

Combined laparoscopic and endoscopic treatment of perforated gastroduodenal ulcer using the ligamentum teres hepatis (LTH)

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Received: 10 May 1994/Accepted: 28 November 1994

Abstract. We propose a novel technique for laparoscopic treatment of perforated gastroduodenal ulcers. The principle of this procedure involves the closure of the perforated ulcer using the ligamentum teres hepatis (LTH). The LTH is cut near its umbilical end and then dissected up to the site of its hepatic insertion. The umbilical extremity of LTH is grasped with a Dormia noose passed through the ulcerated perforation via a gastroscope. Using the noose, the LTH is pulled through the ulcerated perforation until its volume fits and completely closes the perforation. This laparoscopic technique was performed in 15 patients (12 M, 3 F) with anterior perforated duodenal ulcer revealed within the previous 6 h. The procedure could not be performed in three cases: diameter of the perforation exceeding 1.5 cm ($n = 1$), general purulent peritonitis ($n = 2$). In the other 12 cases, closure of the ulcerated perforation with the LTH was realized without technical difficulty. The postoperative course was uncomplicated. The posttreatment comfort was excellent; the mean period of hospitalization was 10 days (range, 8–14 days). An endoscopic examination carried out following 5 weeks of anti-H₂ treatment showed that cicatrization of the ulcer was good and that no pyloric stenosis remained. These initial results suggest that laparoscopic treatment of perforated gastroduodenal ulcer using the LTH is a simple procedure which can be performed with general assurance of success in patients whose perforated ulcers have occurred quite recently. As the laparoscopic procedure is less aggressive than a laparotomy, it enhances the postoperative comfort of patients and prevents the risk of parietal complications. Compared to laparoscopic endosuture this procedure is simple, effective, easier, and particularly adapted to large ulcerated perforation or when

an ulcer's edges are tough or friable, tending to tear when knots are tied.

Key words: Laparoscopy — Endoscopy — Perforated gastroduodenal ulcer — Ligamentum teres hepatis

In an attempt to avoid the parietal complications involved in open surgery and to enhance the patient's postoperative well-being, we developed a novel technique using laparoscopy for the treatment of perforated gastroduodenal ulcer. The assessment of efficacy of laparoscopic treatment of perforated gastroduodenal ulcer is still to be demonstrated. Three conditions are generally needed: the perforation must be situated in the anterior duodenal wall; it must be seen early, within the 6 first h; and vagotomy must be unnecessary [1]. Compared to open procedure, the advantages are those of minimal invasive surgery: less postoperative pain, short hospital stay, quick recovery. The main techniques reported are the sealing of the perforation by omentum, and use of biological glue and suturing with generally good results [2, 6]. Suturing is certainly the most secure technique but difficult to perform when the perforation is large or when the ulcer's edges are tough or friable, tending to tear when knots are tied. In order to avoid those technical difficulties in the laparoscopic treatment of perforated gastroduodenal ulcer, we propose a novel technique—a combined laparoscopic and endoscopic method. The principle of this procedure involves the closure of the perforated ulcer using the ligamentum teres hepatis (LTH).

Patients and methods

Patients

Fifteen patients, 3 women and 12 men, ranging in age from 25 to 60 years (mean 41 years) presented at our institution with acute symp-

Presented at the annual meeting of the Society of American Gastrointestinal Endoscopic Surgeons (SAGES), Nashville, TN, USA, 18–19 April 1994.

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toms of perforated ulcer. None of the subjects showed signs of shock or of renal insufficiency and none had been treated before for an ulcer disease. Eight of the 15 patients had been treated in the previous days (2–15 days) with antiinflammatory drugs. In all cases, a laparoscopic exploration revealed an ulcer in the anterior duodenum that had perforated within the previous 6 h. A decision was made to perform the combined laparoscopic and endoscopic technique in all 15 patients.

