritonitis and thus an emergency laparotomy is necessary to repair the transection immediately [4]. Complete pancreatoduodenectomy is often the choice of treatment for an injured pancreatic head because the complex damage to the main pancreatic duct is invasive in patients with unstable vital signs [5–7]. Horizontal or

coronary transection of the pancreatic head is very rare [8]. This report describes a patient with critical hemostasis due to rare horizontal laceration and transection caused by blunt pancreatic head trauma. The hemostasis was treated and then appropriate intraoperative management and partial pancreatoduodenectomy (PD) resulted in a good outcome with no serious complications.

2. Case presentation

A 57-year-old woman sustained blunt trauma to the abdomen during a car accident. The unstable vital signs due to hemorrhagic shock transiently responded to a blood transfusion during emergency transport by helicopter-ambulance to our hospital.

The patient was conscious without signs of neurological damage upon arrival at the emergency center two and half hours after the accident. A physical examination showed hemorrhagic ane-

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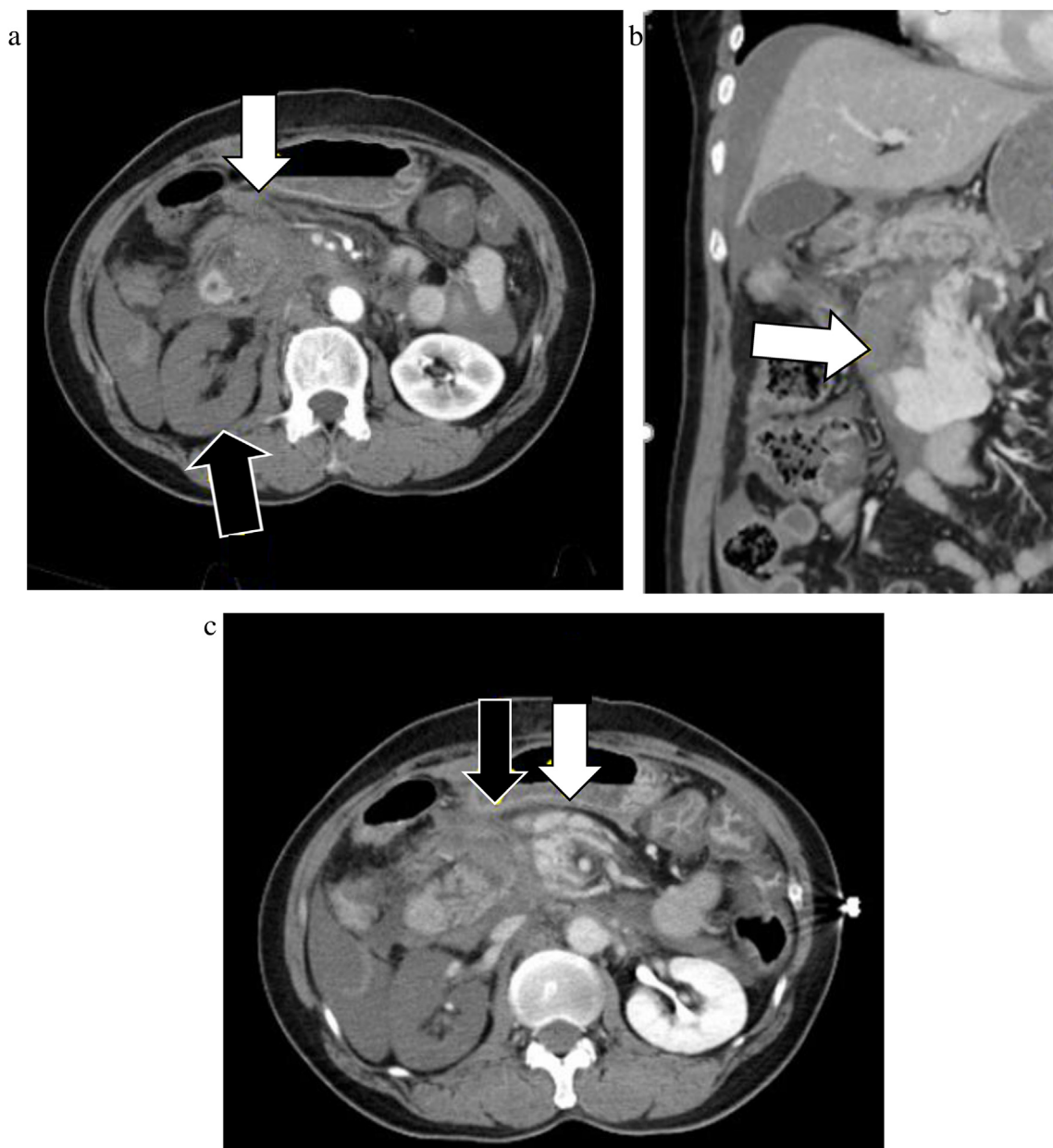


