State of the art paper

Migration of abdominal drains into the gastrointestinal tract: unexpected complications

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Abstract

Introduction: To give an overview of the literature on intraluminal migration of the drain placed in the intraperitoneal area.
Material and methods: We present a new case of intraluminal migration of the drain placed in the intraperitoneal area and a literature review of studies published in English language on intraluminal migration of the drain placed in the intraperitoneal area, accessed via PubMed and Google Scholar databases.
Results: A 55-year-old male patient presented to our clinic with abdominal pain and jaundice who underwent pancreaticoduodenectomy having been diagnosed with carcinoma of the distal choledoch. During the patient's follow-ups it was seen that the drain placed into the abdomen had migrated into the intraluminal area. The patient was treated successfully by the controlled removal of the drain. In addition, a total of 9 reports concerning 14 cases of intraluminal migration of the drain placed in the intraperitoneal area meeting the aforementioned criteria were included in the literature review. Eleven of these patients were male (70%), while 3 were female (30%) and their mean age was 62.5 (49–79). While 12 of these patients were treated by drain removal, 2 had surgical treatment.
Conclusions: We believe that controlled removal of the drain can safely be applied in patients whom the fistula tract has been established following upper GI system surgeries that are complicated by intraluminal drain migration.

Key words: drain, complication, intraluminal migration.

Introduction

Intraperitoneal drainage is one of the oldest methods performed in order to prevent the possible accumulation of material such as blood and fluids in the intraabdominal cavity and/or to be able to follow up anastomoses following intraabdominal surgical procedures [1]. The routine utilization of drains following intraabdominal surgical procedures still proves to be a controversial issue [2]. It is, however, seen as an indispensable part of surgery, especially pancreaticoduodenectomy, for many surgeons. Not only common surgical drain-related complications such as pain, infection, obstruction, and function loss are seen, but also rare complications such as visceral organ perforation, evisceration, and strangulation can also be observed [3–7].

Our aim in this study was to present the case of a patient who in the follow-ups was detected to have intraluminal migration of the drain placed in the intraperitoneal area following pancreaticoduodenectomy, in the light of data reported in the literature.

Material and methods

Following the hereby presented case, we found 9 articles in English on the migration of drains into hollow organs through use of the single and various combinations of the search terms "drain," "complication," "intraluminal migration," and "penetration" in the databases PubMed and Google Scholar. Table I summarizes the data collected by these 9 articles (14 patients) [8–16].

Data on the age, sex, operational diagnosis, surgery performed, the diagnostic method used in the detection of the migration of the drain into the intraluminal area and the treatment method, and the type of the drain used were recorded for the cases found following the literature review.

Results

A 55-year-old male patient presented to our clinic with abdominal pain and jaundice. His physical examination revealed that sclera and skin were icteric. Among the patient's abnormal laboratory results a pre-prandial blood glucose level of 151 mg/dl (normal: 70–110), total/direct bilirubin level of 16/10.5 mg/dl, aspartate aminotransferase (AST): 60 U/l (7–50), alanine aminotransferase (ALT): 72 U/l (8–50), alkaline phosphatase (ALP): 1000 U/l (95–280), γ-glutamyl transferase (GGT): 450 U/l (7–49), and amylase level of 1624 U/l were found. His CEA and CA 19-9 levels were found to be within normal limits. His abdominal computed tomography (CT) results revealed dilatation in the biliary tree and a sudden break in the distal common bile duct. The patient received endoscopic retrograde cholangiopancreatography (ERCP) upon suspicions of periampullary tumor. Narrowness in the distal common bile duct and dilatation in the pancreatic duct were observed. Stents were placed in the pancreatic duct and the common bile duct. Pathology results indicated adenocarcinoma. The patient, who did not have any inoperability criterion, underwent pancreaticoduodenectomy and regional lymphadenectomy. Histopathological examination was reported to be moderately differentiated adenocarcinoma. There were no pathological lymph nodes.

