The Role of Pancreaticoscopy during surgery for Chronic Pancreatitis

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ABSTRACT

Pancreatic duct stone is a cause or a complication of chronic tropical pancreatitis is yet not known. Though minimal invasive procedure like ERCP/ESWL have been recommended, surgery is still a therapeutic option for pancreatic stone. In this study we have assessed the outcome of surgical procedures for pancreatic ductal stone in patients with chronic pancreatitis at our hospital and use of pancreaticoscopy for stone clearance and length of dochotomy.

Between June 2013 and June 2016, 24 patients diagnosed with pancreatic ductal stone associated with chronic pancreatitis were reviewed and the patients were followed up for up to 36 months. The 24 patients underwent ultrasonography, computed tomography, or both, with an overall accuracy rate of 95%. Of these patients, 20 underwent the Frey's procedure and 4 underwent the Whipple procedure. There was intraoperative death in one patient due to intraoperative bleeding from SMA and one post operative mortality due to sepsis following pancreatic necrosis after pancreatitis of remnant pancreas. Of the 24 patients, 22 were followed up for 4-36 months. Stone clearance was confirmed with use of pancreaticoscopy and intraoperative ultrasound. Pancreatic stone disease is a challenging disease in developing countries. Surgical remedies have been modality of treatment. With majority of patient having head dominance lesion, Frey's procedure is choice of treatment and pancreaticoscopy have been armamentarium for assessment of stone clearance and decision making of length of dochotomy.

Key words: Pancreaticoscopy; pancreatic duct stone; Frey's procedure

INTRODUCTION

Chronic pancreatitis is a spectrum of disease which is characterized by morphological destruction of pancreas with varied clinical presentation of exocrine and endocrine insufficiency. Despite advances in medical therapy and minimal invasive procedure like ERCP, ESWL management of chronic pancreatitis have been always difficult with only surgery being remedy either for treatment of complications or failure of medical therapy.[1,2] Surgical options depend on ductal morphology and parenchymal diseases. Drainage procedure like Puestow's lateral pancreaticojejunostomy or resectional procedure like Whipple's operation were two extreme treatment options, while middle pathway of drainage and resectional method like Frey's operation where there is lateral pancreaticojejunostomy with head coring and its modifications like Berne's procedure depends largely on the morphology of the ductal system[3-5]. Despite of drainage or resectional surgery, while doing restoration of pancreatic duct drainage it should be associated with anastomosis pancreaticojejunostomy. Hence, while doing anastomosis, the length of the anastomosis directly correlate with stone burden and head mass burden. In classical Frey's surgery, ideally pancreaticojejunostomy has been conventionally opened till the end of the tail followed by anastomosis.[6] Our hypothesis was while doing duct to mucosa pancreaticojejunostomy there are chances of involvement of second and third degree pancreatic ducts more so in tail where pancreatic tissue burden is less, leading to occlusion of these side branch leading to persistence of raised intraductal pressure so that patient does not get better with pain score and followed by recurrence of symptoms. Hence, resection and/or drainage procedure with the help of pancreaticoscopy will decrease the length of dochotomy which in turn will decrease the chance of intake of opening of second or third degree pancreatic duct during duct to mucosa anastomosis of pancreaticojejunostomy and further with the help of pancreaticoscopy it will confirm about stone clearance.

MATERIALS AND METHODS

This prospective descriptive study was conducted from June 2013-June 2016 in Unit III, Department of Surgery, Kathmandu Medical College Teaching Hospital, Sinamangal, Nepal. Ethical clearance for the study was obtained from the Institute Ethical Committee and all provisions of the Declaration of Helsinki were followed in this study.

Data Collection: All patients with diagnosis of chronic pancreatitis with pancreatic ductal stone during this study period were included in this study. All patients had preoperative Izbicki pain score (Table 1)[7] collected and post operatively during follow up at 6 months and yearly.

Exclusion Criteria: Acute on chronic pancreatitis were excluded.

