

Original Research Article

Laparoscopic versus open repair of duodenal perforation: a comparative study in tertiary care hospital in Uttarakhand, India

Praveen Kumar^{1*}, Saurabh Kumar¹, Ram Kumar Verma¹,
Akshat Agarwal¹, Rashmi Kumari²

¹Department of General Surgery, ² Department of Community Medicine, SGRRIMHS and SMIH, Dehradun, Uttarakhand, India

Received: 27 September 2016

Accepted: 01 October 2016

*Correspondence:

Dr. Praveen Kumar,

E-mail: praveentyagi6@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Duodenal ulcer perforation is a common cause of emergency laparotomy. Minimal access surgery is opted with hesitation in most surgical units. The present study was conducted to determine the feasibility of laparoscopic repair of duodenal perforation and to compare it with the conventional open repair in our set-up.

Methods: The patients admitted in a single unit of surgery department during a two year period were included in the study. All the patients were admitted in emergency with the diagnosis of duodenal perforation. These were subjected to either laparotomy or laparoscopic repair of duodenal perforation. Results were analyzed and compared.

Results: Result analysis indicated laparoscopic approach to be associated with less post-operative complications and morbidity with better patient recovery.

Conclusions: We concluded that minimal access approach to duodenal ulcer perforation is safe and should be offered in properly selected cases.

Keywords: Duodenal ulcer, Laparoscopy, Omental patch, Perforation

INTRODUCTION

Duodenal ulcer perforation is an abdominal emergency needing early intervention. Most are dealt with conventional laparotomy and Graham's patch repair. The first laparoscopic repairs were described in 1990. Mouret et al reported the first sutureless fibrin glue omental patch.¹ Nathanson et al described the first laparoscopic suture repair for perforated duodenal ulcers.²

Laparoscopic repair is indeed a very useful method of dealing with this common complication of peptic ulcer disease, which forms a large bulk of patients presenting to surgery emergency with acute abdomen. Laparoscopic approach overcomes the disadvantages of a conventional open repair which includes large upper abdominal incision, wound infection and dehiscence, prolonged ileus and pulmonary complications, delayed recovery times

and late complications like incisional hernia. Laparoscopic repair confers all the advantages of minimal access surgery for this life-threatening condition and is desirable in properly selected patients. Many studies support this modality of management.³⁻⁵

Our tertiary care hospital caters to the most remote areas of the state. Due to lack of resources and expertise, a huge segment of the population is not offered laparoscopic choice. This study was taken up to compare the laparoscopic and open repairs for the management of perforated duodenal ulcer and to assess the safety and feasibility of laparoscopic route in our set-up.

METHODS

This retrospective study was carried out at SGRRIMHS and SMIH, Dehradun, India. The patients admitted in

surgery emergency in one unit in a two year period (June 2014- June 2016) with the diagnosis of perforated duodenal ulcer were included in the study. The patients with following features were excluded from the study- age <15 or >70 years, hemodynamic instability despite hydration, symptoms over 72 hours, previous abdominal surgeries and major medical co-morbidities.

After appropriate selection and counseling, 44 patients underwent open and 21 patients were subjected to laparoscopic repair. Laparoscopic repair included four port insertion- 10 mm umbilical, 5 mm ports in right and left mid-clavicular lines and 5 mm port in epigastrium. The epigastric port for liver retraction was not put in 3 patients with liver adherent to the anterior abdominal wall and repair was accomplished with 3 ports. The perforation was repaired with 2.0 silk on round body needle with intra-corporeal suturing and Graham's patch omentopexy was done.

A drain was put through right side working port in the Morrison's pouch after thorough lavage and suction of the peritoneal cavity. Another drain was put through left side working port in the pelvic cavity. Open repair involved the standard exploratory laparotomy with

closure of perforation and omental graft (Graham's repair). Abdominal drain in the Morrison's pouch was put after peritoneal lavage.

In the postoperative period, all patients received same antibiotic prophylaxis with adequate analgesia and fluid replacement. Postoperative complications, pain scores and patient recovery was assessed. All patients were given *H. pylori* eradication therapy at the time of discharge and a minimum of one month follow-up was done.

RESULTS

We analyzed 65 patients with the diagnosis of duodenal ulcer perforation. 21 patients in the laparoscopic group and 44 patients in the open repair group were assessed and compared. The features included patient profile, intra-operative time, postoperative complications, pain scores (VAS), time to resume orals and hospital stay. Follow up was done for minimum one month.

The mean age in open repair group was 41.61 years and in laparoscopic repair was 35.33 years. This was statistically significant (Table 1).

Table 1: Age distribution.

Statistical derivation	Open procedure (N = 44)	Lap procedure (N = 21)	Unpaired student t-test value	P Value
Mean	41.61	35.33	2.692	<0.05 significant
SD	10.14	9.957		

Table 2: Patient profile.

