Laparoscopic Management of a Retroperitoneal Duodenal Perforation Following ERCP for Periampullary Cancer
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ABSTRACT

Introduction: Endoscopic retrograde cholangiopancreatography (ERCP) is a fairly common procedure being performed in several centers worldwide. Although it is proven to be efficient and relatively safe, complications do occur (1.8%). We present a patient with ERCP-induced retroperitoneal perforation of the duodenum treated laparoscopically at our institution.

Case Report: The patient is a 60-year-old female who underwent ERCP for obstructive jaundice due to periampullary carcinoma, during which the perforation occurred. Laparoscopy was performed 5 hours later and the perforation sutured primarily.

Results: The operating time was 125 minutes. On the fourth postoperative day, the patient developed a retroperitoneal collection, confirmed by computed tomographic scan. Re-look laparoscopy was performed and the fluid drained. She recovered completely and was discharged on the eighth postoperative day.

Conclusion: Duodenal perforation following ERCP is rare, with an incidence of 1.8%. Both surgical and nonsurgical management have been reported, each with its specific indications. Our patient needed surgery, because the perforation was large and a retroperitoneal collection was present. Laparotomy is the preferred approach, though now laparoscopy is a viable and effective alternative, because it provides the benefits of minimal access, such as reduced pain and early ambulation.

Key Words: ERCP, Retroperitoneal duodenal perforation, Laparoscopy.
with scissors. A localized collection of bilious fluid was adjacent to the second part of the duodenum (Figure 2). This fluid was sucked out, revealing a large 2x2-cm perforation with prolapsing mucosa identified on the lateral surface of the distal second part of the duodenum (Figure 3). Because the edges were not friable, we decided to perform primary closure with intracorporeal sutures. This was achieved in 2 layers, by first taking continuous sutures using 3.0 Vicryl, and then a layer of interrupted seromuscular sutures using 3.0 Ethibond Excel (Figure 4). Thorough peritoneal toilet was performed using the irrigation-suction device. Two drain tubes (size 24F) were placed, one in the vicinity of the second part of the duodenum and the other in the peritoneal cavity. All the port sites were closed.

**RESULTS**

The total operating time was 125 minutes. Orally, nothing was allowed, and total parenteral nutrition was commenced. The nasogastric tube was kept in situ for 3 postoperative days (POD), during which periodical suction was given. The patient continued to have fever (~100°F), abdominal dis-
tension, and occasional pain during the first 3 postoperative days. Antibiotics were changed to intravenous piperacillin + tazobactam 13 g/day. The drain tubes drained 10 mL to 15 mL of fluid daily. In spite of the antibiotic change, the patient continued to have fever, so a CT scan was performed on the fourth postoperative day, which revealed retroperitoneal fluid collection extending from the right pararenal space to the right paracolic gutter, with no evidence of leakage from the perforated site (Figure 5). The previously placed drain tubes were visualized and found to be just anterior to this collection. A re-look laparoscopy was performed, and the collection (75 mL) was drained, with repositioning of the drain tubes. The patient continued to have low-grade fever for the next 24 hours, which resolved thereafter. Liquids were allowed orally on the second day following the re-look procedure, and a soft diet from the fourth day onward. Another CT scan done on the seventh postoperative day was normal. No problems occurred.

DISCUSSION

The incidence of duodenal perforation following ERCP is 1.8%. In a large series of ERCP procedures, Loperfido et al. reported a 0.43% (12/2769) incidence of retroperitoneal perforations; 0.21% (6/2769) were treated conservatively, with 0.03% (1/2769) mortality. Other leading centers report that therapeutic endoscopy increases the risk of complications, and perforation is more likely when the examination is performed by an inexperienced endoscopist. CT scan is the most useful investigation in post-ERCP duodenal perforations. As far as we know, the laparoscopic closure of duodenal perforations following ERCP has not been reported thus far. Of course, laparoscopic closure of perforated peptic duodenal ulcers has been widely reported, including our own study. At our institution, we have never performed open or laparoscopic repairs for post-ERCP injuries, this being our first. Not only can the suturing be performed laparoscopically, but a thorough peritoneal wash can also be given aided by the superior magnified image provided by the laparoscope. Laparoscopic pyloric exclusion after ERCP-induced perforation has been reported. The grading of duodenal perforations (Table 1) is important to the surgeon, as it quite accurately dictates whether a patient needs surgical or conservative management. Usually, Type I perforations require immediate operative intervention, because they are larger in size and hence a greater risk of contamination is present. The other 3 types can be managed nonoperatively with close surveillance. Surgical intervention should be undertaken if the patient does not improve or continues to deteriorate within 24 hours of treatment. Our patient had a 2x2-cm Type IV injury with significant soiling due to a retroperitoneal collection of bile, warranting operative intervention. Owing to its anatomical locality, there is a high likelihood that type IV perforations are referred to the surgeon quite late compared with intraperitoneal perforations. This late presentation leads to local sepsis in and around the region of perforation, which, in turn, is responsible for the friability and edema of the edges of perforation, thus adding significantly to the mortality and morbidity. Because our patient was referred to us within 5 hours of the perforation,

Figure 5. Postoperative computed tomographic scan (A = axial section, B = sagittal section): arrows showing a retroperitoneal collection of fluid and air displacing the right kidney (K).
the edges were not friable, so there was no problem in sutureing the duodenum. In the case of a delayed presentation, chance of infection and tissue friability is high, rendering primary closure risky. Placing an omental plug is an option we often use to repair large perforations, but since in this case the perforation was retroperitoneal, the omentum could not be used. Patients with perforations diagnosed within 24 hours of surgery have a mortality rate of 13%, whereas diagnosis delayed beyond 24 hours increases mortality rates to 43% because of sepsis or multiorgan failure.14 Recently, there have been reports of using fibrin glue and hemoclips endoscopically to close these perforations.15 Larger perforations, irrespective of their site, warrant operative intervention, ie, an exploratory laparotomy or laparoscopy, subject to the availability of expertise. While dealing with retroperitoneal perforations (either third or fourth part of the duodenum), wide kocherization with mobilization of hepatic flexure is desirable, followed by horizontal tensionless double-layered closure of perforation with inner absorbable and outer nonabsorbable suture material without compromising the lumen of the duodenum.16 It was unfortunate that our patient required a second surgery, but because it was performed laparoscopically as well, a laparotomy was avoided. It may be argued that the perforation could be managed by a single laparotomy, though minor leakage from the sutured area is a known complication following laparotomy as well.

**CONCLUSION**

Laparoscopic closure of post-ERCP duodenal perforations is an excellent alternative to traditional exploratory laparotomies. Laparoscopy provides a very good magnified view of the target tissues allowing adequate repair and thorough peritoneal toilet. Also, it gives the patient the added advantage of less pain and early recovery.

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