

Endoscopic fibrin glue injection for closure of pancreaticutaneous fistula following transgastric endoscopic necrosectomy

Ji Woong Jang, Do Hyun Park, Sung-Hoon Moon, Sang Soo Lee, Dong Wan Seo, Sung Koo Lee, Myung-Hwan Kim

Ji Woong Jang, Do Hyun Park, Sung-Hoon Moon, Sang Soo Lee, Dong Wan Seo, Sung Koo Lee, Myung-Hwan Kim, Division of Gastroenterology, Department of Internal Medicine, University of Ulsan College of Medicine, Asan Medical Center, Seoul 138-736, South Korea

Author contributions: Jang JW, and Park DH wrote the paper; Jang JW, Park DH, and Moon SH carried out the procedures; Park DH, Seo DW, Lee SK, and Kim MH advised and informed about the knowledge.

Correspondence to: Do Hyun Park, MD, PhD, Division of Gastroenterology, Department of Internal Medicine, University of Ulsan College of Medicine, Asan Medical Center, 388-1 pungnap-2dong, Songpaju, Seoul 138-736, South Korea. dhpark@amc.seoul.kr

Telephone: +82-2-30103194 **Fax:** +82-2-4760824

Received: June 10, 2008 **Revised:** August 30, 2008

Accepted: September 6, 2008

Published online: October 21, 2008

Abstract

Transgastric endoscopic necrosectomy has been recently introduced as the effective and alternative management of infected pancreatic necrosis and pancreatic abscess. However, up to 40% of patients who undergo endoscopic necrosectomy may need an additional percutaneous approach for subsequent peripancreatic fluid collection or non-resolution of pancreatic necrosis. This percutaneous approach may lead to persistent pancreaticutaneous fistula, which remains a serious problem and usually requires prolonged hospitalization, or even open-abdominal surgery. We describe the first case of pancreaticutaneous fistula and concomitant abdominal wall defect following transgastric endoscopic necrosectomy and percutaneous drainage, which were endoscopically closed with fibrin glue injection *via* the necrotic cavity.

© 2008 The WJG Press. All rights reserved.

Key words: Fibrin glue; Pancreatocutaneous fistula; Infected pancreatic necrosis; Pancreatic abscess; Endoscopic necrosectomy

Peer reviewer: Ibrahim A Al Mofleh, Professor, Department of Medicine, College of Medicine, King Saud University, PO Box 2925, Riyadh 11461, Saudi Arabia

Jang JW, Park DH, Moon SH, Lee SS, Seo DW, Lee SK, Kim MH. Endoscopic fibrin glue injection for closure of pancreaticutaneous fistula following transgastric endoscopic necrosectomy. *World J Gastroenterol* 2008; 14(39): 6093-6095 Available from: URL: <http://www.wjgnet.com/1007-9327/14/6093.asp> DOI: <http://dx.doi.org/10.3748/wjg.14.6093>

INTRODUCTION

Infected pancreatic necrosis and pancreatic abscess are serious complications of acute pancreatitis, and open necrosectomy is the mainstay of management for these complications^[1]. However, operation-related morbidity and mortality, and longer hospitalization are not uncommon complications^[1,2]. Transgastric endoscopic necrosectomy has been recently introduced as the effective and alternative management for infected pancreatic necrosis and pancreatic abscess^[3-7]. However, up to 40% of patients who undergo endoscopic necrosectomy may need an additional percutaneous approach for subsequent peripancreatic fluid collection or non-resolution of pancreatic necrosis^[8]. This percutaneous approach may lead to persistent pancreaticutaneous fistula, which remains a serious problem and usually requires prolonged hospitalization, or even open-abdominal surgery^[9-12]. We describe the first case of pancreaticutaneous fistula and concomitant abdominal wall defect following transgastric endoscopic necrosectomy and percutaneous drainage, which were endoscopically closed with fibrin glue injection *via* the necrotic cavity.