Drain amylase and blood amylase were analyzed on the postoperative 3rd day. Amylase results were 220 and 60 U/l respectively. Also drain amylase levels were normal on postoperative 5th and 7th days. Oral intake was started on the postoperative 4th day and it was gradually increased. But on the postoperative 8th day the patient had to have another CT as his fever was 39°C, had tachypnea and tachycardia, and had high infection parameters as was shown in his laboratory results (white blood cell count: 20 100/mm^3, C-reactive protein: 21.16 mg/l, and procalcitonin: 3 ng/ml). The patient was subjected to exploratory surgery upon the detection of intraabdominal extraluminal collection in areas close to the anastomotic lines of pancreaticojejunostomy and gastrojejunostomy, and because he was septic. It was observed that there was a leak in the anastomosis of the pancreaticojejunostomy and that the drains were not working. The drains were replaced following drainage of the intraabdominal collection. The patient's oral intake was stopped and was followed by total parenteral nutrition. The patient had a daily bilious output of 300–500 cc/day in the first days following the second procedure and this amount dropped to 100 cc/day. The patient, who had a lower drain output and a good general condition, was started on a water regimen on the 15th day of the second procedure, and the amount of drain output suddenly went up. The patient drank methylene blue upon suspicion of a gastroenterostomic leak, and the methylene blue was immediately detected in the drains.

It was decided that the anastomosis of gastroenterostomy should be checked through gastroscopy as the leak was still present on the 20th day of the second procedure. The results of gastroscopy revealed that the soft drain, which was sent from the right side of the abdomen, migrated from the neighboring area of the anastomotic line of the gastroenterostomy to the intraluminal area (Figure 1) and it was removed outside the lumen by pulling it approximately 5 cm backwards. A double-lumen nasojejunal tube was endoscopically placed to the distal jejunal loop for nutrition as well. Subsequently the abdominal drain was pulled back daily in a controlled manner. Following the initiation of the drain removal, the fistula flow rate decreased and the fistula was closed up with the complete removal of the drain. No abnormalities were observed in the follow-ups of the patient, and an oral contrast CT was performed on the 5th day of the drain removal. No leaks were detected (Figures 2 A, B). The patient was started on oral intake and was discharged on postoperative day 53 without any problems.

Literature review

Our research conducted without any date limitation using PubMed and Google Scholar databases revealed 9 articles written in English and 14 cases. Eleven of these patients were male (70%), while 3 were female (30%), and their mean age was 62.5 (49–79). Ten patients underwent the

Table I. General characteristics of 14 reported cases with intraluminal migration of the drain placed in the intraperitoneal area

Authors	Year	Total	Gender	Age	Diagnosis	Surgery	Diagnostic method	Treatment	Drain type	Drain insertion time
Eleftheriadis [8]	1990	2	M	60	Gastric adenocarcinoma	Total gastrectomy, Roux-en-Y anastomosis	Endoscopy	Subsequent removal	28 Fr Argyle drainage tube	Primary surgery
			M	68	Liver hydatid disease	Pericystectomy	Endoscopy	Subsequent removal	Semi-soft 32 Fr Latex tube drain	Primary surgery
Ravishankar [9]	2001	2	M	49	Crohn's disease	Gastrojejunostomy	Contrast study performed via the drain	Subsequent removal	ND	Second look surgery
			M	63	Gastric carcinoma	Total gastrectomy + Roux-en-Y anastomosis	Contrast studies performed via the drain	Removal	Foley catheter	Second look surgery
Wilmot [10]	2007	4	F	62	Esophageal adenocarcinoma	Esophagogastrectomy and gastric pullthrough	Upper GI study (with water-soluble contrast and barium)	Removal	ND	Primary surgery
			M	65	Esophageal adenocarcinoma	Esophagogastrectomy and gastric pullthrough	Upper GI study (with water-soluble contrast and barium)	Removal	ND	Primary surgery
			M	65	Esophageal adenocarcinoma	Esophagogastrectomy and gastric pullthrough	Upper GI study (with water-soluble contrast and barium)	Subsequent removal	ND	Primary surgery
			M	55	Esophageal adenocarcinoma	Esophagogastrectomy and gastric pullthrough	Upper GI study (with water-soluble contrast and barium)	Replacing 2 new drains after 2-week follow-up	ND	Primary surgery
Lai [11]	2010	1	M	67	Gastric carcinoma	Lower esophagectomy, total gastrectomy, Roux-en-Y anastomosis	Computed tomography and endoscopy	Removal	13 mm vacuum drain	Primary surgery
Karabulut [12]	2011	1	M	64	Rectum adenocarcinoma	Low anterior resection, end-to-end colorectal anastomosis, and diverting loop ileostomy	Observation (the drain came out from diverting ileostomy)	Subsequent removal	28 Fr silicone drain	Primary surgery
Bae [13]	2011	1	M	70	Distal choledochal tumors	Whipple	Endoscopy	Subsequent removal	ND	Primary surgery
Carlomagno [14]	2012	1	F	79	Sigmoid diverticulitis	Anterior resection	CT	Laparotomy	ND	Primary surgery
Subhash [15]	2013	1	F	55	Malignant MCN of the distal pancreas	Distal pancreatectomy, splenectomy and segmental resection of the involved transverse colon	CT	Laparotomy	20 Fr Foley catheter	Interventional radiology
Shao [16]	2016	1	M	54	Splenic rupture	Splenectomy	Endoscopy	Subsequent removal	Rubber drainage tube	Primary surgery