Fig. 1. (a) White arrow, hematoma around pancreas; black arrow, infarcted right kidney. (b) Arrow, hematoma and extravasation of contrast media (bleeding). (c) White arrow, normal parenchyma of pancreatic body; black arrow, transected space of pancreatic head.

mia and a bruise on the upper abdomen. Abdominal computed tomography (CT) using contrast media revealed a massive pool of intra-abdominal blood and the extravasation of contrast media or hematoma around the pancreas head, duodenum and superior mesenteric vessels (Fig. 1a and b). The pancreatic parenchyma seemed to be transected (Fig. 1c). The right kidney was infarcted by an arterial injury, otherwise no other thoracic or abdominal organs were damaged. The unstable vital signs due to hemorrhagic shock rapidly progressed during management at the emergency center, so she was referred to the Division of Hepato-biliary-pancreatic Surgery at the Department of Surgery. An emergency laparotomy proceeded at three hours after admission. Although we considered surgical damage control because of the unstable vital signs, we immediately found bleeding from tiny branches of the superior mesenteric artery (SMA) or veins (SMV). A hemostatic clamp easily controlled the bleeding because the main trunk of the SMA or SMV was not affected (Fig. 2). We assessed organ damage after

stopping the hemorrhage and stabilizing the vital signs. The pancreatic head was lacerated and completely horizontally transected (Fig. 3a), but a pancreatic fistula was not remarkable. Pancreatography was impossible, but intra-abdominal cholangiography after initial cholecystectomy confirmed the location of the duodenal papilla. Thus the transected part was separated from the main pancreatic duct (Fig. 3b). As a result, the discontinuous lower pancreas and uncus was not supposed to need repair, but this part with the attached transverse duodenum was resected (Fig. 3c) and the transected stump of the pancreas was tightly sutured (Fig. 3d). Partial PD was then achieved (Fig. 3e). The remnant descending duodenum was attached to the jejunal limb by functional side-to-side anastomosis using a stapler. A total of 4240 mL of blood was lost.

The unstable vital signs due to hemorrhagic shock immediately recovered after surgery and anastomotic leakage or a pancreatic fistula was not evident. Delayed gastric emptying and appetite loss continued for about four weeks and then gradually improved. The

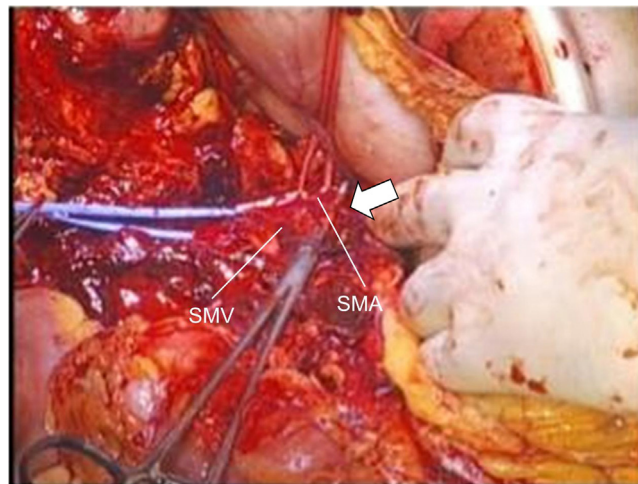


Fig. 2. Superior mesenteric artery (SMA) and vein (SMV) trunk are encircled by red and blue tape, respectively. Arrow, bleeding site clamped with forceps.

patient was discharged three months after surgery and she has remained free of post-operative complications for 18 months.

