

Laparoscopic Repair of Perforated peptic ulcers versus conventional open surgery

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Abstract:

Perforated peptic ulcer is a common abdominal disease that is treated by surgery. The development of laparoscopic surgery causes great controversy regarding the choice of procedure for perforated duodenal ulcer.

In this study the safety and efficacy of laparoscopic surgery was evaluated, different types of procedures were described and early outcomes in comparison with open surgery were assessed. In addition those factors that compromise the outcome were discussed.

The results of some clinical trials suggested that laparoscopic surgery could be a safe and effective strategy for routine clinical practice. It was associated with a significantly lower wound infection, reduced postoperative pain and analgesic consumption. It also allows early return of the patient to his normal life-style. However it has a longer operating time and higher re-operation rate.

Laparoscopy is not recommended for elderly patients, hypotensive patients, coexisting medical disease and in presence of some technical difficulties or large ulcers.

Key words:

Peptic ulcer - Perforation - Laparoscopy - perforation of duodenal ulcer – Omental patch - Peritonitis

Introduction:

Perforation is the second most common complication of peptic ulcer. This commonly associated with NSAID use especially in elderly population. A significant percentage of patients have a history of smoking, alcohol abuse, and postoperative stress. Most of them are positive for *Helicobacter.pylori* infection. Usually the patients are belonged to urban upper middle class.

Approximately 10-20% of patients with peptic ulcers suffer a perforation of the stomach or duodenum in which a chemical peritonitis develops initially from the gastric and duodenal secretion but in a few hours bacterial contamination is superimposed. The disease could be life-threatening and early diagnosis and treatment is extremely important. Nowadays due to presence of really effective medications against peptic ulcer for decreasing the amount of acid and also eradication of *Helicobacter.pylori* the necessity for definitive therapy is much lesser than before. Usually the only surgical procedure that is necessary is simple closure with or without omental patch. This purpose has been performing by conventional open surgery. Laparoscopic repair of perforated duodenal ulcer was first reported in 1990 and due to some advantages of this procedure and benefits of minimal access surgery, this new technique became popular quickly.

AIMS:

The aims of this study is evaluating the efficacy, safety and outcome of laparoscopic surgery for perforated duodenal ulcers in comparison with conventional laparotomy, and also determine the risk factors which influence the outcome to identify those patients that are not good candidates for laparoscopic approach.

The following parameters were evaluated for laparoscopic and open procedure:

- 1-operating technique
- 2-operating time
- 3-intraoperative complications
- 4- risk of anesthesia
- 5-rate of conversion to open surgery
- 6-postoperative pain and the opiate analgesic requirements
- 7-postoperative morbidity & mortality
- 8-hospital stay
- 9-cost
- 10-quality of life analysis

Materials and metods:

A literature search was performed using search engine Google, HighWire Press, SpringerLink and library facility available at laparoscopic hospital. The following search terms was used: laparoscopy _ perforation of duodenal ulcer

Criteria for selection of papers were upon statistical way of analysis, institute if they were specialized for laparoscopy, the way of management and operative techniques.

Perforation of peptic ulcer:

Perforation of peptic ulcer usually presented as an acute abdomen. Nearly one third of the patients have no history of the disease. Initial symptoms of perforated duodenal or gastric ulcer include a severe and sudden onset abdominal pain that is worse in right upper quadrant and epigastrium and usually accompanied by vomiting and nausea. There is rapid generalization of pain and examination shows peritonitis with lack of bowel sounds. In 10% of cases there is an associated episode of melena [11]. Perforated peptic ulcer is more common in elderly patients, which may be related to higher use of NSAID. Also due to ambiguous signs of the disease there is a delay in diagnosis. Elderly patients are likely to have other medical problems which increases the rate of morbidity and mortality in this group. There are some measures to decrease the risk of peptic ulcer disease and perforation. Since about 30% of patients with perforated peptic ulcer is taking NSAID, use of this drugs should be lessen or at least use concomitant antiulcer medications. Smoking cessation and abstinence from alcohol should also decrease the risk of complicated peptic ulcer. Early diagnosis and treatment of peptic ulcer have important role in prevention of complications.[10]

Diagnosis:

Patient is in obvious distress and the abdominal exam shows peritoneal signs including guarding and rigidity. Fluid sequestration in the third space of the inflamed peritoneum causes dehydration.

The problem can be associated with elevated serum amylase but not as high level as pancreatitis.

Chest x-ray in upright position or abdominal x-ray in left lateral decubitus position can show pneumoperitoneum in 80% of cases.[9]

Use of water-soluble contrast medium with an upper gastrointestinal tract series or computed tomography scan may be helpful.