Figure 1. Endoscopy indicates the drain that had migrated into the gastrojejunostomy site

surgical procedure because of malignity (esophagus, pancreas, common bile duct, stomach, and rectum), while 4 had surgery because of Crohn's disease, sigmoid diverticulitis, splenic rupture, and hepatic hydatid cyst. Only 3 of these patients had lower gastrointestinal (GI) system surgery.

Two of the drains, which migrated to the intraluminal area, were placed during the re-laparotomy procedures performed after complications of the first operation, and 1 was percutaneously placed by interventional radiology to replace the drain which was removed by the patient after the first operation.

When the diagnostic methods were studied, it was observed that 4 cases were diagnosed by upper GI study (with water soluble contrast and barium), 4 by endoscopy, 3 by CT, 2 by contrast study performed via the drain, and 1 by observation (the drain came out from the diverting ileostomy). While 12 of these patients were treated by drain removal, 2 had surgical treatment. Out of 12 patients who did not receive surgical treatment, 7 patients had their drains removed gradually, 4 had direct removal, and 1 was treated by direct drain removal and the subsequent replacement of the drain with 2 new drains. Those two patients who had surgery were the ones with drain migration to the lower GI system. Table I summarizes the demographic and clinical characteristics of the patients.

Discussion

Although abdominal drain use is a method that has been implemented for many years, its use after every surgical procedure has become an issue of controversy. In a meta-analysis published in 2004 on the use of prophylactic drain use in surgical procedures of the GI system, the authors argued that many GI procedures could be performed safely without prophylactic drains and there was a need for novel rules on prophylactic drain use for many centers. The authors also underlined the fact that randomized controlled studies on the use of prophylactic drains in especially upper gastrointestinal system procedures were needed [2].

Many surgeons prefer to use drains in pancreatic procedures because of the high risk of anastomotic leaks, especially after pancreaticoduodenectomy, in order to facilitate early diagnosis of leaks and to expedite their recovery, to decrease the frequency of postoperative collection and abscesses, and because of the fact that these leaks are potentially life-threatening [2, 6, 7].