3. Discussion

We have treated 13 patients with blunt pancreatic trauma at the pancreatic body using the Letton-Wilson operation (anastomosis between distal pancreas and jejunum) [9–11] ($n=3$), direct repair by suturing ($n=7$) and distal pancreatectomy ($n=1$). One patient required initial surgical damage control, which is required only for uncontrolled bleeding, complex hemorrhage and unstable blood pressure and heart rate due to hemorrhagic shock [12]. However, the timing and procedures at surgical second-look might be difficult. Direct suturing can cause a pancreatic fistula. Thus, jejunal anastomosis is considered more effective for transection of the main pancreatic duct. Vertical transection of the pancreatic body is frequent due to the position of the spine [4]. Some surgeons have performed complete PD. However, although vertical transection is uncommon and difficult to repair under unstable, emergency conditions, the necessary functions of the peri-pancreas head should be spared, particularly in younger patients.

Reports describing horizontal lacerations of the pancreatic head are unavailable as far as we could ascertain. We determined during surgery that the damaged area in our patient was clearly transected. Therefore, we considered that this laceration might be the border of an anatomical segment. The ventral and dorsal parts of the pancreas fuse during the fetal period [13,14] and thus we supposed that this border between these parts of the pancreas head had been separated by the blunt trauma. The reason why the pancreatic main duct was not injured would be possibility of a pancreatic divisum, which is relatively rare congenital anomaly because the main duct was remained the dorsal pancreas [15]. In such a case, the main pancreatic duct flows into the duodenum via minor papilla and the intraoperative cholangiography did not show any reflux into the pancreatic duct. There were no reports regarding blunt trauma cases in patients with divisum, to our knowledge. The important issue for our patient was that the main pancreatic duct was damaged, which could have led to fatal post-operative complications or an extended hospital stay. Other reports have described the importance of preoperative endoscopic retrograde pancreatography (ERCP) to confirm a fistula or transection [16]. Such an assessment of stable patients might be important, but preparation for ERCP was insufficient in our patient, who also had persistently unstable vital signs after hemostasis. Cholangiography can sometimes reveal similar findings to pancreatography and we

attempted this via the cystic duct. Eventually, part of the ampulla of Vater was confirmed. We considered that part of the main pancreatic duct was separated from the damaged space as shown in Fig. 3a.

Even though the pancreas was spared during surgery, a pancreatic fistula at the stump was a concern [12]. Therefore, drainage tubes were appropriately positioned placed around the transected space and octreotide was administered to reduce pancreatic juice for two days after surgery [17]. Organ-sparing operation should be necessary in pancreatic head trauma [18]. However, amylase levels in pooled intra-abdominal fluid collected via an intra-abdominal drainage tube were not high and immediately normalized. Complication with a pancreatic fistula did not occur in our patient. We attempted a duodeno-jejunostomy and passage of the anastomosis was retained for a long time. Twisting the anastomosis due to the hard staples might be a consideration. Hand-suturing might be more effective if a sufficient amount of time is available for surgery.

4. Conclusion

A patient who sustained blunt pancreatic head trauma with horizontal transection underwent a successful partial PD. This type of injury is very rare but how to manage the effects of such blunt trauma and which surgical procedures to implement are important to consider.

Conflict of interest

None.

Submission declaration

The authors declare that the work described has not been published previously, that it is not under consideration for publication elsewhere, that its publication has been approved by all authors and either tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere, including electronically in the same form in English or any other language, without the written consent of the copyright holder. The present work has been reported in line with the SCARE criteria [19].