Methods

The principle of this procedure involves the closure of the perforated ulcer using the LTH. This technique can be used only in anterior ulcerated perforations that are accessible to a laparoscope, which is usually introduced through the right paraumbilical region. The initial step consists of freeing the borders of the ulcer, which are usually depressed by epiploic adhesions or by the left lobe of the liver. Ablation of the attached or adjoining membranes is carried out using an atraumatic forceps. The peritoneum and entire abdominal cavity are then easily washed using an aspiration-irrigation system. The next step of the procedure involves the closure of the ulcerated perforation. The LTH is cut near its umbilical end, which is cleaved with microscissors to its falciform portion, and the ligament is then dissected up to the site of its hepatic insertion (Fig. 1). The umbilical extremity of the LTH is grasped with the Dormia noose that has been introduced into the peritoneal cavity via a gastroscope and extended through the ulcerated perforation (Fig. 1). Using the noose, the end of the LTH is pulled through the ulcerated perforation until its volume fits and completely closes the perforation (Fig. 2). Tension is maintained on the noose during removal of the gastroscope, and the firm surface thus provided enables the introduction of a gastric tube which is closed with a Y-junction, enabling the Dormia noose to be held in place by a Kocher's forceps (Fig. 3). Finally, peritoneal drainage is accomplished by inserting a transcutaneous drainage tube (argyl 24) into the subhepatic region. The gastric tube is aspirated at 20–40 mm H₂O. The gastric tube is removed along with the Dormia noose on the 7th day.

Results

The laparoscopic procedure could not be performed in three cases: in one case, the diameter of the perforation exceeded 1.5 cm, which precluded its closure using the LTH, and two patients exhibited a general, purulent peritonitis that ruled out the possibility of laparoscopic treatment. In the other 12 cases, closure of the ulcerated perforation with LTH was realized without technical difficulty. The postoperative course was uncomplicated due to a 5-day period of antibiotic therapy consisting of piperacillin and H₂-blocker treatment with 400 mg ranitidine/day. As judged by the patients themselves, the postoperative comfort was excellent; the subjects could sit in an armchair on the 1st day after the procedure, and all were capable of eating on the 8th day. The mean period of hospitalization was 10 days (range 8–14 days). An endoscopic examination carried out following 5 weeks of H₂-blocker treatment showed that cicatrization of the ulcer was good and that no pyloric stenosis remained. None of the patients complained of digestive dysfunction or parietal pains.

Discussion

The aim of this study was mainly to assess the laparoscopic possibility of sealing a perforated ulcer with

the LTH. Compared to open surgery, the laparoscopic closure of a perforated ulcer with LTH is a safe procedure; as a minimally invasive therapy, it reduces postoperative pain and avoids parietal eventration.

Nevertheless, compared to open surgery and other laparoscopic procedures, this study failed to demonstrate any advantage concerning the time of the hospital stay. In our experience, the mean hospitalization of 10 days (8–14 days) is not significantly different from the hospital stay after open operative surgery (9 days; range 7–21 days). Perhaps the cautious evaluation of this innovating procedure during this study could explain this rather delayed discharge of the patients, which was decided upon only after full clinical and nutritional recovery. Now the hospital stay has been reduced, and the last five patients of this study all were discharged on the 8th day, after removal of the Dormia noose and nasogastric tube on the 4th day, without any problem. Most recent studies comparing open and laparoscopic closure of perforated ulcer do not reveal any difference in hospital stay. The Belgian experience, using laparoscopic suturing or omental patch, was an equivalent mean time of hospital stay (9 days) [6]. Open and laparoscopic plication have been compared, and showed no significant difference (7 days) in either group concerning return to normal feeding, medical therapy, or hospital stay [3, 5]. Furthermore, the postoperative course doesn't seem to be influenced by the nature of the laparoscopic procedure performed to close the perforated ulcer. Laparoscopic suture repair and laparoscopic tissue glue repair have been compared, and show an equivalent postoperative course and the same short hospital stay (5.7 days) [4]. Physiopathological factors can probably explain the large range of hospital stays observed, whatever kind of laparoscopic procedure used. Generally, the postoperative ileus and gastric stasis induced by peritonitis after perforated ulcer do not allow the quick recovery to normal feeding required for early discharge of the patient. The normal feeding recovery and discharge could also be delayed by a prolonged gastric stasis when important pyloroduodenal inflammation or partial duodenal stenosis is encountered. The delay of transit return depends on the importance of the peritoneal inflammation and would be obviously longer after diffuse septic peritonitis (delayed diagnosis). On the other hand, freshly perforated ulcer with localized peritoneal inflammation would result in the shortest hospital stay (8–9 days), as we could notice in this study. The general health conditions and the age of patients must also be considered to explain the large range of hospital stay observed after perforated ulcer. Thus, the elderly patients treated most regularly with antiinflammatory drugs had the longest hospital stay (10–14 days).