Profile feature		Open N (%) 44 (67.69)	Lap N (%) 21 (32.30)	Statistical derivation
Sex	Male	37 (84.1)	20 (95.2)	$\chi^2 = 1.637$ df = 1, P = 0.2008
	Female	07 (15.9)	01 (4.8)	
H/O Peptic ulcer ds.	Yes	7 (15.9)	02 (9.5)	$\chi^2 = 0.486$ df = 1, P = 0.4858
	No	37 (84.1)	19 (90.5)	
Smoking	Yes	33 (75.0)	16 (76.2)	$\chi^2 = 0.011$ df = 1, P = 0.9170
	No	11 (25.0)	05 (23.8)	
NSAIDS	Yes	21 (47.7)	03 (14.3)	$\chi^2 = 6.826^*$ df = 1, P = 0.0090
	No	23 (52.3)	18 (85.7)	

*indicates significant.

In the laparoscopic repair group 84.1% patients were males and in the open repair group 95.2% were males. Thus, both groups had predominance of male patients. In the open repair group 75% patients had history of smoking similar to laparoscopic group with 76.2%. The history of peptic ulcer disease was present in 15.9% patients in open group and 9.5% in laparoscopic group. In open repair 47.7% had history of NSAID use compared to 14.3% observed in the laparoscopic repair group which was statistically significant (Table 2). One patient in our study was converted from laparoscopic to open group

leading to a conversion of 4.54%. The mean intra-operative time in open repair was 56.82 minutes and laparoscopic repair was 91.19 minutes. The difference was statistically significant. The laparoscopic repair took significantly longer operative time (Table 3).

The postoperative complications are cited in Table 4 (a). Patients managed with laparoscopic approach had significantly reduced wound infection. 20.5% patients developed wound infection in the open group compared to none in the laparoscopic group. The difference was statistically significant Table 4(b).

Postoperative recovery was also significantly better in laparoscopic group with better VAS scores and shorter hospital stay. Pain score on day 2 was 2.82 in laparoscopic group and 6.80 in open group. The mean time to resume oral feeding after laparoscopic repair was

2.67 days which was significantly shorter than the open group with mean time of 4.34 days. The mean hospital stay was 8.59 days in open while it was 5.10 in the laparoscopic group (Table 3).

Table 3: Intra/post op factors.

Factor	St. derivation	Open (N = 44)	Lap (N = 21)	Unpaired t test value	P Value
Operative time (mins)	Mean	56.82	91.19	22.42	<0.001 (highly significant)
	SD	7.24	4.718		
Day 2 VAS*	Mean	6.80	2.82	11.11	<0.05 (significant)
	SD	0.76	0.512		
Time to resume oral feeding (days)	Mean	4.34	2.67	35.71	<0.05 (significant)
	SD	0.914	0.483		
Hospital stay (days)	Mean	8.59	5.10	193.88	<0.001 (highly significant)
	SD	0.81	0.301		

*VAS- Visual analogue score.

Pain scores were significantly reduced at one month follow up in laparoscopic group with all patients reporting no pain. 20.5% patients with open repair had pain at one month post-operative period (Table 5).

Table 4 (a): Post-operative complications.

Complication	Open (N/%)	Lap (N/%)
Fever	9 (20.45)	5 (11.36)
Leak	0 (0.0)	0 (0.0)
Wound infection	9 (20.45)	0 (0.0)
Prolonged ileus	2 (4.54)	0(0.0)
Pulmonary infection	1 (2.27)	1 (2.27)

Table 4 (b): Wound infection.

Post-op. complication	Open	Lap	Conclusion
Wound infection	Yes 9 (20.5)	0 (0.0)	$\chi^2 = 4.986^*$ df = 1, P = 0.0256
	No 35 (79.5)	21(100)	

*indicates significant.

Table 5: Follow-up.

Feature	Open	Lap	P value
Wound pain	9	0	0.025*
Incisional hernia	0	0	
Complications due to adhesions	0	0	

*indicates significant.

DISCUSSION

Minimal access surgery is steadily replacing the open surgical approach for a vast number of indications. However, there remains a definite hesitation in implementing laparoscopic repair of duodenal

perforation, which is a very common complication of peptic ulcer disease presenting in emergency. The choice of operative route depends to a large extent on the laparoscopic experience of the surgeon on duty.⁶

The mean age in laparoscopic group was significantly lower than open repair group. This may have contributed to better patient recovery in the laparoscopic group. But, since the mean age in open repair was 41.61 years which is significantly lower than 54 years reported in a large meta-analysis by Antoniou et al⁸ and patients with comorbidities were excluded from our study, age alone may not be the only factor responsible for the better outcome in laparoscopic group.

