

A PROSPECTIVE COMPARATIVE STUDY OF LAPAROSCOPIC APPENDICECTOMY VERSUS OPEN APPENDICECTOMY

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ABSTRACT

BACKGROUND

Appendicular pathology presenting as acute appendicitis is the most frequent cause of persisting progressive lower abdominal pain in all age groups of patients. For more than a century, the traditional open method of appendicectomy has been both safe and effective. However, recent literature suggests that patients undergoing laparoscopic appendicectomy have a faster postoperative recovery.

The aim of the study is to compare the open and laparoscopic methods of appendicectomy in general surgical practice in terms of operating time and certain postoperative parameters including pain, cosmesis, length of hospital stay and postoperative complications.

MATERIALS AND METHODS

This is a non-randomised controlled trial study. The total population group included 73 patients (Age group between 18 - 60 yrs.). 36 patients had laparoscopic appendicectomy (Group-A) and 37 patients had open appendicectomy (Group-B). This study was carried out in the Department of General Surgery at Calcutta National Medical College. The study was done over a period of one year from 01.01.2016 to 01.01.2017. The data derived from our study was statistically analysed using X² Chi-square test and Mann-Whitney U test. P < 0.05 was taken as the level of significance.

RESULTS

Patients having laparoscopic appendicectomy had a shorter hospital stay (3 days vs. 5 days, p < 0.1). The operating time for the laparoscopic procedure was longer (60 mins vs 30 mins, p < 0.001). The incidence of postoperative morbidity following both procedures were comparable.

CONCLUSION

Both laparoscopic and open methods of appendicectomy are feasible, safe and effective for treating appendicitis. In our study postoperative pain, wound infection and duration of hospital stay were less after laparoscopic surgery. However, the operating time for the laparoscopic method was longer. Therefore, in our study laparoscopic appendicectomy was found to enjoy an overall advantage in terms of postoperative recovery.

KEY WORDS

Laparoscopic Appendicectomy, Appendicectomy, Laparoscopic versus Open Appendicectomy.

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BACKGROUND

The human vermiform appendix is usually referred to as "A Vestigial Organ with no known Function."¹ Appendicular pathology presenting as acute appendicitis is the most frequent cause of persisting progressive lower abdominal pain in all age groups of patients.¹ There is no way to prevent the development of appendicitis. The only way to reduce the morbidity is to perform appendicectomy before perforation or gangrene has occurred.¹

Several authors have proposed that laparoscopic appendicectomy should be the preferred method of surgery for acute appendicitis.²⁻¹²

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Open appendicectomy has been safe and effective for acute appendicitis for more than a century. McBurney's point McArthur (Gridiron) incision for open appendicectomy remained the procedure of choice until 1983, when Kurt Semm performed "laparoscopic appendicectomy" for the first time. Since then both the conventional open and laparoscopic methods are being practised and several comparative studies have been reported.^{2,5,7-30} Most of the studies show that laparoscopic appendicectomy is safe with improved diagnostic accuracy compared to the open method.^{4-24,26-30,31-34,35,36-37} Others however mention the drawbacks of laparoscopy in the background of complicated appendicitis and in presence of intraabdominal adhesions.^{23,25,35} Laparoscopic technique, in the hands of experienced laparoscopic surgeons takes no longer than open appendicectomy.^{6-8,10,25-28} However, most of the studies have shown that laparoscopic method is more time consuming, though patients enjoy the benefits of a faster postoperative recovery.^{5,6,8,9,11,15,18,21,23-28,30,37}

Aims and Objectives

The present study was undertaken to compare the open and laparoscopic methods of appendicectomy in general surgical practice in terms of operating time and certain postoperative

parameters. These parameters included postoperative pain, wound infection, intraabdominal sepsis, adhesive ileus and intestinal obstruction. The length of hospital stay and total period of convalescence in terms of resumption of normal and strenuous activities were also considered.