In this study, laparoscopic vagotomy associated with ulcer closure wasn't performed, because this procedure was considered difficult to perform well in the presence of inflamed tissues; in addition to consuming time, a possible risk of mediastinal infection exists when esophagus is dissected. Nowadays, antiulcer

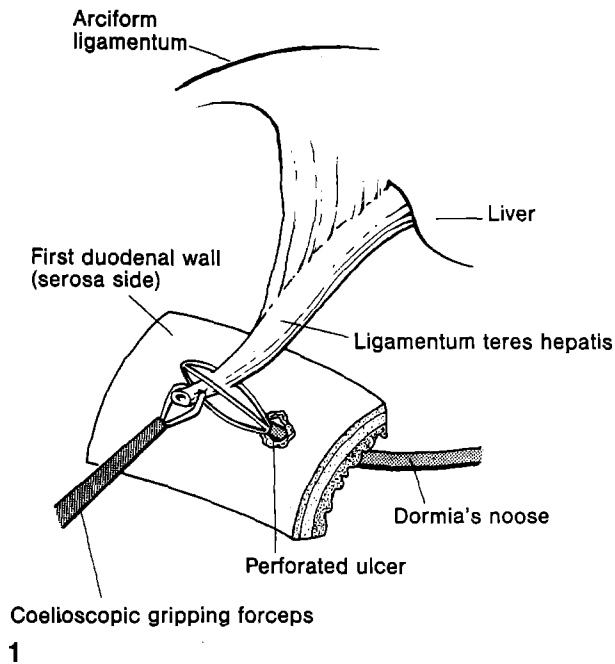
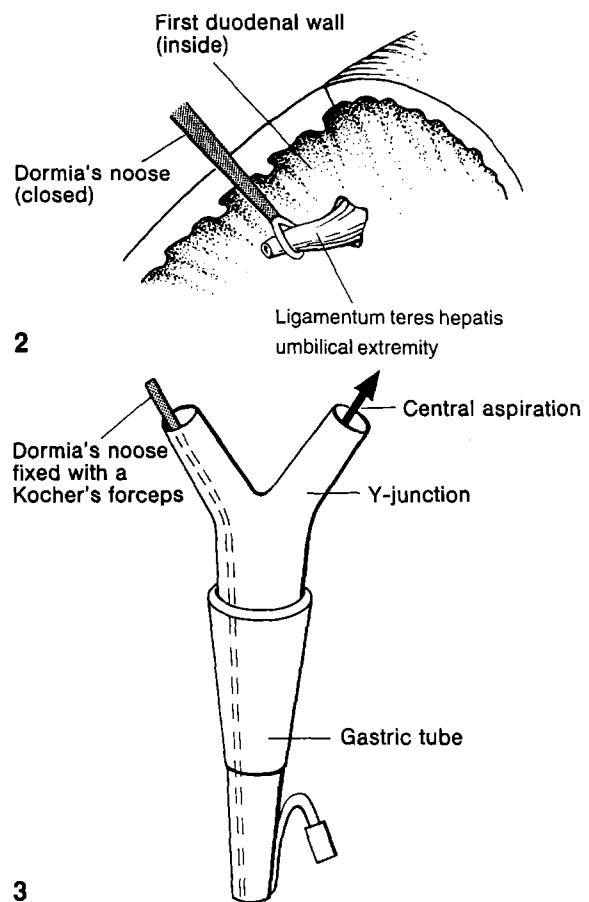


Fig. 1. Laparoscopic view showing the dissection of the LTH following sectioning of the falciform portion. The umbilical extremity of the LTH is grasped with the Dormia noose, which has been introduced through the perforation.

Fig. 2. Endoscopic view showing the LTH being pulled with Dormia noose until it closes the ulcerated perforation.

