

Original Article

Intraoperative pancreatography using an endoscopic
naso-pancreatic drainage tube for the prevention of pancreatic
fistula after local pancreatic resection

Tamotsu Kuroki, Yoshitsugu Tajima, Noritsugu Tsuneoka, Tomohiko
Adachi, Takashi Kanematsu

Department of Surgery, Nagasaki University, Graduate School of
Biomedical Sciences, 1-7-1 Sakamoto, Nagasaki 852-8501, Japan.

Running title: Pancreatic local resection using ENPD tube

Offprint requests to: T. Kuroki

FAX: 81-95819-7319

e-mail: tkuroki-gi@umin.ac.jp.

Abstract

Background: Local pancreatic resections can avoid the unnecessary resection of the normal pancreatic parenchyma in comparison with standard pancreatic resection. However, the incidence of pancreatic fistula after local pancreatic resection is high, and still responsible for most morbidity and mortality.

Methods: We reviewed 6 patients who underwent intraoperative pancreatography using an endoscopic naso-pancreatic drainage (ENPD) tube during local pancreatic resection for the prevention of postoperative pancreatic fistula.

Results: One patient had injury to the main pancreatic duct during surgery, and transient pancreatic fistula of grade B occurred. In this patient, ENPD tube was left in place for the management the pancreatic fistula, resulted in a favorable outcome. Other 5 patients showed no postoperative complications including pancreatic fistula.

Conclusions: Intraoperative pancreatography using ENPD tube is a simple technique and useful for the prevention of pancreatic fistula after local pancreatic resection.

Keywords: Pancreatic fistula; pancreatic local resection; ENPD; pancreatography

Introduction

Recent improvements in surgical devices and advances in knowledge of the pancreatic anatomy have allowed surgeons to apply a variety of novel surgical procedures when performing local pancreatic resections. Local pancreatic resections can avoid the unnecessary resection of the normal pancreatic parenchyma in comparison with standard pancreatic resection such as pancreaticoduodenectomy and distal pancreatectomy, consequently preserve the endocrine and exocrine functions of the pancreas. In local pancreatic resection, the main pancreatic duct and common bile duct are able to be preserved without any dissection or reconstruction of the pancreaticobiliary tract. In addition, many benign and low-grade malignant pancreatic lesions, including intraductal papillary mucinous neoplasms (IPMNs) and mucinous cystic neoplasms, have recently been detected by the improved diagnostic modalities. Such pancreatic lesions would be a good indication for performing a local pancreatic resection. However, pancreatic fistula occurs in a high incidence after local pancreatic resection and is still responsible for most morbidity and mortality after pancreatic surgery, possibly leading to a lethal bleeding [1-3]. To prevent

pancreatic fistula after pancreatic surgery, many surgical techniques and instruments have been proposed, such as pancreatic transection using an ultrasonic dissector, an automatic stapler, fibrin glue sealing of the pancreatic stump, and administration of somatostatin analogue [4-10]. However, these attempts failed to completely avoid the occurrence of postoperative pancreatic fistula. In this report, we describe the efficacy of preoperative endoscopic naso-pancreatic drainage (ENPD) tube technique to avoid the injury to the main pancreatic duct in performing local pancreatic resection.

Patients and Methods

Six patients underwent a local pancreatic resection in the pancreatic head with a use of ENPD tube between April 2005 and June 2007. There were 3 men and 3 women with a mean age of 73 years (range, 56-84 years). Diagnoses included branch-type IPMN of the pancreas (n=5) and insulinoma (n=1). All patients had a soft pancreas without fibrosis. Under general anesthesia, we placed a 5F-size ENPD tube (Olympus, Tokyo Japan) for intraoperative pancreatography prior to laparotomy (Fig. 1). The ENPD tube was inserted deeply into the main pancreatic duct for approximately 10cm through the orifice. During the pancreatic transection, the main pancreatic duct was carefully evaluated by repeated intraoperative US and pancreatography via the ENPD tube. Five patients underwent local resection in the superior pancreatic head region. Two patients underwent local resection in the uncinate process of the pancreas. After a completion of local pancreatic resection, pancreatography via the ENPD tube was performed to check out the injury to the main pancreatic duct or leakage from the transected pancreatic branch ducts at the cut surface of the pancreas. A mixture of indigocarmine and contrast material was

used for the pancreatography, because it enable us to detect any minor pancreatic leakage as a blue spot at the cut surface of the pancreas and to close the points of leakage appropriately with a 4-0 absorbable monofilament sutures. Pancreatic fistula was defined by the international study group on pancreatic fistula (ISGPF) definition [11].