CASE REPORT

A 63-year-old woman with acute biliary pancreatitis was admitted to our hospital. A computer tomography (CT) scan showed pancreatitis, peripancreatic fluid collection and gallbladder (GB) wall thickening with polypoid lesions. Endoscopic retrograde cholangiopancreatography (ERCP) showed a GB cancer with combined anomalous union of the pancreaticobiliary duct. After interdisciplinary consultation, although the patient suffered from acute biliary pancreatitis with peripancreatic fluid collection,

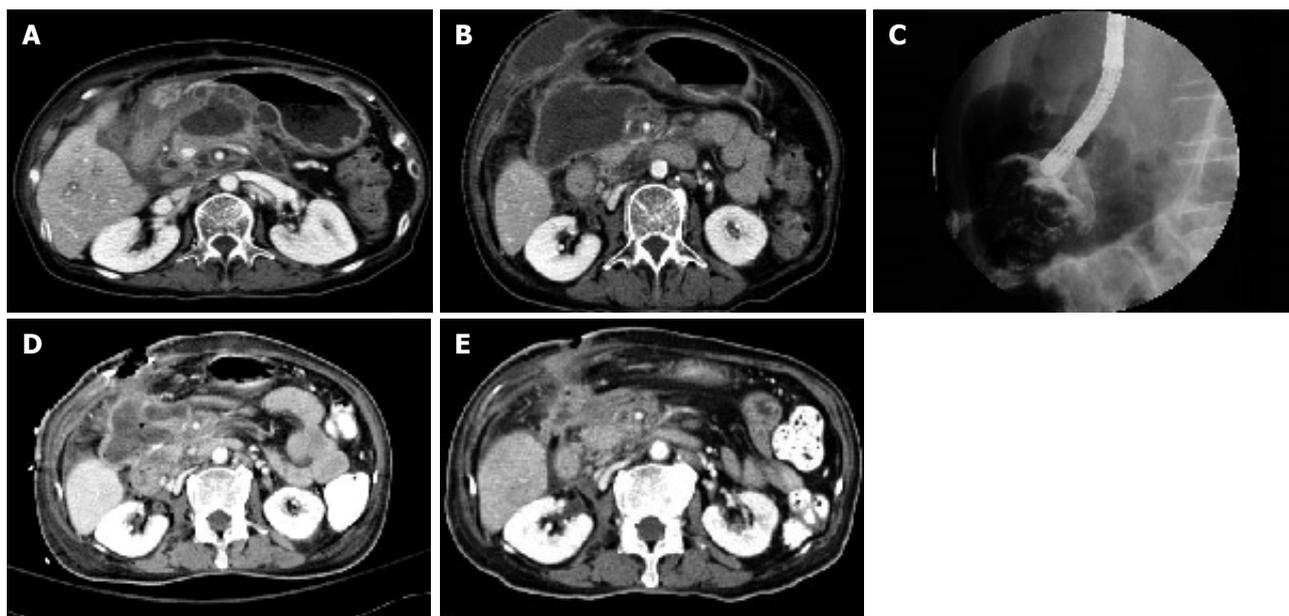


Figure 1 Multiple peripancreatic fluid collections on the body and head portions of the pancreas with a subcutaneous abscess on the right upper quadrant connected to these peripancreatic fluid collections (A, B), fluoroscopy and follow-up CT showing a frank pancreatocutaneous fistula and abdominal wall defects alongside the percutaneous route (C, D), follow-up CT showing nearly resolved infected peripancreatic necrosis, pancreatocutaneous fistula, and abdominal wall defect after endoscopic necrosectomy and repair of the fistula with fibrin glue (E).



Figure 2 Complete obliteration of the fistula tract after injection of fibrin glue beyond and on the luminal side of the fistula.

we decided to perform an open cholecystectomy. Resected specimen revealed a stage II GB cancer. The patient's postoperative recovery was uneventful.

Two months later, she was readmitted for fever and previous operation wound site bulging, redness, and heat. A CT scan revealed the aggravation of fluid collection in her abdominal wall's right upper quadrant, in addition to peripancreatic fluid collection bulging into the body portion of her stomach (Figure 1A and B). We inserted a percutaneous pig-tail catheter for subcutaneous fluid collection and performed an endoscopic transgastric necrosectomy because the patient refused a surgical intervention.

As our previous reports illustrate^[13,14], a transgastric endoscopic necrosectomy was performed. During endoscopic necrosectomy and saline irrigation with a water-jet scope (GIF-Q 260J; Olympus Optical Co, Tokyo, Japan), skin wound dehiscence at the incision site of open cholecystectomy occurred alongside the percutaneous