Fig. 3. Illustration of the aspiration system, including a Y-junction that enables fixation of the Dormia noose by a Kocher's forceps.



drugs such as H₂ blockers and proton inhibitors are expected to cure most duodenal ulcers. For this reason we consider vagotomy unnecessary if the perforation reveals the ulcer. The medical treatment started after the laparoscopic procedure is able to cure the ulcer, particularly in young patients, in stressful condition or suffering from poor nutritional status. Thus, for the same reason, vagotomy seems unnecessary if the perforated ulcer is provoked by antiinflammatory drugs. However, vagotomy must be considered if the perforation is the complicated evolution of a previously treated duodenal ulcer. Such patients were excluded from the study, and four patients underwent an open procedure during the same period: selective vagotomy, or vagotomy-pyloroplasty (Judd) in the case of duodenal stenosis.

Conclusion

These results suggest that laparoscopic treatment of perforated gastroduodenal ulcers using the LTH could be performed with general assurance of success when a perforated ulcer has occurred quite recently and when vagotomy is not required. This technique should particularly be considered in young patients in whom the ulcer has been complicated by a fresh perforation. As the laparoscopic procedure is less aggressive than a laparotomy, it enhances the postoperative comfort of

patients and decreases the risk of parietal complications such as suppuration or eventration. Compared to endosuture, this procedure seems simple, effective, easier, and particularly adapted for the closure of a large ulcerated perforation or for those occasions when an ulcer's edges are tough or friable, tending to tear when knots are tied.

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Discussion

Dr. Cohen: (Denver) An intriguing technique, but I noticed that one of your reasons for being unable to do it was because the ulcer was more than 1.5 cm. I wonder whether, in fact, you are not taking what is a very simple endoscopic suturing procedure for ulcers of less than 1.5 cm and making it into a complicated procedure.

Dr. Costalat: It was a very important lesion and the delay was very important and, in fact, it needed open laparotomy and a partial gastrectomy in this present case.

Dr. Dent: (Moderator) I think the concern, though, if I might interpret the question a bit, is that since you did not use it for a large ulcer, but used it therefore for smaller ulcers, wouldn't it have been just as easy to suture those ulcers rather than use your technique?

Dr. Costalat: We think that the main interest of this technique is to be particularly adapted for the closure of large perforated ulcer or when the ulcer's edges are friable and difficult to suture. Effectively, a suturing procedure is more adequate and easier for closing a small ulcer.

Dr. Helmi: (Qatar) I'm concerned in cases where the lumen of the duodenum would be deformed and narrowed by scarring, and that the ligamentum might totally obstruct the lumen. Do you think this could happen with this technique.

Dr. Costalat: That is the reason we continue the gastric aspiration for 7 days, but we did not observe closure of the lumen by the ligament, which is relatively thin.

Dr. Dent: So you had no obstruction of the duodenum?

Dr. Way: (Los Angeles) The Graham patch was in-

vented to solve the problem that you are solving by what appears to be a more complex form of surgical treatment that requires that the nasogastric tube be in for a week. Most of the patients treated by a Graham patch would be home by then. Why don't you use that technique? It's already a standard technique used to solve the problem that you're inventing this more complex operation to solve. I don't understand.

Dr. Costalat: I don't use omentum, which would not fit the perforation, particularly when the perforation is larger. The ligament very tightly closes the perforation. It's very secure.

Dr. Donahue: (Chicago) About half of our patients with perforated ulcers have pyloric stenosis or deformity and they do very well with a highly selective vagotomy and pyloric reconstruction. I wonder how many of your patients have required this treatment? I'm concerned about your treatment because it adds 7 days of hospitalization and provides no definitive treatment of the ulcer, I wonder if you're not taking a step backward rather than forward in the treatment of ulcer disease.

Dr. Dent: Did any of your patients in follow-up require definitive ulcer therapy because of either recurrence or stenosis of the pylorus? I know your follow-up is short.

Dr. Costalat: We started in 1992 and the follow-up never showed a problem with these patients, who are continuing their treatment.

Dr. Dent: And none have recurred at the moment on, I assume, maximum medical therapy for their ulcer disease?

Dr. Costalat: Medical therapy is very important, after this kind of treatment.