Table 1. Izbicki Pain Score Chart (Total Score: Sum of Single values divided by 4)

Frequency of pain attacks	Daily	100
	Several times a week	75
	Several times a months	50
	Several times a year	25
	None	
VAS	No pain	0
	maximum pain	100
Analgesic medication		
(morphine-related analgesic potency)	Morphine	100
	Buprenorphine	80
	Pethidine	20
	Tramadol	15
	Metamizole	3
	Acetylsalicylic acid	1
Time of disease related inability to work (last year)	Permanent	100
	1 year	75
	1 month	50
	1 week	25
	None	0

Frey's Procedure:[8]

It's a combination of lateral pancreaticojejunostomy from head till tail along with coring out of the pancreatic head overlying the ducts of Wirsung and Santorini and the uncinate process, keeping at least 5 mm pancreatic tissue posteriorly and medially.

Our modifications:

After identification of pancreatic duct by per operative ultrasound, opening of pancreatic duct at neck which is identified by dipping of main pancreatic duct and then pancreaticoscopy was used to see the stone burden and stone clearance and ductal anatomy. Stone clearance was confirmed by per operative ultrasound. Length of dochotomy was measured in all patients.

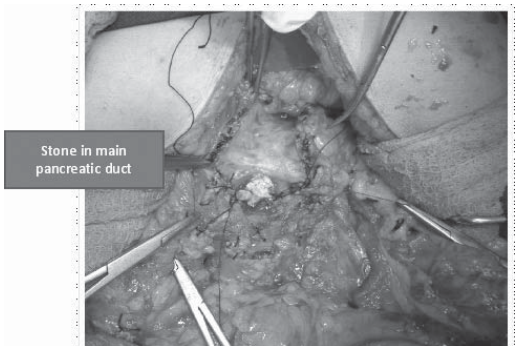

Figure 1: Stone in main pancreatic duct

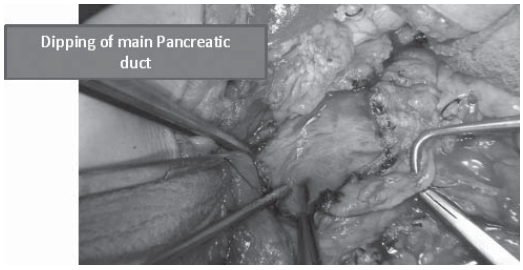

Figure 2: Dipping of main pancreatic duct

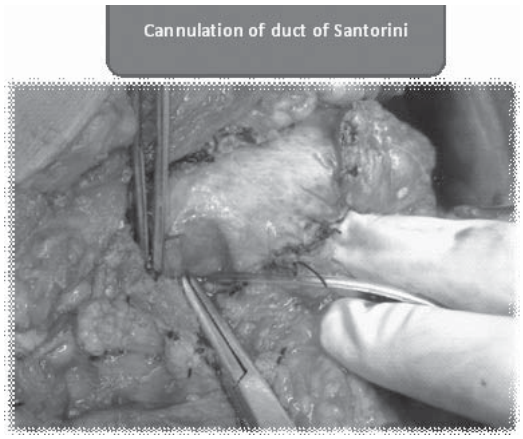

Figure 3: Mandatory cannulation of duct of Santorini

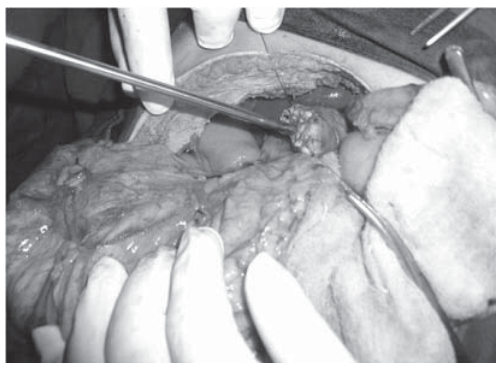

Figure 4: Use of pancreaticoscopy during Whipple procedure

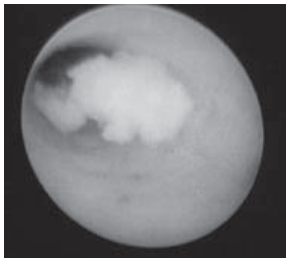

Figure 5: Stone visualization during Pancreaticoscopy

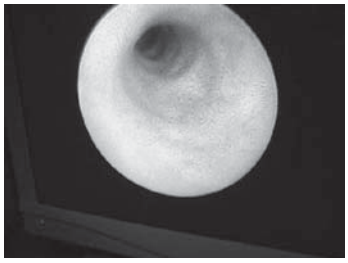

Figure 6: Confirmation of Stone Clearance and Second Degree Ductal opening

Figure 7: Pancreatic Stone Volume

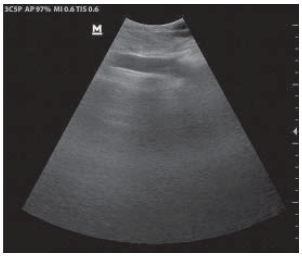

Figure 8: Confirmation of Stone Clearance by per operative Ultrasound

Descriptive statistics of mean, standard deviation, percentage were obtained from the data. Statistical analysis was by SPSS statistical package version 10.1.