Perforation of peptic ulcer is a contraindication for endoscopy, because the procedure may worsen spillage of gastric contents or disrupt a sealed perforation.

Treatment:

Once the diagnosis has been made, the patient is resuscitated with isotonic fluid and given analgesia, antacid medication and antibiotic. Nasogastric intubation is also helpful to decrease the amount of leakage. As in the open approach, delayed presentation, hemodynamic instability, and preexisting co-morbidities necessitate aggressive resuscitation prior to surgery and close peri-operative monitoring in order to benefit from the advantages offered by laparoscopic intervention.

Rarely the perforation has sealed spontaneously by the time of examination and nonsurgical treatment can be considered. Non operative management is appropriate only in the absence of clinical peritonitis and when leakage of gastric contents are sealed and confirmed by radiologic contrast study. 12

There are several options for surgical treatment of perforated peptic ulcer. These include simple closure of the wound with or without omental patch and definitive surgery with highly selective vagotomy(HSV), truncal vagotomy and drainage (TV+D) and partial gastrectomy. The choice between combining definitive treatment and simple closure of

the perforation is still a matter of controversy. This choice depends on age and fitness of the patient and the status of the peritoneal cavity. Currently due to presence of really effective medications for treatment of peptic ulcer there is a trend away from definitive operation for perforated duodenal ulcer. Indication for definitive treatment is: young age (<50 years), absence of co-morbidity, onset of symptoms less than 24 hours prior to admission, absence of generalized purulent peritonitis, history of recurrent ulceration in spite of H. pylori eradication therapy.[1]

Laparotomy : Closing the perforation by simple suture was recommended by Mikulicz in 1880 and omental patch was described by Graham.

Laparotomy is usually performed through an upper midline incision. Initially irrigation and exploration is done, following detecting the perforation oversewing by taking 1cm bites either side of ulcer with or without omental patch is carried out. All gastric ulcers require biopsy to exclude malignancy. If the ulcer is not found easily the lesser sac should be opened to examine the posterior of stomach. Always it should be remembered that multiple perforations can occur. Thorough irrigation of peritoneal cavity should be done using 10 liters of normal saline. If closure is secure a drain is not required.

Laparoscopic management : Patient is positioned in 15-20 degree reverse Trendelenburg's position, The surgeon may stand on the right side of patient or between the legs of the patient The camera surgeon stand on the patient's right side and the assistant surgeon on the left side.

Following insertion of first port through an infraumbilical incision, adequate pneumoperitoneum is established. Insufflation pressure was maintained below 11 mm Hg to minimize the risk of transperitoneal translocation of bacteria and endotoxemia. A 10mm camera is placed in the umbilicus. Two working ports are inserted on each side of the camera port, using the triangular conception to form a diamond shape. The left-hand working port (5 mm) is placed in the right midclavicular line, above the level of the umbilicus. The right-hand working port (5mm) is placed in right upper quadrant, 8-10cm from the midline. The upper trocar is inserted in the subxiphoid area that is used for irrigation & suction and/or retraction of the quadrate lobe of the liver. The gallbladder which usually covers the perforation, is retracted upward and the inflammatory adhesions are divided. Gallbladder is held by the assistant using the subxiphoid port. The area is observed carefully and the perforation identified. To measure the size of the perforation it could be compared with tip of suction-irrigation tube that is 5mm. whole abdomen should be cleaned and irrigated quadrant by quadrant, using about 10 liters of isotonic sodium chloride solution. Special attention was given to the supra- and subhepatic regions, the left subdiaphragmatic space and pelvic cavity. Fibrinous membranes on the small bowel are removed as much as possible without damaging the serosal surfaces.

Various laparoscopic techniques have been described for closing the perforation including simple closure using intra or extra-corporeal knots with or without omental patch, sutureless technique, holding the omental patch by fibrin glue, sealing with a gelatin sponge or combination of endoscopy and laparoscopy.[11-14]

In most of the cases the perforation is closed using the classic Graham patch technique with nonabsorbable sutures . Two or three interrupted sutures are placed and kept without tying. An omental flap raised with intact blood supply was placed over the perforation, held in place by the grasper in the epigastric port, and the sutures are tied over the omental flap. This method is preferred to suturing the perforation closed and covering the repair with an omental patch.[1-7] Intracorporeal suturing is preferred against extracorporeal knotting because the latter is likely to cut through the friable edge of the perforation.

