

Original Research Article

Post pancreatic surgery hemorrhage: management and outcome

Mohit Sharma*

Department of Digestive diseases, Lakeshore Hospital, Maradu, Kochi, Kerala, India

Received: 31 July 2016

Accepted: 27 August 2016

***Correspondence:**

Dr. Mohit Sharma,

E-mail: drmohit.gis@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Postoperative hemorrhage after pancreatic surgery is a serious complication. This study analyzed clinical presentation, risk factors and management of post pancreatic surgery hemorrhage to determine the role of angioembolization and surgery.

Methods: 536 patients who underwent pancreatic surgery from 2003 to 2009 were studied with regard to postoperative hemorrhage. The severity of bleeding (mild, moderate and severe) and presentation (early, delayed) was defined as per guidelines of international study group of pancreatic surgery definition. Associated postoperative complications, diagnostic workup, interventions done and their outcomes were analyzed.

Results: 24 out of 536 (4.47%) had post pancreatic surgery hemorrhage. 17 were male and 7 were female. Mean age of the patients was 48.87 (Range 17-78 years). Of these 24 patients 13 (54.16%) had undergone Whipple's procedure, 9 (37.5%), Frey's operation, 1 (4.16%) enucleation of insulinoma and 1 (4.16%) median pancreatectomy. 4 patients presented as early hemorrhage, delayed presentation was in 20 patients. Extraluminal hemorrhage was present in 8 patients, 13 patients manifested as intraluminal hemorrhage whereas combined extra and intraluminal hemorrhage was present in 3 cases. Conservative management was done in 7 patients, 13 patients required angiography and surgical management was done in 8 patients. There were 4 deaths; rest 20 patients were managed successfully.

Conclusions: Hemorrhage after pancreatic surgery occurred in 4.47% of cases. Early hemorrhage is usually due to failure of primary hemostasis. Postoperative pancreatic fistula is the main risk factor for delayed postoperative hemorrhage. Angiographic embolization was the procedure of choice for controlling delayed bleeding. Both surgery and angiography had role in post pancreatectomy hemorrhage.

Keywords: Pancreatic surgery, Hemorrhage, Angioembolization, Complications

INTRODUCTION

The mortality rate after major pancreatic surgery has decreased over the last few decades in most high volume centers to less than 5%.¹⁻³ However morbidity still remains considerable high between 20%-40%.^{4,5} The most common complications are pancreatic fistula (15-20%), delayed gastric emptying (15-40%).^{3,6} Hemorrhage after pancreatic surgery is less common (4-14%).⁷⁻⁹

It has been classified by international study group into early and late hemorrhage.¹⁰ It is a potentially life threatening complication. Early diagnosis and management is of major concern to pancreatic surgeon.

Armamentarium of management ranges from observant monitoring to interventional procedures like angioembolization and re exploration.

The aim of our study is to analyze the incidence, clinical features, risk factors, diagnostic procedures and management of hemorrhage after pancreatic surgery.

METHODS

It is a retrospective analysis of prospectively collected data from 2003 to 2009. 536 patients who underwent resectional pancreatic surgery in Department of digestive diseases, Lakeshore hospital, Kochi were included in the study. Patients undergoing pancreatic necrosectomy and

pseudocyst drainage were excluded from the study. The specific parameters of patients with post-surgery hemorrhage analyzed included primary pathology, intraoperative findings, postoperative interval between pancreatic surgery and bleeding, clinical presentation of hemorrhage, associated complications (pancreatic fistula, delayed gastric emptying, intra-abdominal collection), diagnostic workup, therapeutic interventions and outcome.

The severity of bleeding (mild, moderate and severe) and presentation (early, delayed) was defined as per guidelines of international study group of pancreatic surgery definition¹⁰. For defining pancreatic fistula international study group for pancreatic fistula classification was used.¹¹

Statistical analysis was performed using SPSS software (version 10.0; SPSS Inc, Chicago, IL).

RESULTS

From 2003 to 2009 536 patients underwent major pancreatic surgery. Out of 536 patients 229 (42.73%) underwent whipple's pancreaticoduodenectomy, 224 (41.79%) frey's procedure, 63 (11.75%) distal pancreatectomy, 14(2.61%) median pancreatectomy, 2 (0.37%) total pancreatectomy and 2(0.37%) enucleation. 24 out of 536 (4.47%) had post-surgery hemorrhage. 17 were male and 7 were female. Mean age of the patients was 48.87 (Range 17-78 years). In 24 patients who suffered from post pancreatic surgery hemorrhage, 13 (54.16%) had underwent Whipple's procedure, 9 (37.5%) frey's operation, 1 (4.16 %) enucleation of insulinoma and 1(4.16%) median pancreatectomy (Table 1).