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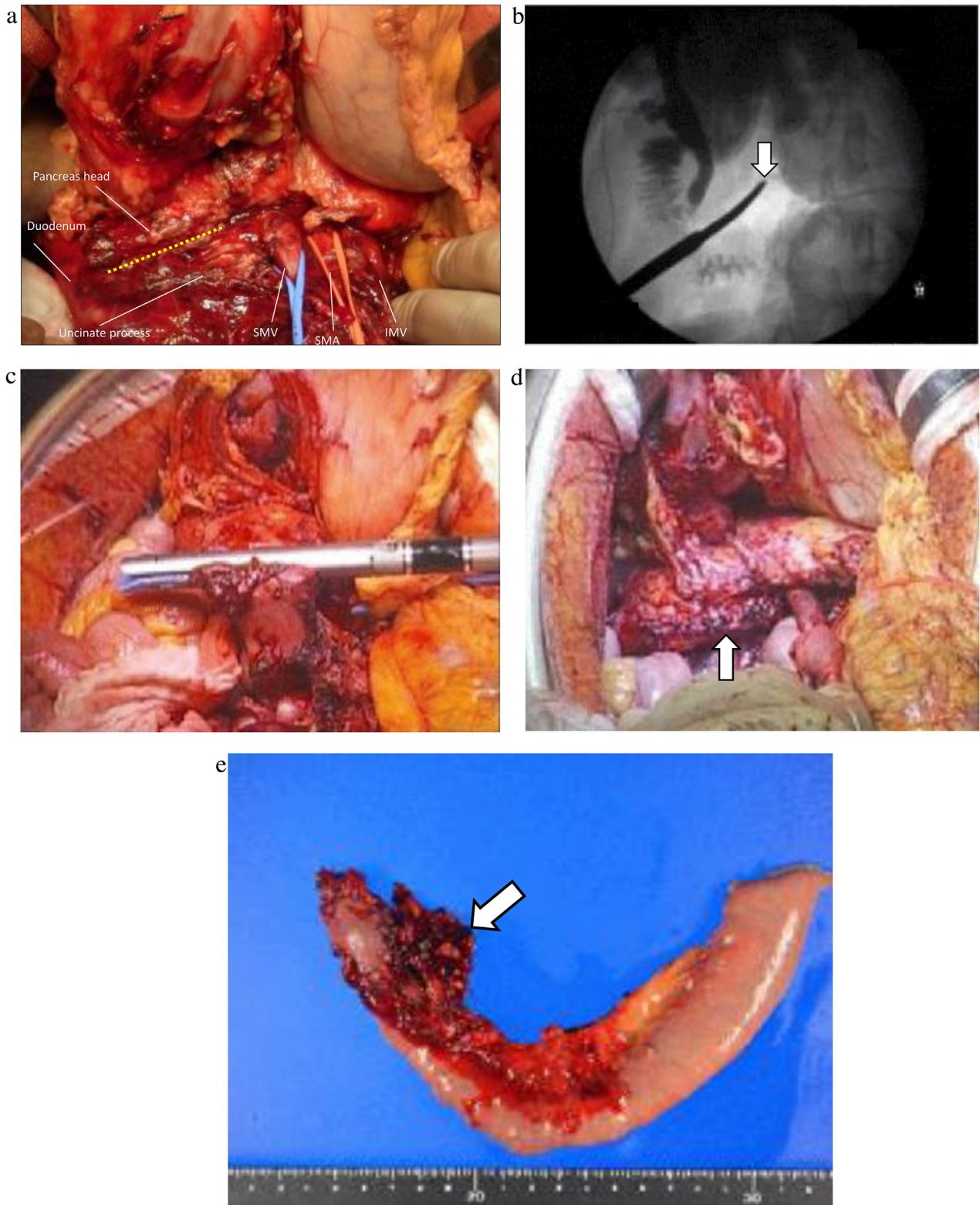


Fig. 3. (a) Dotted line, horizontal transected space of pancreatic head. (b) Intraoperative cholangiographic findings. Arrow, transected space with forceps that is separate from duodenal papilla. (c) Resected lower pancreas and attached duodenum (horizontal portion). (d) Pancreatic stump was fixed with tight sutures. (e) Specimen of tissue after partial PD.

Ethical approval

At our institute, ethical permission for case report is not necessary.

Consent

None.

Author contributor

All authors contributed the perioperative management and writing this paper. Atsushi Nanashima is a main operator and wrote this mainly.

Registration of Research Studies

N/A.