RESULTS

All 24 patients underwent ultrasonography, computed tomography, or both, with an overall accuracy rate of 95 %(Table 2). Of these patients, 20 underwent the Frey's procedure and 4 underwent the Whipple procedure (Table 3). There was intraoperative death in one patient due to intraoperative bleeding from superior mesenteric artery (SMA) and one post operative mortality due to sepsis following pancreatic necrosis after pancreatitis of remnant pancreas. Patients were followed up with decrease in Izbicki pain score. (Table 4).

Table 2. Age distribution

Location of Pancreatic Ductal stone	**24**
•	Head and body
•	Body
•	Diffuse ductal and parenchymal stone
16	24.71 ± 6.1
2	13:11
6	52.41 ± 11.18 months
Preoperative Izbicki Pain Score (Mean ± SD)	71.5 ± 17.55
CT imaging mean length of pancreatic duct (cm)	10.1± 3 cm
• Head and body • Body • Diffuse ductal and parenchymal stone	16 2 6
Preoperative Izbicki Pain Score (Mean ± SD)	71.5 ± 17.55
CT imaging mean length of pancreatic duct (cm)	10.1± 3 cm
CT Imaging Mean diameter (cm)	1.57± 0.3 cm

Table 3. Types of surgery with length of dochotomy

Operative procedure	**Length of dochotomy (n:Number of patients)**		
	Without use of Pancreaticoscopy	Use of Pancreaticoscopy	
Frey's procedure	13.5 cm(n:2)	8 ± 2 cm(n:18)	
Whipples procedure	8 cm(n:1)	5 ± 2 cm(n:3)	(Fischer exact test : p value: 0.278)

Table 4. Post operative Izbicki Score of patient during follow up.

Izbicki pain score	**1st year (total pt =7) (Follow up no:6) Mortality :1**	**2nd year (total pt=9) (Follow up no: 14) Mortality:1**	**3rd year (total pt =8) (Follow up no =22)**
Pain VAS(0-100)	21.75 ±8.9	17±7.4	15.5±8.2
Frequency of pain (0-100)	3.9 ±9.3	4.5±8.2	5.3±6.7
Pain medication (0-100)	7.5±7.69	6.5±9.6	6.3±6.5
Inability to work (0-100)	0	0	0
Pain score (0-100)	8.28	5.9	5.7

DISCUSSION

According to our study, we have been able to reduce the length of dochotomy and confirm the stone clearance by the use of pancreaticoscopy during surgery, which we think might reduce the rate of recurrence of pain. As studies have suggested the length of dochotomy during classical Frey's procedure needs to be from

head till tail with head coring, however, have not taken account of second degree and third degree pancreatic ductal anatomy during anastomosis, which we think might come up in duct to mucosa anastomosis during pancreaticojejunostomy.[9] Till now very few papers have mentioned about role of intraoperative pancreaticoscopy during pancreatic surgery. Kachaamy T. *et al,* [10] all have shown the importance of intraoperative pancreaticoscopy where there were able to avoid total pancreatectomy in a patient with diagnosis of IPMN which turn out to be chronic pancreatitis. Similarly, Pucci MJ .*et al* have shown the importance of intraoperative pancreaticoscopy where they were able to extend the surgical margin in 22 % of cases secondary to its use. [11]Surgical treatment have shown better results than ERCP procedure as study done by Dite *et al* [12] and Cahen *et al* [13,14] in terms of pain and physical health scores (p values < 0.001 and 0.003, resp.).Similarly, randomized control trial done by Farkas *et al*,[15] and Izbicki *et al* [16] have shown that Frey's procedure provides a better quality of life, however there was no difference between Frey's and pancreaticoduodenectomy (pylorus preserving Whipple) in terms of pain relief .In our study, we believe that doing modified Frey's procedure and Classical Whipples procedure with drainage with the help of pancreaticoscopy will decrease the length of dochotomy which in turn will decrease the chance of intake of opening of second or third degree pancreatic duct during duct to mucosa anastomosis of pancreaticojejunostomy and further with the help of pancreaticoscopy it will confirm about stone clearance.