Table 1: Characteristics of patients presenting with haemorrhage.

No. of cases	24
Male	17
Female	7
Mean age	48.87 (17-78 years)
Type of surgery	
Whipple procedure	13 (54.16%)
Frey's procedure	9 (37.15%)
Median pancreatectomy	1 (4.16%)
Enucleation	1 (4.16%)

As per the definition 4 patients presented as early hemorrhage and 20 as delayed hemorrhage. 13 patients hemorrhage manifested as intraluminal gastrointestinal bleed in the form of hemorrhagic nasogastric tube aspirate, melaena and drop in hemoglobin. 8 cases had extraluminal intraperitoneal bleed as detected by hemorrhagic fluid in the drain accompanied by drop in hemoglobin. 3 had combination of both intra and extraluminal hemorrhage (Table 2). 3 of the 4 patients

with early hemorrhage manifested as intraperitoneal bleed.

Table 2: Clinical presentation of haemorrhage.

Presentation	No. of cases
Early	4
Late	20
Intraluminal	13
Extraluminal	8
Intra plus extraluminal	3

7 patients during surgery had soft pancreas and 5 had peripancreatic inflammation. Postoperatively 10 patients had pancreatic fistula, 7 intra-abdominal collection, 5 had delayed gastric emptying.

Management

Upper GI endoscopy was done in 4 cases. In 2 cases it was inconclusive. 1 case it revealed marginal ulcer at gastrojejunostomy site which was dealt by adrenaline injection, however patient continued to bleed requiring angiography. In 1 post Frey's procedure case it was done due to persistent melaena despite negative angiography. In this patient endoscopy revealed bleeding from ampulla of vater, later on laparotomy revealed distal pancreatic tip as source. Ultrasound of the abdomen (12 cases) and CT scan (7 cases) was done to diagnose intra-abdominal collection (Table 3).

Table 3: Management.

Intervention	No of cases
Observation	08
Upper G I endoscopy	04
Angiography	13
Surgery	08

Angiography

13 patients underwent angiography. In 9 of 13 bleeding site could be identified. In 11 cases angiography was done as primary diagnostic cum therapeutic procedure. In 2 cases angiography was done as second procedure when these patients continued to have hemorrhage despite primary re-exploration. In 4 patients it was repeated twice because of failure of primary angiography to detect bleeding site. In 3 of these 4 patients bleeding site was detected and successfully embolized in the second angiography. 1 of these 4 patients continued to have bleed, she underwent emergency laparotomy, bleeding was identified from the proper hepatic artery. The following bleeding sites were identified on angiography jejunal vessels-3, gastroduodenal artery-2, inferior pancreaticoduodenal artery-1. In 4 cases site could not be identified. Pseudoaneurysm was detected in 3 patients (1-gastroduodenal artery, 1-superior pancreaticoduodenal artery, 1- inferior pancreaticoduodenal artery).

One patient developed jejunal infarction after embolization of bleeding jejunal artery. He required exploration, dismantling of pancreaticojejunal anastomosis, resection of gangrenous segment and redo pancreaticojejunostomy.

Surgery

8 patients underwent re exploration. In 4 of 8 cases hemorrhage was early. Bleeding site identified were retroperitoneum (n=2), ovarian pedicle (n=1), pancreatic head (n=1). One case that had bled from ovarian pedicle had additional procedure of hysterectomy along with Whipple’s procedure; this case was excluded from analysis. In all of these patients hemodynamic instability was the primary indication. Remaining 4 cases who underwent surgery had presented as delayed hemorrhage. In 2 of these 4 patients hemodynamic instability was the indication, in 1 of these patients bleeding site was identified from the side of hepatic artery, another patient distal pancreas was found to have bleeder with necrosis, he underwent distal pancreatectomy and splenectomy. 1 patient had large peripancreatic abscess so surgery was chosen over angiography. No specific site was found in this patient. Remaining 1 patient underwent laparotomy, because he continued to have bled after embolization of bleeding jejunal artery branch. CT scan in this patient had shown lesser sac collection. Re exploration revealed infarction of anastomotic jejunal limb, infarcted segment was resected along with slice of pancreatic tissue followed by pancreaticojejunostomy (Table 4).

