Laparoscopic Peptic Ulcer Perforation Closure: the Preferred Choice

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Abstract Peptic ulcer perforation is a common life-threatening emergency needing immediate intervention. Laparoscopic closure of perforation is now widely practiced over conventional open closure. This study aimed to compare laparoscopic peptic ulcer perforation closure with conventional open closure in terms of operative time, postoperative analgesia, complications, hospital stay, and return to routine activities. This unicentric, nonblinded, prospective, randomized study was carried out in 50 patients with peptic ulcer perforation who were randomly allocated to undergo either laparoscopic closure or open closure surgery with 25 patients in each group. The mean operative time (60 vs 90 min) was less in the laparoscopic group ($p < 0.05$). Postoperative analgesia requirements (1 vs 6 days) were also less in laparoscopic patients ($p < 0.05$). Complications (nil vs 6; $p < 0.05$) and hospital stay (3 vs 8 days) were less in laparoscopic patients ($p < 0.05$). Patients return to normal activities (5 vs 10 days; $p < 0.05$) earlier in laparoscopic perforation closure than in open closure. Our study has shown better outcomes and lesser morbidities with laparoscopic approach in terms of shorter operative time, shorter hospital stay, less analgesic requirements, and less wound infections. Patients also return to routine activities earlier with the laparoscopic approach. It is a safe alternative to open surgery and should be a preferred choice when there are no contraindications to laparoscopy.

Keywords Peptic ulcer perforation · Laparoscopic closure · Open closure

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Introduction

Peptic perforation is a life-threatening common emergency faced by a surgeon in his practice. Though the incidence of peptic perforation has remained constant, the surgical treatment has advanced for the betterment. Routine laparotomy and suture closure of perforation is still the most common approach of operative treatment. However, with the introduction of laparoscopy, the treatment has drastically changed. The laparoscopic approach of closure of peptic perforation is now being applied widely. The long incision of laparotomy has changed to few centimeters of scars in laparoscopy. Studies have shown that the laparoscopic closure of perforation offers important advantages such as a decrease in operative time, decrease in postoperative pain, decrease in morbidities such as wound infection and incisional hernia, and decrease in hospital stay. It is also cost-effective and cosmetically better. Patients also return to routine activities earlier in laparoscopic closure. Therefore, this study aimed to compare conventional laparotomy with laparoscopic closure of peptic ulcer closure in terms of operative time and postoperative outcomes such as pain, wound infection, incisional hernia, hospital stay, and return to normal physical activities.

Materials and Methods

This unicentric, nonblinded, prospective, randomized study was carried out at M.P. Shah Medical College, Jamnagar, Gujarat from January 2009 to July 2011 in which 50 cases of peptic perforation were taken for the study. All patients were hemodynamically stabilized before subjecting them to surgeries. Routine investigations and special investigations, if needed, were obtained. Procedures and outcomes were well explained to the patients and written consents were obtained. Though the patients were selected randomly, special care was taken of not subjecting the patient of the

severely compromised respiratory system to laparoscopy and also if there were other contraindications to laparoscopy. Twenty-five patients were operated upon by standard right paramedian laparotomy, whereas another 25 patients were operated upon laparoscopically. A standard upper paramedian laparotomy was done under general anesthesia in the open repair, whereas standard four-port technique was used in laparoscopic repair. At laparotomy, after thorough peritoneal lavage, peptic perforation was closed in 3-0 Vicryl intermittent stitches and omental patch was kept after it. The drain was kept in subhepatic space and the mass closure of the wound was done by one size monofilament. Laparoscopy was performed under general anesthesia, with patient lying supine and surgeon standing on the left side of the patient. A CO₂ pressure of 12 mmHg was used. A 0° laparoscope was introduced through 10-mm umbilical port and the diagnosis was confirmed. The patient was put in slight anti-Trendelenburg position. Three 5-mm ports were inserted—two in the mid-clavicular line on the left side and one on the right side. Free peritoneal fluid and pus were removed and sent for culture/sensitivity. The size of the ulcer was roughly measured from the tips of the forceps. The perforation was closed using two to three interrupted 3-0 Vicryl sutures tied over the omentum patch using intracorporeal knot-tying technique. On completion, thorough peritoneal lavage was done with warm normal saline and Betadine. The peritoneal cavity was drained by leaving the drain in right subhepatic space through port wound. Results were recorded in form of demographics such as age, sex, past history of peptic ulcer disease, site and size of perforation, operative time, postoperative analgesia, postoperative antibiotic requirement, postoperative complications such as a leak, wound infection, etc., hospital stays, and return to normal activities. There was no conversion from laparoscopy to open repair in our study.

Observations and Results

Discussion

Peptic ulcer disease is one of the most common diseases prevailing all around the globe. Because of the changing lifestyle associated with increase in stress, increase in smoking, increase in alcohol consumption, and increase in NSAID use, the incidence of peptic ulcer disease is on the rise. However due to availability of better drugs the incidence of life threatening complication such as perforation has remained constant. Because of laparoscopy, the surgical treatment of peptic perforation closure is drastically altered for the betterment and laparoscopic peptic ulcer perforation closure is slowly turning out to be the preferred choice among surgeons over conventional laparotomy. The results of the comparison between conventional right paramedian laparotomy and laparoscopic closure of peptic ulcer perforation are discussed here. All surgeries were performed by well-experienced and trained consultant-level surgeons so that all parameters can be compared uniformly. The mean age of peptic perforation was 50 years and 51 years in both the groups. Most patients were male in both the groups [82 vs 18 %, relative risk 0.88, 95 % confidence interval (CI) 0.45–1.70]. Forty-six percent of patients were known cases of peptic ulcer disease and had taken drugs for it. The most common site of perforation was the first part of duodenum (58 %) followed by prepyloric region (32 %) and pyloric (10 %). The size of perforation was less than 1 cm in 82 % of patients (Table 1). As shown in Table 2, the mean operative time was significantly less in laparoscopic group than in the laparotomy group (60 vs 90 min; $p < 0.05$). All other parameters such as postoperative analgesic requirements (1 vs 6 days; $p < 0.05$), resumption of oral feeding (3 vs 5 days),