The majority of patients in our study in both the groups were males. Similar male dominance in such patients were reported by Bertleff et al.⁷ Association with predisposing factors of peptic ulcer disease esp. smoking and NSAID use was observed in our study. Vaidya et al in their study also reported similar findings.⁹

We adopted four ports positioning in laparoscopic repair but, in 3 patients we put three ports. Successful repair with three ports has been described by Lo et al.¹⁰ Abdalaziem et al also reported similar technique with omission of the liver retraction port.¹¹

There are many causes of conversion of laparoscopic to open route. We had one patient who had to be converted to open route due to inadequate omental patch mobilization. Variable conversion rates have been quoted in literature ranging from as low as 0% by Palanivelu et al to up to 14.2% by Siu et al.^{5,12}

We found significantly increased operative time in the laparoscopic group (91.19 minutes) compared to open group (41.61 minutes). Lau et al reported similar difference in the operative times.¹³ The longer time taken

in laparoscopic repair is off-set by the significantly improved post-operative recovery and patient satisfaction.

In our study, we found that in the laparoscopic group patients had less postoperative pain (mean VAS score 2.82 on day 2), earlier resumption of oral feeding (mean 2.67 days), less wound complications and shorter hospital stay. Many studies conclude that laparoscopic technique gives better postoperative course compared to open repair.^{5,12,14}

CONCLUSION

The laparoscopic management of duodenal ulcer perforation is an effective and safe modality of treatment which may be offered in emergency as well. It has encouraging outcome with minimal conversions to open surgery, better patient recovery and no mortality. There is paucity of data to support the laparoscopic route in our state and more research needs to be undertaken to establish it as the modality of choice. We found laparoscopic repair to be a feasible and safe option in the management of perforated duodenal ulcer.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Mouret P, Francois Y, Vignal J, Barth X, Platet R. Laparoscopic treatment of perforated peptic ulcer. Br J Surg. 1990;77(9):1006.
2. Nathanson LK, Easter DW, Cuschieri A. Laparoscopic repair/peritoneal toilet of perforated duodenal ulcer. Surg Endosc. 1990;4(4):232-3.
3. Lunevicius R, Morkevicius M. Systematic review comparing laparoscopic and open repair for perforated peptic ulcers. Br J Surg 2005;92:1195-207.
4. Lau WY, Leung KL, Zhu XL, Lam YH, Chung SC, Li AK. Laparoscopic repair of perforated peptic ulcer. Br J Surg.1995;82(6):814-6.
5. Palanivelu C, Jani K, Senthilnathan P. Laparoscopic management of duodenal ulcer perforation: is it advantageous? Indian J Gastroenterol. 2007;26:64-6.
6. Sommer T, Elbroend H, Andersen FH. Laparoscopic repair of perforated ulcer in Western Denmark a retrospective study. Scand J Surg. 2010;99:119-21.
7. Bertleff MJ, Lange JF. Laparoscopic correction of perforated peptic ulcer: first choice? a review of literature. Surg Endosc. 2010;24:1231-9.
8. Antoniou SA, Antoniou GA, Koch OO, Pointner R, Granderath FA. Meta-analysis of laparoscopic versus open repair of perforated peptic ulcer. J Soc Laparoendosc Surg. 2013;17(1):15-22.
9. Vaidya BB, Chaitanya PG, Shah JB. Laparoscopic repair of perforated peptic ulcer with delayed presentation. J Laparoendosc Adv Surg Tech. 2009;19(2):153-6.
10. Lo HC, Wu SC, Huang HC, Yeh CC, Huang JC, Hsieh CH. Laparoscopic simple closure alone is adequate for low risk patients with perforated peptic ulcer. World J Surg. 2011;35:1873-8.
11. Abdelaziem S, Hashish M, Suliman A, Sargsyan D. Laparoscopic repair of perforated duodenal ulcer (Series of 50 cases). Surg Sci. 2015;6:80-90.
12. Siu WT, Leong HT, Law BK. Laparoscopic repair for perforated peptic ulcer: a randomized controlled trial. Ann Surg. 2002;235:313-9.
13. Lau YL, Leung KL, Kwong KH, Davey IC, Robertson C, Dawson JJ. A randomized study comparing laparoscopic versus open repair of perforated peptic ulcer using suture or sutureless technique. Ann. Surg. 1996;224(2):131-8.
14. Bertleff MJ, Halm JA, Bemelman WA. Randomized clinical trial of laparoscopic versus open repair of the perforated peptic ulcer: the LAMA trial. World J Surg. 2009;33:1368-73.

Cite this article as: Kumar P, Kumar S, Verma RK, Agarwal A, Kumari R. Laparoscopic versus open repair of duodenal perforation: a comparative study in tertiary care hospital in Uttarakhand, India. Int Surg J 2016;3:1975-8.