

ORIGINAL RESEARCH

Comparative Study between Open and Laparoscopic Repair of Duodenal Ulcer Perforation

A. G. Das¹, S. R. Kulkarni², R. Chabra³, A. Surushe⁴, J. C. Monteiri⁵

ABSTRACT

Background: The introduction of computer chip television was a seminal event in the field of laparoscopy. Before its conception, laparoscopy was used as a means of diagnosis and performance of simple procedures in gynecology. The introduction in 1990 of laparoscopic chip applicator with 20 automatically advancing clips made surgeons more comfortable with laparoscopic surgeries.

Aims and Objectives: This study aims to study the efficacy, advantages, disadvantages, limitations, post-operative pain, and complications leading to morbidity and mortality, duration of hospital stay, recurrence, and return to normalcy between open and laparoscopic procedures and to arrive at a conclusion as to the best modality of treatment between the two.

Methodology: Patients who in the course of surgery were converted to open surgery, patients in whom surgery could not be completed due to any reason. The data were collected in a prepared pro forma.

Results: In our study, the post-operative complications, i.e., SSI, wound dehiscence, and intra-abdominal collection were 10% each in the laparotomy and perforation closure with no post-operative complications in the laparoscopic perforation group closure.

Conclusion: Advanced laparoscopic procedures have better result and outcomes compared to open procedures, but the cost factor should be kept in mind as it is still an important factor in a developing country like ours.

Keywords: Duodenal ulcer perforation, Laparoscopic procedures, Open repair.

How to cite this article: Das AG, Kulkarni SR, Chabra R, Surushe A, Monteiri JC. Comparative Study between Open and Laparoscopic Repair of Duodenal Ulcer Perforation. *Int J Med Oral Res* 2019;4(1):1-4.

Source of support: Nil

Conflicts of interest: None

INTRODUCTION

Hans Christian Jacobaeus reported the first laparoscopic operation in humans in 1910. The introduction

^{1,3-5}Resident, ²Professor and Head

¹⁻⁵Department of General Surgery, Krishna Institute of Medical Science Karad, Maharashtra, India

Corresponding Author: A. G. Das, Resident, Department of General Surgery, Krishna Institute of Medical Science Karad, Maharashtra, India. e-mail: ankur.gdas@gmail.com

of computer chip television was a seminal event in the field of laparoscopy. Before its conception, laparoscopy was used as a means of diagnosis and performance of simple procedures in gynecology.^[1-5] The introduction in 1990 of laparoscopic chip applicator with 20 automatically advancing clips made surgeons more comfortable with laparoscopic surgeries.^[6-9] This study aims to study the efficacy, advantages, disadvantages, limitations, post-operative pain, and complications leading to morbidity and mortality, duration of hospital stay, recurrence, and return to normalcy between open and laparoscopic procedures and to arrive at a conclusion as to the best modality of treatment between the two.

METHODOLOGY

The present study was a prospective study of 50 cases of duodenal perforation admitted to Krishna Institute of Medical Sciences, Karad, Satara district, Maharashtra, from June 2016 to December 2017. 50 cases for the study were selected on the basis of non-probability (purposive) sampling method. The inclusion criteria were patients with bowel perforation closures. The exclusion criteria were patients medically unfit to undergo surgery, patients who in the course of surgery were converted to open surgery, and patients in whom surgery could not be completed due to any reason. The data were collected in a prepared pro forma. The diagnosis of peritonitis due to duodenal perforation was made by clinical examination, erect x-ray abdomen, and four quadrant aspiration.

Investigations such as Hb, TLC, dc, urine examination, rbs, blood urea, serum creatinine, HIV, and HBsAg were done. Chest X-ray and electrocardiography were done for patients above 40 years for anesthetic evaluation.

Statistical software SPSS version 20 was used for data analysis. Proportions and percentages were calculated. Variables were compared by performing Chi-square test for small numbers; Fisher's exact test was applied whenever applicable. $P < 0.05$ was considered as statistically significant.