Table 4: Indication of surgery.

Indication	No of cases = 8
Hemodynamic instability	6 Early bleed-4 Delayed bleed-2
Intra-abdominal abscess	1
Persistent bleed (failure of angiography)	1

Deaths

There were 4 deaths in postpancreatectomy patients complicated by hemorrhage (mortality rate-16.66%). 1 of the 4 had early bleed, emergency exploration revealed bleeding from pancreatic bed. He died later on due to renal failure, sepsis. Other 3 patients were in delayed bleeding group. 1 patient had undergone laparotomy followed by angioembolization due to continuous bleed. He died due to sepsis and multi-organ failure. Another patient died because of severe hemorrhagic shock during shifting to angiography suit. Remaining 1 patient in whom angiogram failed to show any bleeding site died because of sepsis and multi-organ failure while being on conservative management.

Conservative treatment was done in 7 patients. It includes transfusion of blood, octreotide infusion, IV fluids and antibiotics.

DISCUSSION

Pancreatic anastomotic failure, delayed gastric emptying and intra-abdominal collection accounts for the majority of morbidity after pancreatic surgery. Postpancreatectomy hemorrhage is rare with reported prevalence of 2-18%.¹²⁻¹⁵ Incidence of postpancreatectomy hemorrhage in our study 4.47% is consistent with what has been reported in the literature. Despite uncommon incidence it is associated with high mortality rate 14.66% in our study. Other studies had also shown high mortality rate.^{4,14,16,17} This underscores the hemorrhage as critical complication of postpancreatectomy surgery.

Hemorrhage can occur early or late after pancreatic surgery. According to international study group of pancreatic surgery (ISGPS) definition early bleeding is defined as < or = 24 hour after index operation and late as > 24 hr.¹⁰ In our series early hemorrhage occurred in 4 cases and delayed hemorrhage in 20 cases. In 3 cases it was technical failure in terms of inadequate hemostasis in the operative field and manifested as intraperitoneal hemorrhage. In 1 case it was bleeding from the resection cavity (Frey’s procedure). This finding was consistent with reports in the literature.^{13,14,19} This reinforces the concept that early hemorrhage is usually the result of technical failure to achieve the hemostasis. Delayed hemorrhage has been attributed to pancreatic fistula causing erosion or pseudoaneurysm formation resulting in bleeding.^{7,18,20} 10 our patients with pancreatic hemorrhage had pancreatic fistula (OR=5.38 95% CI 2.28-12.65).

Intraoperative factors such as soft texture of pancreas, peripancreatic inflammation and postoperative complication of pancreatic fistula was significantly associated with postoperative hemorrhage. In as much as 22 out of 24 cases i.e. 91.2% who had post pancreatic surgery hemorrhage had unfavorable intraoperative factors and postoperative pancreatic fistula. Choi et al has shown significant relationship between preceding intra-abdominal complication and delayed hemorrhage development.¹⁸ Angiography was successful in localizing bleeding in 9/13 (69.23%) resulting in successfully embolization. 1/ 13 (7.69%) patient developed infarction of the jejunal loop in an attempt to embolize bleeding jejunal artery from the proximal branch. 3 of the 4 patients with negative angiogram were managed successfully with conservative management. These results were consistent with the reports in literature.²¹⁻²³ Our data suggest that if the patient is hemodynamically stable, it is of worth to repeat angiogram. Also majority of patients with negative angiogram can be managed with conservative means.

5 of the 8 patients (62.5%) who underwent surgery had successful outcome. 2 patient died due to sepsis and multi-organ failure. 1 patient developed fecal fistula requiring diversion ileostomy. Inferior results of surgery are possibly due to technical difficulty in assessing the site of bleed, requiring disrupting of pancreaticoenteric anastomosis and hence complications

CONCLUSION

Hemorrhage after pancreatic surgery occurred in 4.47% of cases. Both surgery and angiography had role in postpancreatectomy hemorrhage. Failure of primary hemostasis is mainly responsible for early hemorrhage and requires prompt reoperation to achieve hemostasis. Postoperative pancreatic fistula is the main risk factor for delayed postoperative hemorrhage. Angiographic embolization was the procedure of choice for controlling delayed bleeding.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: Not required