Heslin *et al.* [6], however, conducted a retrospective study in which they compared the results of 38 patients who did not have drains placed during surgery and 51 patients with drains placed. The authors concluded that there were no statistically significant differences between the two groups with

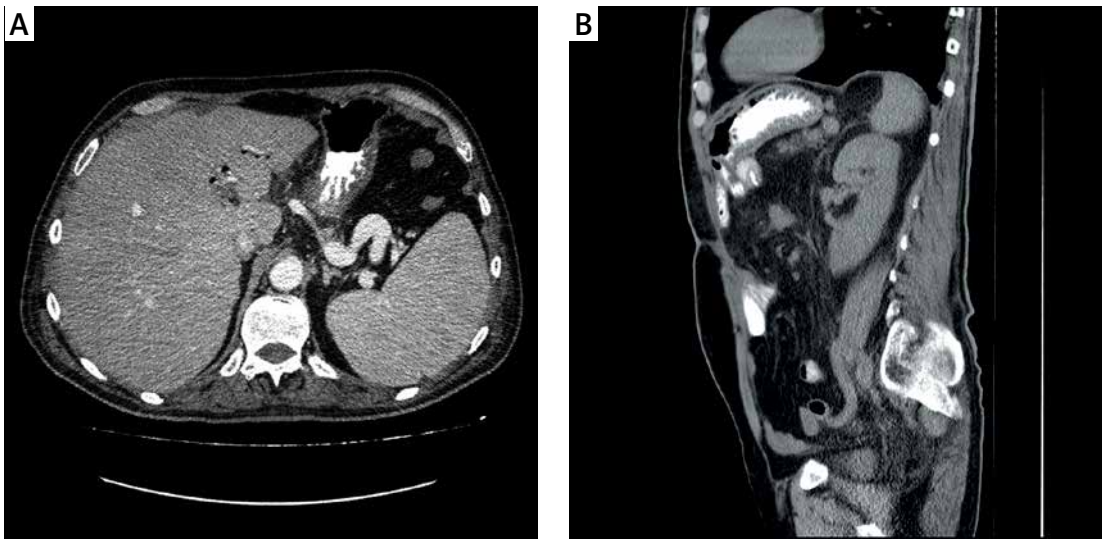

Figure 2 A, B. Closure of the fistula following conservative management, as observed by computed tomography

regards to intraabdominal abscess, pancreatic or biliary fistula, percutaneous drainage, and reoperation. Similarly, Conlon *et al.* [7], found no differences between patients with and without drains following pancreatectomy in their prospective study. In spite of the data presented by these studies, most surgeons use drains following pancreatic procedures, including those at our clinic.

Wound site infection, pain, and function losses related to obstructions can be listed among the common complications related to drain use. Serious complications that necessitate resurgery alongside those that result in delayed hospitalization and even death have also been reported. These include small bowel strangulation, visceral organ perforation, appendicitis, and evisceration of many organs following drain removal [3–5].

Various methods can be used at the diagnostic stage, and this depends on the location of the area that the drain migrated. Mostly endoscopy and contrast passage graphies are helpful tools to use after esophageal and gastric surgery [8, 10, 13, 16]. Computed tomography scans are mostly helpful after lower gastrointestinal surgical procedures [11, 14, 15]. Other than these techniques, fluoroscopy-guided control by the administration of contrast material can also prove to be helpful [9]. We prioritized endoscopic evaluation as our patient's leak continued for a long time and he had a good clinical picture.

When we evaluated the data reported in the literature, we saw that drains not only migrated after the first surgical procedure but they could also migrate following complications necessitating re-laparotomy, or radiologically replaced drains could also migrate [7–11]. In our case, the patient had re-laparotomy because of intraabdominal collection and the drain placed during the second operation migrated. We thought that this complication was related to the peri-tubal intense inflammation.

Studies in the literature showed us that the leaks could spontaneously close up following the controlled and gradual removal of the drain after upper GI system surgery [7–9]. Treatment in lower GI system surgery was performed through laparotomy [10, 11]. In our case initially the drain was removed out of the lumen as well. It was gradually removed in subsequent follow-ups. We observed that the fistula closed up spontaneously.

In conclusion, the intraluminal migration of the drain placed into the abdomen following GIS surgery is rather rare. Physicians should take note of this rare condition in intestinal fistulas extended from the drain in postoperative follow-ups. Endoscopy and contrast imaging can prove to be useful diagnostic tools. We believe that this condition that is observed following upper GI system surgery can be treated through the controlled removal of the drain in which the fistula tract is established.

Conflict of interest

The authors declare no conflict of interest.

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