RESULTS

In our study, the minimum age was 25 years and the maximum age 68 years with the mean age being

Table 1: Mean age and standard deviation

Operation performed	n	Minimum	Maximum	Mean	Standard deviation
Laparotomy and closure	25	25	65	50.25	18.06
Laparoscopic closure	25	27	68	52.55	15.03

T=0.489, P=0.62, not significant

Table 2: Duration of surgery

Operation performed	n	Mean duration in minutes	Standard deviation	T value P value
Laparotomy and closure	25	91.50	10.5541	T=21.10
Laparoscopic closure	25	145.5	7.2457	P<0.001

51 years overall, whereas the difference in mean of two study groups was 50.25 years and 52.55 years which was not found statistically significant. Of all patients, male and female distribution was equal. In our study, the mean duration of surgery for laparotomy and closure was 91.5 min and 145.50 min for laparoscopic perforation closure. The duration of surgery in the laparoscopic group was significantly more compared to the open group. In our study of the patients subjected to laparotomy and perforation closure, 18 had moderate and 7 had severe degree of pain compared to the laparoscopic group where all the patients had mild post-operative pain as evident in the table and graph above, the length of incision attributing to more post-operative pain in the laparotomy group. In our study, the post-operative complications, i.e., SSI, wound dehiscence, and intra-abdominal collection were 10% each in the laparotomy and perforation closure with no post-operative.

Duodenal Ulcer

Complications in the laparoscopic perforation group closure. Thus, the morbidity associated with laparotomy perforation closure was significantly more compared to laparoscopic group. In our study, the mean duration of hospital stay in the laparotomy and laparoscopic perforation closure group was 16.7 and 7.4 days, respectively. The post-operative stay was comparatively longer in the open group compared to the laparoscopic group and statistically highly significant. In our study, the mean cost of hospitalization was Rs. 8353.00 for laparotomy perforation closure and Rs. 11,936.00 for laparoscopic perforation closure. In our study, the mean duration of return to activity and normal work was 23.6 days in laparotomy perforation closure group and 9.9 days in laparoscopic perforation closure group. The duration of return to normal lifestyle and work was more in laparotomy as against laparoscopic perforation closure group. There was no mortality in both laparotomy and laparoscopic closure group in our study [Tables 1-10].

Table 3: Post-operative pain

Post-operative pain	Laparotomy closure (%)	Laparoscopic perforation closure (%)
Mild	0	25 (100)
Moderate	18 (72)	0
Severe	7 (28)	0
Total	25 (100)	25 (100)

Table 4: Post-operative complication - SSI

Collection	Surgery done	
	Laparotomy closure	Laparoscopic closure
Wd		
No	23 (90)	25 (100)
Yes	2 (10)	0
Total (%)	25 (100)	25 (100)

Table 5: Post-operative complication - wound dehiscence

Collection	Surgery done	
	Laparotomy closure	Laparoscopic closure
Wd		
No	23 (90)	25 (100)
Yes	2 (10)	0
Total (%)	25 (100)	25 (100)

Table 6: Post-operative complication - intra-abdominal

Collection	Surgery done	
	Laparotomy closure	Laparoscopic closure
Wd		
No	23 (90)	25 (100)
Yes	2 (10)	0
Total	25 (100)	25 (100)

DISCUSSION

In a study done by Porecha comparing the laparoscopic and open DU perforation closure, the mean age was around 50 years for laparoscopic repair and 51 years for open repair.^[10,11] In our study, the mean age was 50.25 years versus 52.55 years. Our study results match the above-mentioned study. In a study done by Porecha, the mean duration of surgery was 90 ± 5 min in the laparotomy group and 68 ± 5.2 min for

Table 7: Duration of hospitalization

Hospital stay	N	Mean±SD	T value P value
Laparotomy closure	25	16.7±6.3605	T=7.210
Laparoscopic closure	25	7.4±1.0750	P<0.001

SD: Standard deviation

Table 8: Cost of hospitalization

Cost of hospitalization	N	Mean	Standard deviation	T value P value
Laparotomy closure	25	8353.0000	1242.3370	T=11.036
Laparoscopic closure	25	11936.0000	1039.4464	P<0.001

Table 9: Return to work

Return to work	N	Mean	Standard deviation	T value P value
Laparotomy closure	25	23.60	13.0911	T=4.894
Laparoscopic closure	25	9.9	3.0714	P<0.001