REFERENCES

- Trede M, Schwall G, Saeger HD. Survival after pancreatoduodenectomy: 118 consecutive resections without an operative mortality. *Ann Surg.* 1990;211:447-58.
- Condon KC, Klimsttra DS, Brennan MF. Long term survival after curative resection for pancreatic ductal adenocarcinoma. *Ann Surg* 1996;223:273-9.
- Cameron JL, Pitt HA, Yeo CJ. One hundred and forty five consecutive pancreaticoduodenectomies without mortality. *Ann Surg.* 1992;217:430-5.
- Miedema BW, Sarr MG, van Heerden JA. Complications following pancreaticoduodenectomy: Current management. *Arch Surg.* 1992;127:954-9.
- Sperti C, Pasquali C, Piccoli A, Pedrazoli S. Survival after resection for ductal adenocarcinoma of the pancreas. *Br J Surg.* 1996;83:625-31.
- Cameron JL, Pitt HA, Yeo CJ. One hundred and forty five consecutive pancreaticoduodenectomies without mortality. *Ann Surg.* 1993;217:430-5.
- Sato N, Yamaguchi K, Shimizu S. Coil embolization of bleeding visceral pseudoaneurysms following pancreatectomy: the importance of early angiography. *Arch Surg.* 1998;133:1099-102.
- Balladur P, Christophe M, Tiret. Bleeding of the pancreatic stump following pancreaticoduodenectomy for cancer. *Hepatogastroenterology.* 1996;43:268-70.
- Halloran CM, Ghaneh P, Bosonnet L. Complications of pancreatic cancer resection. *Dig Surg.* 2002;19:138-46.
- Wente MN, Veit JA, Bassi C. Postpancreatectomy hemorrhage (PPH): an international study group of pancreatic surgery (ISGPS) definition. *Surgery.* 2007;142(1):20-5.
- Bassi C, Dervenis C, Butturini G. Postoperative pancreatic fistula: an international study group (ISGPF) definition. *Surg.* 2005;138:8-13.
- Yekebas EF, Wolfram L, Cataldegirmen G. Postpancreatectomy hemorrhage diagnosis and treatment: and analysis in 1669 consecutive pancreatic resections. *Ann Surg.* 2007;246:269-80.
- Castro SM, Kuhlmann KF, Busch OR. Delayed massive hemorrhage after pancreatic and biliary surgery: embolization or surgery? *Ann Surg.* 2005;241:85-91.
- Rumstadt, Schwab M, Korth P, Samman M. Hemorrhage after pancreatoduodenectomy. *Ann Surg.* 1998;227:236-41.
- Berg VMI, Allema JH, Gulik TM. Delayed massive hemorrhage after pancreatic and biliary surgery. *Br J Surg.* 1995;82:1527-31.
- Chou FF, Chen SM, Chen YS. Postoperative morbidity and mortality of pancreaticoduodenectomy for periampullary cancer. *Eur J Surg.* 1996;162:477-81.
- Bottger TC, Junginger T. Factors influencing morbidity and mortality after pancreaticoduodenectomy: Critical analysis of 221 resections. *World J Surg.* 1999;23:164-71.
- Choi SH, Moon HJ, Heo JS. Delayed hemorrhage after pancreaticoduodenectomy. *J Am Coll Surg.* 2004;199:186-91.
- Yeo C. Management of complications following pancreaticoduodenectomy. *Surg Clin North Am.* 1995;75:913-24.
- Bongrand MN, Sauvanet A, Denys A. Conservative management of pancreatic fistula after pancreaticoduodenectomy. *J Am Coll Surg.* 2004;199:19-203.
- Teramoto K, Kawamura T, Takamatsu S. A case of hepatic artery embolization and partial arterializations of the portal vein for intraperitoneal hemorrhage after a pancreaticoduodenectomy. *Hepatogastroenterology.* 2003;50:1217-9.
- Otah E, Cushin BJ, Rozenblit GN. Visceral artery pseudoaneurysms following pancreaticoduodenectomy. *Arch Surg.* 2002;137:55-9.
- Blanc T, Cortes A, Goere D. Hemorrhage after pancreaticoduodenectomy: when is surgery still indicated? *Am J Surg.* 2007;194:3-9.

Cite this article as: Sharma M. Post pancreatic surgery hemorrhage: management and outcome. *Int Surg J* 2016;3:1816-9.