Since urea breath test to detect H. pylori infection is expensive and is not available freely, sometimes ulcer-edge biopsy can be performed for this purpose. In case of positive H. pylori, eradication of the infection may prevent ulcer recurrence after simple surgical closure.

Decision to convert to an open approach was dictated by the patient's age, presence of concomitant disease, volume of free air or fluid collection on abdominal computerized tomography, intolerance to carbon dioxide insufflation with consequent hemodynamic instability, and the inability to obtain appropriate laparoscopic closure due to the size of the perforation (>8mm) or the friability of the ulcer edges.[1-7]

Endoscopic/laparoscopic repair of perforated duodenal ulcers was also assessed and showed that it is a safe and effective surgical tactic. Endoscopy identified the site of perforation and guided repair. Endoscopic snaring of omentum and pulling into the defect proved to be an effective adjunct for closure.[11]

The other technique is laparoscopic sutureless repair that a piece of gelatin sponge is rolled into a cone and its tip is placed into the perforation hence the base of the cone protruded onto the serosal surface. The plug is secured by injection some fibrin glue around it.[15-12]

An experimental study was done on rats to find an easier technique for closure of a perforated peptic ulcer, making it more accessible for laparoscopic surgery. In this experiment the perforation was closed by a bioabsorbable patch made of lactide-glycolid-caprolactone fixed with glue onto the outside of the stomach. Postoperatively, there were no signs of leakage or other complications and also no inflammatory reaction was shown in histological evaluations. There was no adverse reactions because of the degradable material or glue. Hence it is concluded that treatment of a perforated peptic ulcer by placing a patch of biodegradable material like a "stamp" on the outside of the stomach is a feasible option.[6]

Operating time in laparoscopy is about 106 minutes versus 63 minutes in open surgery. As expected, the addition of a definitive surgery markedly increases the operative time (median 140 minutes).[7]

Postoperatively, proton pump inhibitors, intravenous fluids, and broad-spectrum antibiotics are administered. Patients taking non-steroidal anti-inflammatory drugs are advised to discontinue.

Patients are called for follow up at 1 week, 1 month, 6 months, 12 months and yearly thereafter. They were subjected to upper gastrointestinal endoscopy at 1 month and 6 months and at yearly intervals thereafter.[7]

Intraoperative exclusion criteria for the laparoscopic repair are:

- a non-juxtapyloric gastric ulcer
- an ulcer greater than 10mm in diameter
- technical difficulties
- concomitant hemorrhage
- inability to tolerate pneumoperitoneum.

Discussion:

For surgical management of perforated duodenal ulcer regardless of the way of access the main and popular procedure, that is simple closure with or without omental patch, is same in both laparoscopic and open surgery. The operating time is significantly longer for laparoscopy group in comparison with the open repair group. (106 versus 63 minutes). But estimated blood loss is more in open surgeries (120 vs 95 ml).

Rate of conversion to open surgery is about 17% and the most common reasons are cardiovascular instability, difficulty in repairing due to the large size of perforation and disease that is lasted more than 24 hours.[1] Patients with an ulcer perforation size of >8 mm had a significantly increased risk for conversion to open repair. Conversions happened more with surgeons with lesser experience of successful laparoscopic repair. Sometimes the conversion is due to failure to progress or posterior perforation [5]

In those patients who underwent laparoscopy, postoperative comfort is obviously more and the amount of narcotic used is significantly lesser than laparotomy group.[2]

Laparoscopic group have lower wound infection rate

But there was more suture leakage (7% vs 2%) and re-operation rate was significantly higher. An increase in the suture leakage rate is predicted by delayed presentation of more than nine hours.[5]. In some studies mortality is same in both group but in other studies it is more in open surgery (9% vs 0%).[1-3]

Length of hospital stay is obviously shorter in laparoscopic group (3 vs 6 days) and they returned to their work earlier(21 vs 30 days).

Cosmetically, scars following laparoscopic surgery are much more acceptable and patients are more satisfied with their operation.[1]

More studies are needed to determine if laparoscopic surgery is safe in patients with generalized peritonitis or sepsis, because it has better view of the peritoneal cavity and lavage can be done thoroughly. Also avoidance of upper abdominal incision in the presence of infection can prevent from related complications.

Conclusion

Laparoscopic approach for perforated peptic ulcer is a safe emergency procedure and technically feasible. Morbidity & mortality rate in compare with open surgery is acceptable meanwhile postoperative comfort is significantly more. However it is not recommended for elderly patients, presence of coexisting medical disease, long period from perforation to admission or cardiovascular instability.[9-13]

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