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ORIGINAL ARTICLE

Improved rate of pancreatic fistula after distal pancreatectomy: parenchymal division with the use of saline-coupled radiofrequency ablation

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Abstract

Background: Postoperative pancreatic fistula (POPF) is the most common significant complication after distal pancreatectomy (DP) and results in substantial morbidity. Many different methods are available to divide the pancreatic parenchyma and achieve stump closure, but demonstrating an improvement in the incidence of POPF has been difficult.

Methods: A single-institution, retrospective review was conducted to evaluate all hand-assisted laparoscopic DP performed from October 2008 to July 2011 utilizing saline-coupled radiofrequency ablation (RFA) as the exclusive method of achieving division of the pancreatic parenchyma and closure of the proximal pancreatic remnant. All significant complications within the perioperative period were noted.

Results: Thirty-four patients met the criteria for inclusion in the study. One patient was lost to follow-up and thus excluded. Three patients (9.1%) demonstrated a POPF; two were treated with prolonged placement of the intraoperative drain (grade A: 6.1%) and the third was treated with endoscopic cystogastrostomy (grade C: 3.0%). One other significant complication (3.0%) of a perforated gastric ulcer that required partial gastrectomy occurred.

Conclusions: The use of saline-coupled RFA alone for pancreatic parenchymal division and closure after DP is safe and effective. This study found an overall significant complication rate of 6.1%, and a rate of clinically significant POPF of 3.0%.

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Introduction

Distal pancreatectomy (DP) is the procedure of choice for resectable benign and malignant lesions of the pancreatic body and tail.[1,2] Serious complications of DP include pancreatic fistula and abscess. Postoperative pancreatic fistula (POPF) is the most common significant complication after DP and results in substantial morbidity. Currently, reported incidences of POPF after DP range widely from 5% to 33%.[1–5] Significant fistula (grades B and C) as defined according to the International Study Group on Pancreatic Fistula (ISGPF) occurs in 9% to 16% of reported cases.[1,3–7] Unfortunately, this rate has not changed appreciably in over a decade, during which time overall mortality from DP has dropped significantly.[1,8,9]

Although not completely understood, a host of factors, both technical and patient-related, are thought to contribute to an increased risk for the development of POPF. Patient-specific risk factors for POPF include obesity, male gender and tobacco use.[2] The consistency of the pancreatic parenchyma as a contributing factor is debatable: some authors have found that a soft, normal pancreas is more likely to experience complications than a firm, fibrotic parenchyma that will hold sutures or staples more effectively.[1,7,9–12]

Technical factors associated with the development of a POPF include the method utilized for pancreatic transection and any subsequent stump treatment. Although this association is direct and logical, published reports vary widely regarding the impact of specific techniques utilized during DP on rates of POPF. To date,

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large series have been unable to clearly identify a superior method for either parenchymal division or stump treatment. Although many different methods are available to divide the pancreatic parenchyma, the most commonly used are transection with cautery or stapler. Stapled transection is variably performed with or without a bio-absorbable staple line reinforcement. Performing another major procedure concomitantly with the DP has also been shown to predispose to the development of a POPF.[2]

Parenchymal transection is commonly followed by treatment of the pancreatic stump. This is performed to promote sealing of the parenchyma in order to minimize the incidence of leak and subsequent POPF. Options are diverse and include cautery, fibrin glue and omental patches. Currently, the most common method is suture reinforcement, but no data exist to define an optimal method. For example, some reports have found that oversewing the main pancreatic duct after stapled transection of the pancreas results in a reduced incidence of POPF,[13] whereas others have found no such association.[5]

Although the various methods available for pancreatic parenchymal division and closure have been compared many times, demonstrating a superior method that effectively reduces the incidence of POPF has been elusive. The purpose of this study was to review the safety and effectiveness of saline-coupled radiofrequency ablation (RFA) for both division and remnant treatment during DP. Interest in exploring an alternative technique stemmed from the persistently high POPF rate seen with the use of current techniques and equipment. Saline-coupled RFA was adopted because it has been shown to be effective in a porcine model[14] and has demonstrated promising early results in hepatic and renal resections.[15–17]