Table 10: Mortality among study subjects

Mortality	Laparotomy closure	Laparoscopic closure	Total
Yes	0	0	0
No	25	25	50

the laparoscopic perforation group. In the PURR trial, Belgian perforated ulcer repair - randomized trial, the mean duration was 65 ± 5 min in the laparotomy group and 85 ± 5 min for the laparoscopic group.^[12-15] Our study results are comparable for the duration of surgery in laparotomy group, but the mean duration for the laparoscopic perforation closure in both the studies is less than in our study. Immediate post-operative pain was assessed using verbal graphic rating scale, which is already elaborated earlier.^[16,17] In the present study, only immediate post-operative pain was evaluated as can be seen from the chart above, moderate pain in 18 patients and severe pain in 7 patients were only present in the laparotomy perforation closure group, whereas mild pain was present in the laparoscopic perforation closure group. Furthermore, the use of analgesics was more in duration for the laparotomy perforation group compared to the laparoscopic group. This can be probably explained by the length of the incision in the laparotomy group compared to the port site incisions in the laparoscopic perforation closure group. Thus, the pain scores were significantly higher in the laparotomy perforation closure group. In a study done by Porecha, the post-operative pain was more in the laparotomy perforation closure group. The duration of analgesics was more in the laparotomy group.^[18-24] Our study results match the results of the above study. In our study, the post-operative complications such as

SSI, wound dehiscence, and intra-abdominal collection were 10% each in the laparotomy perforation closure group with no complication in the laparoscopic perforation closure group. In a study done by Karimian *et al.*, SSI and wound dehiscence were 11.1% and 7.4%, respectively, for laparotomy perforation closure group and were 3.75 and 0% for laparoscopic perforation. In a study done by Porecha, the post-operative intra-abdominal collection was 4% in laparotomy perforation closure group and 0% in the laparoscopic perforation closure group.^[22-25] Thus, our study results depicted above reveal post-operative complications more in the laparotomy than the laparoscopic group. Thus, our study results were comparable with the above-mentioned studies. In a study conducted by Poreca, the mean duration of hospitalization was 8.06 ± 2.2 and 3.04 ± 2.0 for laparotomy and laparoscopic perforation closure group, respectively. In our study, the mean duration of hospitalization was 16.7 and 7.4 days for laparotomy and laparoscopic perforation closure group, respectively. The mean duration of hospitalization was more at our hospital because ours is a charitable institution. In our study, the mean cost of hospitalization was Rs 3583 more in the laparoscopic perforation closure group compared to the laparotomy group. In a study done by Porecha, the overall cost of hospitalization was more in laparoscopic group of patients as compared to laparotomy perforation group of patients.^[26-28] In our hospital, the mean duration of return to normal activity was 23.6 in the laparotomy group and 9.9 days in the laparoscopic group. In the Swiss study 81 and the study conducted by Porecha, the mean duration was 11 ± 1 , 8 ± 1 and 114 ± 2 , 10 ± 2 for the open and lap perforation closure, respectively, similar to our study wherein the return to normal work and normal lifestyle is earlier in the laparoscopic group as compared to the laparoscopic perforation closure group.^[29,30] In our study, there was no mortality in the laparotomy and laparoscopic perforation closure group, which is comparable, the study done by Porecha as evident in the table above.

CONCLUSION

Advanced laparoscopic procedures have better result and outcomes compared to open procedures, but the cost factor should be kept in mind as it is still an important factor in a developing country like ours. With adequate experience in due course, the recurrences are bound to decrease, operating times will improve, and costs will start coming down with reducing instrumentation costs. Laparoscopy and instruments are here to stay and are the future for surgeons and surgery.