Our limitation is small number of size and is descriptive study; however with low incidence of disease it might be of significant outcome and recommend for further randomized control research trials about use of pancreaticoscopy.We recommend the use of pancreaticoscopy during Frey's or Whipple procedure while performing surgery for pancreatic ductal stone in chronic pancreatitis.

REFRENCES

1. Bell RH Jr, Denham W. Chronic pancreatitis. In Cameron JL, ed. Current Surgical Therapy. 8th ed. Philadelphia: Elsevier 2004, pp 490–494.
2. Kozarek RA, Brandabur JJ, Ball TJ, et al. Clinical outcomes in patients who undergo extracorporeal shock wave lithotripsy for chronic calcific pancreatitis. Gastrointest Endosc 2002; 56:496–500.
3. Traverso LW, Tompkins RK, Urrea P, Longmire WP. Surgical treatment of chronic pancreatitis: twenty-two years' experience. *Ann Surg* 1979; 190:312–319.
4. Harrison JL, Prinz RA .The surgical management of chronic pancreatitis: pancreatic duct drainage. *Adv Surg* 1999 32:1–21.
5. Traverso LW .The surgical management of chronic pancreatitis: the Whipple procedure. *Adv Surg* 1999; 32:23–39
6. Frey CF, Smith GJ. Description and rationale of a new operation for chronic pancreatitis. *Pancreas* 1987; 2:701–707.
7. Ho HS, Frey CF. The Frey procedure: Local resection of pancreatic head combined with lateral pancreaticojejunostomy. *Arch Surg* 2001; 136:1353–1358.
8. Strate T, Taherpour Z, Bloechle C, et al. Long-term Follow-up of a Randomized Trial Comparing the Beger and Frey Procedures for Patients Suffering From Chronic Pancreatitis. *Ann Surg*. 2005; 241(4):591-598.
9. Frey CF, Amikura K. Local resection of the head of the pancreas combined with longitudinal pancreaticojejunostomy in the management of patients with chronic pancreatitis. *Ann Surg* 1994;220: 492-507.
10. Kachaamy T, Salah W, Dzeletovic I, Wasif N, Harrison E, Faigel DO, Pannala R. Intraoperative laparoscopic-assisted pancreatoscopy and its role in differentiating main duct intraductal papillary mucinous neoplasm from chronic pancreatitis. Gastrointest Endosc. 2015 Feb; 81(2):459-60
11. Pucci MJ, Johnson CM, Punja VP, Siddiqui AA, Lopez K, Winter JM, Lavu H, Yeo CJ. Intraoperative pancreatoscopy: a valuable tool for pancreatic surgeons? J Gastrointest Surg. 2014 Jun; 18(6):1100-7.
12. Dıte P, Ruzicka M, Zbori V, and Novotny I, "A prospective, randomized trial comparing endoscopic and surgical therapy for chronic pancreatitis," *Endosc*, 2003;.35(7), 553–558,
13. Cahen DL, Gouma DJ, Nio Yet al. "Endoscopic versus surgical drainage of the pancreatic duct in chronic pancreatitis," *The N Eng J Med* 2007; 356(7), 676– 684.
14. Cahen DL, Gouma DJ, Laram´ee P et al. "Long-term outcomes of endoscopic vs surgical drainage of the pancreatic duct in patients with chronic pancreatitis," *Gastroenterology 2011;* 141(5): 1690–1695.
15. Farkas G, Leindler L, Daroczi M, and Farkas Jr G., "Prospective randomized comparison of organ-preserving pancreatic head resection with pylorus-preserving pancreaticoduodenectomy," *Langen Arch Surg 2006;* 391(4): 338– 342.
16. Izbicki JR, Bloechle C, Broering DC, Knoefel WT, Kuechler T, and Broelsch CE . "Extended drainage versus resection in surgery for chronic pancreatitis: a prospective randomized trial comparing the longitudinal pancreaticojejunostomy combined with local pancreatic head excision with the pylorus preserving pancreatoduodenectomy," *Ann of Surg* 1998; 228(6):771–779.