Materials and methods

A single-institution, retrospective review was conducted from October 2008 to July 2011 to evaluate all hand-assisted, laparoscopic DPs utilizing saline-coupled RFA (EndoSH 2.0™; Salient Surgical Technologies, Inc., Portsmouth, NH, USA) as the exclusive method for achieving division of the pancreatic parenchyma and closure of the proximal pancreatic remnant. After routine exposure of the pancreas, it is inspected to ensure resectability. A line of transection is identified, utilizing intraoperative ultrasound when necessary, that will allow a margin of at least 1–2 cm to be attempted. Isolation of the splenic vessels is followed by stapled transection in cases of splenectomy, and by complete dissection and exclusion from the distal pancreas in cases of splenic preservation. Control of the pancreas body is maintained by hand assistance during transection using an EndoSH™ hook. Pancreatic tissue is lifted and cauterized while saline-coupling is maintained to ensure the complete sealing of the parenchyma and ducts (Fig. 1a). The level of accumulated saline is modulated by an assistant utilizing a suction catheter in order to prevent pooling. Excessive suctioning is avoided because a sufficient amount of saline must remain to couple the electrode and tissue at all times.

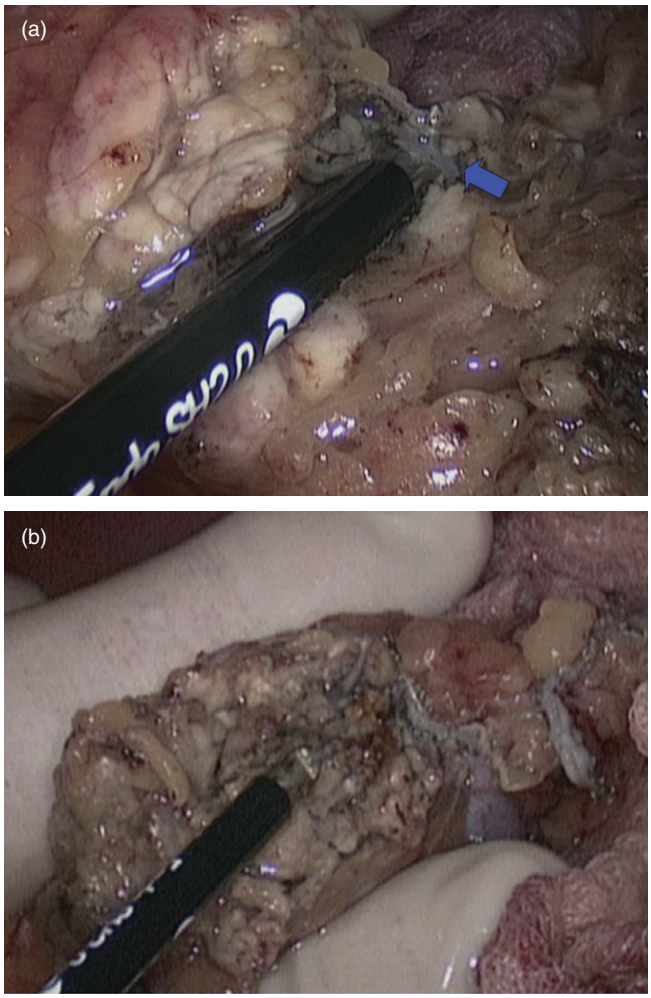

Figure 1 (a) The hook device (EndoSH 2.0™; Salient Surgical Technologies, Inc.) is used to separate and lift the pancreatic parenchyma to facilitate division during distal pancreatectomy utilizing saline-coupled radiofrequency ablation (RFA). Continuous RFA energy is delivered to allow consistent dissection and concomitant sealing of the pancreatic parenchyma. (b) After complete transection of the pancreatic body, the remnant is inspected and treated to ensure complete sealing

Finally, the transected stump is carefully inspected and further treatment is applied to any areas of concern for incomplete sealing (Fig. 1b).

Patients were excluded from the study if they had been lost to clinical follow-up. The primary outcome measure was the occurrence of any significant procedure-related complication, including POPF or the need for repeat intervention. Secondary outcome measures were length of initial hospitalization, need for re-admission, and duration of operatively placed drains. Postoperative pancreatic fistula was defined in accordance with the definition of the ISGPF.[18] Abdominal computerized tomography (CT) imaging was obtained during follow-up.