REFERENCES

1. Stephen W, Eubank MD, Eubank S, Lee L, Swanstorm MD. *Mastery Of Endoscopic And Laparoscopic Surgery*. 2nd ed. U.S: Lippincott Williams And Wilkins; 2004.
2. Mirhashemi R, Harlow BL, Ginsburg ES, Signorello LB, Berkowitz R, Feldman S, et al. Predicting risk of complications with gynecologic laparoscopic surgery. *Obstet Gynecol* 1998;92:327-31.
3. Kripalani A, Bhatia P, Prasad A, Govil D, Garg HP. *Comprehensive laparoscopic surgery*. Ch. 16. In: Bhat MG, editor. *Laparoscopic Appendectomy*. New York: Springer. p. 136-8.
4. Semm K. History, In *Operative Gynaecologic Endoscopy*. In: Sanfillippo JS, Levine RL, editors. New York: Springer Verlag; 1989.
5. John MA, Kimberly SM, Kirkwood MD. *Textbook of Surgery By Sabiston*. 18th ed. New York: Saunders; 2007. p. 1333.
6. Berci G, Shore JM, Panish J, Morgenstern L. The evaluation of a new peritoneoscope as a diagnostic aid to the surgeon. *Ann Surg* 1973;178:37-44.
7. Zucker KA, Bailey RW, Reddik EJ, *Fundamentals, A Textbook Of Surgical Laparoscopy*. USA: Quality Medical Publishing; 1991. p. 356.
8. Sivak MV, Schleutermann DA, Charles J, Lightdale MD. *Indications, Contraindications And Complications Of Diagnostic Laparoscopy. A Textbook Of Gastroenterologic Endoscopy*. 2nd ed. Philadelphia, PA: Saunders; 2000. p. 1462-75.
9. Marshall RL, Jebson P, Davie IT, Scott DB. Circulatory effect of Co2 insufflation on the peritoneal cavity for laparoscopy. *Br J Anaesth* 1972;44:680-4.
10. Harris M, Om P, Crawther A. Cardiac arrhythmias during anaesthesia for laparoscopy. *Br J Anaesth* 1984;56:1213-6.
11. Arandia HV, Grogon AW. Comparison of this dense of combined risk factors of gastric ACIFD aspiration. *Anaesth Analog* 1980;59:862-4.
12. Graham RR. The surgeons problem i duodenal ulcer. *An J Surj* 1938;40:102-17.
13. Feliciano DV. Do perforated duodenal ulcers need an acid-decreasing surgical procedure now that omeprazole is available? *Surg Clin North Am* 1992;72:369-80.
14. Mouret P, François Y, Vignal J, Barth X, Lombard-Platet R. Laparoscopic treatment of perforated peptic ulcer. *Br J Surg* 1990;77:1006.
15. Bergamaschi R, Marvik R, Johnson G, Thoresen EK, Ystgaard B, Myrvold HE. Open Vs laparoscopic repair of perforated peptic ulcer. *Surg Endosc* 1999;13:679-82.
16. Robertson GS, Wemyss-Holden SA, Maddern GJ. Laparoscopic repair of perforated peptic ulcers. The role of laparoscopy in generalised peritonitis. *Ann R Coll Surg Engl* 2000;82:6-10.
17. Lau WY, Leung KL, Zhu XL, Lam YH, Chung SC, Li AK, et al. Laparoscopic repair of perforated peptic ulcer. *Br J Surg* 1995;82:814-6.
18. Lau WY, Leung KL, Kwong KH, Davey IC, Robertson C, Dawson JJ, et al. A randomized study comparing laparoscopic versus open repair of perforated peptic ulcer using suture or sutureless technique. *Ann Surg* 1996;224:131-8.
19. Siu WT, Leong HT, Law BK, Chau CH, Li AC, Fung KH, et al. Laparoscopic repair for perforated peptic ulcer: A randomized controlled trial. *Ann Surg* 2002;235:313-9.
20. Nassar A. Laparoscopic omental patch repair of perforated duodenal ulcer with automated stapler. *Br J Surg* 1994;81:1393.
21. Porecha MM, Mehta SG, Udani DL, Mehta PJ, Patel K, Nagre S. Comparison Of laparoscopic vs open peptic perforation closure. *Internet J Surg* 2008;17:2.
22. Nathanson LK, Easter DW, Cuschieri A. Laparoscopic repair/peritoneal toilet of perforated duodenal ulcer. *Surg Endosc* 1990;4:232-3.
23. Lee FY, Leung KL, Lai BS, Ng SS, Dexter S, Lau WY, et al. Predicting mortality and morbidity of patients operated on for perforated peptic ulcers. *Arch Surg* 2001;136:90-4.
24. Lee FY, Leung KL, Lai PB, Lau WJ. Selection of patients for laparoscopic repair of perforated peptic ulcer. *Br J Surg* 2001;81:133-6.
25. Khoursheed M, Faud M, Safar H, Dashti H, Behbehani A. Laparoscopic repair of perforated duodenal ulcer. *Surg Endosc* 2000;14:156-8.
26. Thompson AR, Hall TJ, Anglin BA, Scott-Conner CE. Laparoscopic plication of perforated ulcer: Results of a selective approach. *South Med J* 1995;88:185-9.
27. Lagoo S, McMahon RL, Kakihara M, Pappas TN, Eubanks S. The sixth decision regarding perforated duodenal ulcer. *JLS* 2002;6:359-68.
28. Memon Ma. Laparoscopic omental patch repair for perforated peptic ulcer. *Ann Surg* 1995;222:761-2.
29. Bertleff MJ, Halm JA, Bemelman WA, van der Ham AC, van der Harst E, Oei HI, et al. Randomized clinical trial of laparoscopic versus open repair of the perforated peptic ulcer: The LAMA trial. *World J Surg* 2009;33:1368-73.
30. Karimian F, Amniah A, Lebaschi AM, Missharifi R, Alibaksh A. Perforated peptic i=ulcer. comparison between laparoscopic and open repair. *Med J* 2009;10:1.