MATERIALS AND METHODS

This non-randomised controlled trial study was carried out in the Department of General Surgery at Calcutta National Medical College over a period of one year from 01.01.2016 to 01.01.2017.

The study included 73 patients (Age group between 18-60 yrs.). The patients were placed in two groups. Patients placed in Group-A had laparoscopic appendectomy, while patients of Group-B had open appendectomy.

The study was carried out as a non-randomised single centre study.

Every adult patient coming to the surgical OPD or emergency who was subsequently diagnosed as acute appendicitis and planned for operation was numbered 1, 2, 3, 4, 5 and so on.

All patients were selected irrespective of age, sex, co-morbid factors and odd numbered patients (1, 3, 5, 7 etc.) were selected for lap appendectomy and even numbered patients (2, 4, 6, 8 etc.) were selected for open appendectomy.

Each patient was explained in detail about the operative modalities and postoperative morbidity of both laparoscopic and open appendectomy, but the patients were not given the opportunity to voluntarily opt for any of the two operative procedures. However, informed consent was taken from all the patients. The sample size was taken as per our convenience. At the end of the study period, we had 73 patients with 37 patients selected for laparoscopic appendectomy and 36 patients for open appendectomy. However, during surgery one patient undergoing laparoscopic surgery needed conversion to open method, so that at the end of the study actually 36 patients had laparoscopic appendectomy (Group-A) and 37 patients had open appendectomy (Group-B).

The two treatment groups were well matched with regard to age, sex but not for severity of appendiceal pathology. Histopathological examination was performed on all the specimens of surgically removed appendix.

Each patient underwent thorough clinical history taking. In clinical history details of onset, duration, radiation and severity of pain were noted. Presence of other symptoms like nausea, vomiting and fever were documented. In females of childbearing age, gynaecological history was taken thoroughly to exclude pelvic inflammatory disease or disturbed ectopic pregnancy. A history of dysuria and haematuria was taken from all patients to rule out urinary tract pathology. A general survey and clinical examination was performed to establish the clinical diagnosis of acute appendicitis. This was followed by routine haematological and biochemical investigations. Abdominal ultrasonography was performed on all the patients to confirm the clinical diagnosis. All the patients underwent pre-anaesthetic check-up. Once the patients were declared fit for surgery under anaesthesia, appendectomy was performed on all the patients under general anaesthesia. Patients having severe cardiopulmonary disease, generalised peritonitis, known pre-

existing gastrointestinal or gynaecological pathology were excluded from the study. Pregnant patients were not included. The data derived from our study were statistically analysed using X² Chi-square test and Mann-Whitney U test. P<0.05 was taken as the level of significance.

RESULTS

Variable	Laparoscopic Appendectomy n= 36	Open Appendectomy n= 37
Mean Age (years)	34.9 years	35.4 years
Sex Ratio (F: M)	12: 21	17: 23

Table 1. Demographic Profile

Randomised	Laparoscopic Appendectomy (Days)	Open Appendectomy (Days)	Probability Value
Hospital Stay*	3 (3 -8)	5 (3 -10)	<0.1
Convalescence			
a) Normal Activity*	5.4 (4 -14)	7.1 (2 - 10)	<0.05
b) Strenuous Activity*	12.2 (10 - 21)	16.8 (2 - 20)	<0.01
Cosmesis (VAS)*	1 (0-3)	2(1-8)	<0.01
Operation Time	60 (15-100) Minutes	30 (30-60) Minutes	<0.001

Table 2. Postoperative Course

Values are median. *VAS- Visual Analogue scale.

Randomised	Laparoscopic Appendectomy (n=36)	Open Appendectomy (n=37)	Probability Value
Wound Infection	3	8	<0.05
Intra-abdominal Abscess	3	1	<0.05
Caecal Leak	0	1	Non-significant
Adhesive Ileus	2	1	<0.05
Pneumonia	0	0	Non-significant
Pain (VAS)*			
A) After 12 Hours	12 (MCSD) (12-20)	11 (MCSD) (9 - 15)	> 0.05 not significant
B) After 24 Hours	10 (5 - 20)	10 (5 - 25)	> 0.05 not significant

Table 3. Postoperative Morbidity

MCSD- Minimum Clinically Significant Difference. *VAS- Visual Analogue Scale.