Table 1 Patient demographics

Sr. no	Modalities	Laparoscopic repair (n=25)	Open repair (n=25)	Relative risk (95 % CI)	p value	Chi square
1	Age	25–60 years (median 50 years)	27–62 years (median 51 years)			
2	Sex					
	Male	20	21	0.88 (0.45–1.70)	<0.05	
	Female	05	04			
3	H/o peptic ulcer disease	12	11			
4	Site of perforation					
	Duodenum first part	16	13	1.29 (0.71–2.33)	>0.05	0.74
	Pylorus	03	02			
	Prepyloric	06	10			
5	Size of perforation (cm)					
	<1	20	21	0.88 (0.45–1.70)	<0.05	
	>1	05	04			

Table 2 Operative and postoperative outcomes

Sr. no		Laparoscopic repair (<i>n</i> =25)	Open repair (<i>n</i> =25)
1	Mean operative duration in minutes	60 (8.43) ^a (56.71–63.29) ^b	90 (10.56) ^a (85.86–94.14) ^b
2	Analgesic requirement in days	1 (1) ^b	6 (1.08) ^a (3.89–8.11) ^b
3	Antibiotic requirement in days	3 (1.323) ^a (2.47–3.53) ^b	6 (2.041) ^a (5.18–6.82) ^b
4	Leak	Nil	Nil
5	Wound infection	Nil	4
6	Pelvic abscess	Nil	2
7	Mean postoperative hospital stay in days	3 (1.32) ^a (2.47–3.53) ^b	8 (2.02) ^a (7.19–8.81) ^b
8	Return to normal physical activities in days	5 (2.29) ^a (4.08–5.92) ^b	10 (3.06) ^a (8.88–11.22) ^b

^a Standard deviation^b 95 % confidence interval range

and antibiotic requirements (3 vs 6 days) were better in the laparoscopic group ($p < 0.05$). There were no postoperative complications such as perforation leak, wound infection, pelvic abscess, and incisional hernia in the laparoscopic group. The incidence of wound infection was 16 %, pelvic abscess 8 %, and of incisional hernia was 8 % in the laparotomy group. The postoperative hospital stay was also significantly less in the laparoscopic group (3 vs 8 days; $p < 0.05$). Patients also felt better in the laparoscopic group and returned to their routine activities and work earlier (5 vs 10 days; $p < 0.05$) as shown in Table 2. Therefore, it was evident from the above-mentioned results that laparoscopic peptic perforation closure was superior to conventional laparotomy. We also compared our results with those of other studies done around the world as shown in Table 3.

From above-mentioned studies, it was evident that laparoscopic peptic perforation closure appears to be superior to open repair in terms of postoperative analgesia, hospital stay, and complications. The operative time was also less.

Summary and Conclusion

Peptic ulcer perforation is a life-threatening emergency and requires urgent management in terms of stabilizing the patient hemodynamically followed by closure of perforation. Because of advancement in laparoscopy, peptic ulcer perforation closure by laparoscopy is becoming popular and preferred choice. Our study has shown better outcomes and lesser morbidities with laparoscopic approach in terms of shorter operative time, shorter hospital stay, lesser analgesic requirements, and lesser complications such as wound

Table 3 Comparison among various studies in terms of various operative and postoperative parameters

Study	Mean operative time (min)		Postoperative analgesia (days)		Complications (wound infection, pelvic abscess, leak)		Hospital stay (days)	
	A	B	A	B	A	B	A	B
Golash [1] (<i>A</i> =95, <i>B</i> =57)	45	61	3	6	9	35	4	9
Mehendale et al. [2] (<i>A</i> =34, <i>B</i> =33)	50	55	Decrease doses	–	–	–	4	9
Sui et al. [3] (<i>A</i> =63, <i>B</i> =58)	42	52.3	1 (dose)	3 (doses)	3	7	5	6
Lau et al. [4] (<i>A</i> =44, <i>B</i> =35)	101.3	52.1	3 (doses)	4 (doses)	–	–	5	5
Marietta et al. [5] (<i>A</i> =52, <i>B</i> =49)	75	50	Decrease doses	–	12	24	6.5	8
Bhogal et al. [6] (<i>A</i> =19, <i>B</i> =14)	61	57	1.2	3.8	–	–	3.1	4.3
Bertleff and Lange [7]	Increase		Decrease	–	Increase	–	Decrease	–
Ates et al. [8] (<i>A</i> =17, <i>B</i> =18)	42.10	55.83	Decrease	–	–	–	5	5.33
Lunevicius et al. [9] (<i>A</i> =535, <i>B</i> =578)	Increase	–	Decrease	–	Decrease	–	Decrease	–
Nicolau et al. [10] (<i>A</i> =85, <i>B</i> =174)	85	55	9 (doses)	16 (doses)	Decrease		6.1	7.8
Our study (<i>A</i> =25, <i>B</i> =25)	60	90	1	6	0	6	3	8

A laparoscopic repair, *B* laparotomy (open) repair

infection and pelvic abscess. Patients also return to their work earlier, which is the fact endorsed by many studies worldwide. It can be safely concluded from our study that laparoscopic peptic ulcer perforation closure is a safe alternative to open surgery and should be preferred choice when there are no contraindications to laparoscopy and necessary expertise is present.

Conflict of Interest None

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