route (Figure 1C and D). The patient suffered from discharge (about 100 CC/d) of necrotic materials through the skin wound dehiscence, and extensive skin excoriation. During follow-up endoscopic examination, 50-100 CC of pus with a high concentration of amylase (23220 IU/L) was drained daily through the fistula tract and abdominal wall defect. Subsequent ERCP showed the long common channel of pancreatobiliary duct but no disruption of the main pancreatic duct. Because the surgeon recommended conservative management with additional insertion of a Penrose drain to resolve the wound dehiscence, rather than an operative wound revision, we decided to close the fistula endoscopically. On follow-up endoscopic evaluation, we identified a fistula tract between the necrotic cavity and skin connected to the subcutaneous abscess. The size of fistula was about 1 cm. We endoscopically injected fibrin glue as a sealing material *via* the necrotic cavity (Figure 2). A total of 8 mL of fibrin glue (Tisseel; Baxter, West-lake Village, Calif) was injected into the fistula tract through a double lumen catheter. The patient showed no post-procedural complications, such as anaphylactic reaction. The day after endoscopic closure of the fistula with fibrin glue injection, no pus was discharged from the pancreatocutaneous fistula. On the fifth day after endoscopic closure of the fistula, the wound's dehiscence was also spontaneously closed, with no additional sutures. A follow-up CT scan also showed near resolution of the infected peripancreatic necrosis and sealing of the pancreatocutaneous fistula and abdominal wall defect (Figure 1E). During a 3-mo follow-up period, no relapse of the pancreatocutaneous fistula occurred.

DISCUSSION

During transgastric endoscopic necrosectomy with

a percutaneous approach, patients may develop a pancreaticocutaneous fistula. Although small external fistulae with integrity of pancreatic duct can be spontaneously closed, management of large external fistulae or abdominal wall defects, as in our case, may be cumbersome^[9-11]. During endoscopic necrosectomy, adequate endoscopic irrigation is essential for removal of necrotic tissue^[7]. As in this case, however, saline irrigation with a water-jet scope during endoscopic necrosectomy may be a precipitating factor for frank pancreaticocutaneous fistula and wound site dehiscence alongside the percutaneous catheter because the endoscope may block the outflow tract of the cavity during lavage and consequence pressure becomes too high and the wall is perforated^[7]. For closure of this pancreaticocutaneous fistula, we selected fibrin glue. Fibrin glue injection has been previously used during endoscopy for wound closure and fistula repair^[15-18]. Fibrin glue is a biologic tissue adhesive based on a combination of fibrinogen and thrombin that forms a cell-free clot, and it has been shown to have tissue-healing properties and to be fully reabsorbed by macrophages and fibroblasts within 2 wk of application^[15,16,19].

High-output (> 500 CC/d) external fistulae have a particularly poor prognosis, and are a potential cause of recurrence compared to low-output (< 200 CC/d) external fistulae^[10,11]. Our patient showed a low-output external fistula and an intact main pancreatic duct on pancreatography. This is why endoscopic fibrin glue injection *via* the necrotic cavity alone is effective for rapid closure of fistula and abdominal wall defect, without further surgical management. Though there are few data about the fistula size, a small size of fistula might have contributed to our complete result and good prognosis. In addition, we did not consider using a hemoclip to close the fistula because its placement *via* the necrotic cavity would have been “in-body” and we were concerned with the difficulty of approximating, and bleeding of the friable necrotic cavity using a hemoclip. After the fistula was closed, no fluid recollection was observed, thus complete removal of necrotic tissue was achieved.

In summary, endoscopic fibrin glue injection *via* necrotic cavity is a safe, less invasive, rapid, and effective technique for closure of pancreaticocutaneous fistulae and abdominal wall defects following transgastric necrosectomy with percutaneous drainage. We think that this procedure is proper for low-output (< 200 CC/d), small size (diameter < 1 cm) fistulae, and inner surface should be reached endoscopically. However, some established indications for selecting patients are lack as yet. Therefore, further studies are necessary.