Results

The ENPD tube was inserted successfully within 15 minutes in all 6 patients. During the local pancreatic resection, no patients showed dislocation of the ENPD tube. One patient developed injury to the main pancreatic duct during the pancreatic transection, and the injury was repaired by primary suture with a 6-0 absorbable monofilament sutures. Three patients were found to have minor pancreatic leakage by pancreatography via the ENPD tube. In these 3 patients, we could detect minor leakage of blue dye from the small pancreatic duct branches at the cut surface after local pancreatic resection, and then we closed the leaking points appropriately with a 4-0 absorbable monofilament sutures. In 5 patients except for one case with main pancreatic duct injury, ENPD tubes were immediately removed after the confirmation of no pancreatic leakage at the cut surface of the pancreas. In one patient who had injury to the main pancreatic duct, the ENPD tube indwelled in the main pancreatic duct was useful for the suturing of the injured main pancreatic duct. The ENPD tube was left in place and used for a pancreatic stent as well as a pancreatic drainage. In this patient, transient pancreatic fistula of grade

B (ISGPF definition) [11] was demonstrated, and the ENPD tube was removed 7 days postoperatively. The ENPD tube was useful for the management the postoperative pancreatic fistula. Other 5 patients showed no postoperative complications including pancreatic fistula. In addition, no patients developed acute pancreatitis after ENPD tube placement.

Comments

Several pancreas-preserving surgery, including local pancreatic resection, have been advocated for the benign and low-grade malignant neoplasms of the pancreas [12-14]. Especially, branch-type IPMN of the pancreas is a good candidate for the local pancreatic resection because the branch-type IPMNs show a less lymph node metastasis and a more favorable prognosis when compared to invasive ductal adenocarcinomas of the pancreas [15]. In the benign or low-grade malignant IPMN, complete tumor resection is sufficient for a cure. On the other hand, pancreatic fistula is one of the most frequent and dismal complications after local pancreatic resection [2, 3]. This was due to the existence of small branches of pancreatic duct communicating with the main pancreatic duct on the cut surface of the pancreas which was wider than those in the standard pancreatic resections, including pancreaticoduodenectomy and distal pancreatectomy. Hirota et al. [16] have reported that preoperative endoscopic transpapillary pancreatic stent placement was useful for the prevention of pancreatic fistula following the local pancreatic resection. In the present study, we used an ENPD tube instead of pancreatic short

stent, because ENPD tube can reveal the pancreatic ducts by using intraoperative pancreatography. In addition, the ENPD tube in the main pancreatic duct was clearly and easily detected by intraoperative US, and thus both the direction and position of the main pancreatic duct were correctly identified. Indeed, this technique was useful for identifying the pancreatic ducts to be dissected and for preventing injury to the main pancreatic duct. Intraoperative pancreatography showed not only the main pancreatic duct but also the small branch pancreatic ducts communicating with the main pancreatic duct. These small branches cannot always be identified and managed during the operation. Our technique, intraoperative pancreatography using both indigocarmine and contrast material, enable us to detect and suture small branch pancreatic ducts.

Acute pancreatitis is the most common complication of endoscopic retrograde cholangiopancreatography (ERCP). ENPD tube placement needs the technique of ERCP. In addition, pancreatic stent placement may induce acute pancreatitis [17]. In our patients, fortunately, we had no experienced acute pancreatitis. In our technique, an ENPD tube is immediately removed after the

confirmation of no pancreatic leakage. However, if a main pancreatic duct is injured during the resection of the pancreas, postoperative ENPD tube placement is useful for the management of the pancreatic fistula.

In conclusion, intraoperative pancreatography using ENPD tube is simple technique and useful for the prevention of pancreatic fistula after local pancreatic resection. This technique allows the surgeon to perform a safe pancreas-preserving surgery including local pancreatic resection.

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Figure legend

Fig. 1. Intraoperative pancreatography using ENPD tube.

Fig. 1.