Guarantor

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References

- [1] W.D. Kealey, W.I. Garstin, T. Diamond, Transection of the pancreatic head following blunt abdominal trauma, *Br. J. Clin. Pract.* 49 (1995) 158–159.
- [2] Y. Bunai, A. Nagai, I. Nakamura, I. Ohya, Blunt pancreatic trauma by a wheelchair user restraint system during a traffic accident, *J. Forensic. Sci.* 46 (2001) 965–967.
- [3] Y. Mise, N. Tanaka, T. Furuya, Y. Nomura, M. Nagai, Y. Yoshida, H. Ishii, A. Seo, The Feasibility of Central Pancreatectomy for Blunt Pancreatic Trauma: A Comparative Study of Central and Distal Pancreatectomy, *Hepatogastroenterology* 61 (2014) 1107–1112.
- [4] D.A. Potoka, B.A. Gaines, A. Leppäniemi, A.B. Peitzman, Management of blunt pancreatic trauma: what's new? *Eur. J. Trauma Emerg. Surg.* 41 (2015) 239–250.
- [5] J.E. Krige, A.J. Nicol, P.H. Navsaria, Emergency pancreatoduodenectomy for complex injuries of the pancreas and duodenum, *HPB (Oxford)* 16 (2014) 1043–1049.
- [6] S.K. Ghosh, One stage emergency pancreatoduodenectomy for isolated injury to pancreatic head following blunt abdominal trauma: case report and review of literature, *Bull. Emerg. Trauma* 1 (2013) 127–129.
- [7] J.A. Asensio, P. Petrone, G. Roldán, E. Kuncir, D. Demetriades, Pancreaticoduodenectomy: a rare procedure for the management of complex pancreaticoduodenal injuries, *J. Am. Coll. Surg.* 197 (2003) 937–942.
- [8] T. Sato, A. Kashiwai, C. Ota, M. Nomura, K. Tsuboi, M. Kitagawa, S. Abe, H. Tsuchihashi, K. Suzuki, A rare case of steering wheel injury causing coronal-plane pancreatic lacerations, *Legal Med. (Tokyo)* 21 (2016) 73–76.
- [9] A.H. Letton, J.P. Wilson, Traumatic severance of pancreas treated by Roux-Y anastomosis, *Surg. Gynecol. Obstet.* 109 (1959) 473–478.
- [10] C. Iacono, A. Ruzzenente, L. Bortolasi, A. Guglielmi, Central pancreatectomy: the Dagradi Serio Iacono operation: evolution of a surgical technique from the pioneers to the robotic approach, *World J. Gastroenterol.* 20 (2014) 15674–15681.
- [11] T. Kuroki, Y. Tajima, R. Tsutsumi, T. Adachi, A. Kitasato, K. Hamasaki, T. Kanematsu, Surgical management for stenosis of the pancreaticojejunostomy, *Int. Surg.* 93 (2008) 155–157.
- [12] E. Girard, J. Abba, N. Cristiano, M. Siebert, S. Barbois, C. Létoublon, C. Arvieux, Management of splenic and pancreatic trauma, *J. Visc. Surg.* 153 (2016) 45–60.
- [13] C.J. Mitchell, D.J. Lintott, W.S. Ruddell, M.S. Losowsky, A.T. Axon, Clinical relevance of an unfused pancreatic duct system, *Gut* 20 (1979) 1066–1071.
- [14] M. Radi, J. Gaubert, R. Cristol-Gaubert, V. Baecker, P. Travo, M. Prudhomme, G. Godlewski, D. Prat-Pradal, A 3D reconstruction of pancreas development in the human embryos during embryonic period (Carnegie stages 15–23), *Surg. Radiol. Anat.* 32 (2010) 11–15.
- [15] T. Kozu, K. Suda, F. Toki, Pancreatic development and anatomical variation, *Gastrointest. Endosc. Clin. N. Am.* 5 pp (1995) 1–30.
- [16] N. Doctor, J.S. Dooley, B.R. Davidson, Assessment of pancreatic duct damage following trauma: is endoscopic retrograde cholangiopancreatography the gold standard? *Postgrad. Med. J.* 71 (1995) 116–117.
- [17] V.P. Ho, N.J. Patel, F. Bokhari, F.G. Madbak, J.E. Hambley, J.R. Yon, B.R. Robinson, K. Nagy, S.B. Armen, S. Kingsley, S. Gupta, F.L. Starr, H.R. Moore 3rd, U.J. Oliphant, E.R. Haut, J.J. Como, Management of adult pancreatic injuries: a practice management guideline from the Eastern Association for the Surgery of Trauma, *J. Trauma Acute Care Surg.* (2016) (Epub ahead of print).
- [18] J.D. Wig, A. Kudari, T.D. Yadav, R.P. Doley, K.G. Bharathy, N. Kalra, Pancreas preserving total duodenectomy for complex duodenal injury, *JOP* 10 (2009) 425–428.
- [19] R.A. Agha, A.J. Fowler, A. Saetta, I. Barai, S. Rajmohan, D.P. Orgill, the SCARE Group, The SCARE statement: consensus-based surgical case report guidelines, *Int. J. Surg.* 34 (2016) 180–186.

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