REFERENCES

- 1 **Bassi C**, Butturini G, Falconi M, Salvia R, Frigerio I, Pederzoli P. Outcome of open necrosectomy in acute pancreatitis. *Pancreatology* 2003; **3**: 128-132
- 2 **Connor S**, Alexakis N, Raraty MG, Ghaneh P, Evans J, Hughes M, Garvey CJ, Sutton R, Neoptolemos JP. Early and late complications after pancreatic necrosectomy. *Surgery* 2005; **137**: 499-505
- 3 **Baron TH**, Thaggard WG, Morgan DE, Stanley RJ. Endoscopic therapy for organized pancreatic necrosis. *Gastroenterology* 1996; **111**: 755-764
- 4 **Charnley RM**, Lochan R, Gray H, O'Sullivan CB, Scott J, Oppong KE. Endoscopic necrosectomy as primary therapy in the management of infected pancreatic necrosis. *Endoscopy* 2006; **38**: 925-928
- 5 **Raczynski S**, Teich N, Borte G, Wittenburg H, Mossner J, Caca K. Percutaneous transgastric irrigation drainage in combination with endoscopic necrosectomy in necrotizing pancreatitis (with videos). *Gastrointest Endosc* 2006; **64**: 420-424
- 6 **Seewald S**, Groth S, Omar S, Imazu H, Seitz U, de Weerth A, Soetikno R, Zhong Y, Sriram PV, Ponnudurai R, Sikka S, Thonke F, Soehendra N. Aggressive endoscopic therapy for pancreatic necrosis and pancreatic abscess: a new safe and effective treatment algorithm (videos). *Gastrointest Endosc* 2005; **62**: 92-100
- 7 **Voermans RP**, Veldkamp MC, Rauws EA, Bruno MJ, Fockens P. Endoscopic transmural debridement of symptomatic organized pancreatic necrosis (with videos). *Gastrointest Endosc* 2007; **66**: 909-916
- 8 **Papachristou GI**, Takahashi N, Chahal P, Sarr MG, Baron TH. Peroral endoscopic drainage/debridement of walled-off pancreatic necrosis. *Ann Surg* 2007; **245**: 943-951
- 9 **Fotoohi M**, D'Agostino HB, Wollman B, Chon K, Shahrokni S, vanSonnenberg E. Persistent pancreaticocutaneous fistula after percutaneous drainage of pancreatic fluid collections: role of cause and severity of pancreatitis. *Radiology* 1999; **213**: 573-578
- 10 **Morgan KA**, Adams DB. Management of internal and external pancreatic fistulas. *Surg Clin North Am* 2007; **87**: 1503-1513, x
- 11 **Sikora SS**, Khare R, Srikanth G, Kumar A, Saxena R, Kapoor VK. External pancreatic fistula as a sequel to management of acute severe necrotizing pancreatitis. *Dig Surg* 2005; **22**: 446-451; discussion 452
- 12 **Tajima Y**, Yamanouchi E, Fukuda K, Kitazato A, Kosaka T, Tsutsumi R, Kuroki T, Furui J, Kanematsu T. A secure and less-invasive new method for creation of an internal enteric fistula by using magnets as a therapeutic modality for pancreaticocystocutaneous fistula: a case report. *Gastrointest Endosc* 2004; **60**: 463-467
- 13 **Kang SG**, Park do H, Kwon TH, Park JY, Park SH, Park JH, Lee SH, Chung IK, Kim HS, Kim SJ. Transduodenal endoscopic necrosectomy via pancreaticoduodenal fistula for infected peripancreatic necrosis with left pararenal space extension (with videos). *Gastrointest Endosc* 2008; **67**: 380-383
- 14 **Lee TH**, Park do H, Lee SH, Park JH, Park JY, Kim HS, Park SH, Chung IK, Kim SJ. Simultaneous multitransgastric drainage for large and noncontiguous pancreatic pseudocysts (with video). *Gastrointest Endosc* 2007; **66**: 1237-1238
- 15 **Mutignani M**, Iacopini F, Dokas S, Larghi A, Familiari P, Tringali A, Costamagna G. Successful endoscopic closure of a lateral duodenal perforation at ERCP with fibrin glue. *Gastrointest Endosc* 2006; **63**: 725-727
- 16 **Pescatore P**, Verbeke C, Harle M, Manegold BC. Fibrin sealing in peptic ulcer bleeding: the fate of the clot. *Endoscopy* 1998; **30**: 519-523
- 17 **Huang CS**, Hess DT, Lichtenstein DR. Successful endoscopic management of postoperative GI fistula with fibrin glue injection: Report of two cases. *Gastrointest Endosc* 2004; **60**: 460-463
- 18 **Papavramidis ST**, Eleftheriadis EE, Papavramidis TS, Kotzampassi KE, Gamvros OG. Endoscopic management of gastrocutaneous fistula after bariatric surgery by using a fibrin sealant. *Gastrointest Endosc* 2004; **59**: 296-300
- 19 **Petersen B**, Barkun A, Carpenter S, Chotiprasidhi P, Chuttani R, Silverman W, Hussain N, Liu J, Taitelbaum G, Ginsberg GG. Tissue adhesives and fibrin glues. *Gastrointest Endosc* 2004; **60**: 327-333