DISCUSSION

The demographic profile of the patients consisted of 44 males and 29 females with both groups having a comparatively larger number of male patients (Table-1). The mean age of patients in both groups were almost the same (34 - 35 years).

In our study, the laparoscopic procedure had a longer operative time (60 minutes) compared to the traditional open method (30 minutes) (Table-2). Various studies have reported a similar difference with a mean or median operating time ranging from 8.3 to 29 minutes. Laparoscopic method took a longer time in all these

studies.^{5,9,11,15,18,21,23,24,26,27,37} However, no difference in operating time was reported in few studies.^{7,10,16,30}

In the present study, postoperative pain was assessed after 12 hours and 24 hours. Opiate analgesics were used in both groups (Table-3).

A visual analogue scale was used to assess the postoperative pain, which was found to be less in the laparoscopy group. Postoperative pain and analgesic requirement were significantly less after laparoscopic appendectomy in several reported studies.^{7,9,11,12,14,24} A similar retrospective study of assessment of postoperative pain showed no significant difference in pain scores for both open and laparoscopic appendectomy.³² None of the studies showed comparatively less postoperative pain in cases having open surgery.

Laparoscopic procedure produces a small, cosmetically acceptable scar.^{17-20,22,28,31-36} Laparoscopic appendectomy was assessed using a visual analogue scale in our patients and was associated with improved cosmesis ($p < 0.01$) (Table-2).

In the present study, there were fewer (8.33%) wound infections following laparoscopy compared to the open method (21.62%). The difference was significant ($p < 0.05$) (Table-3). Theoretically, a reduction in wound infection rate following laparoscopy may be achieved by extracting the specimen using an Endobag. Other studies have reported similarly reduced rate in wound infection following laparoscopic appendectomy.^{5,7,10,12,18,21,34,35} However, we had few cases of intraabdominal abscess following laparoscopic surgery associated with gangrenous or perforated appendix. The prevalence of intraabdominal abscess following laparoscopic appendectomy has been reported by others.^{27,30,32}

The rate of development of adhesive ileus after laparoscopic appendectomy was comparatively more after open appendectomy in our study ($p < 0.05$). Two of the patients required surgery for relief of band obstruction. Adhesive ileus after open surgery was relieved by conservative treatment and did not require surgery. (Table-3). Other studies have reported adhesion related intestinal obstruction as the main source of long-term morbidity following open appendectomy.^{10,30} Others have reported that the incidence of bowel obstruction did not differ between the two groups.³¹

Postoperative pneumonia has been reported in other studies as a postoperative complication.¹⁰ However, our study did not have any case of postoperative pneumonia.

The duration of hospital stay for our patients was 3 days and 5 days following laparoscopic and open appendectomy respectively (Table-2). Some of the recent studies found laparoscopic appendectomy associated with significantly shorter hospital stay.^{9,10,18,21,23,24,27,37} Others did not report any difference.^{4,5,6,30} Most studies showed a median hospital stay of 2 to 5 days following either of the procedures.^{5,9,10,18,21,23,24,27,30,37}

In the present study, both groups of patients were allowed to resume their normal as well as strenuous activities according to their convenience. Results have shown that the time to resume heavy strenuous activity was significantly shorter following laparoscopic surgery (Table-2). Less pain in the postoperative period was probably the major contributing factor. Several studies have reported a shorter period of postoperative convalescence and quicker

return to normal activity and work following laparoscopic appendectomy.^{5,7,11,14,16,18,21,24} Most authors however have reported that the duration of resumption of normal activity depends on simple or complicated appendicular pathology irrespective of the open or laparoscopic approach.^{2-4, 6,9,15,17,20,25,28,35,36}

Limitation of Study

1. Sample size- A larger sample size would have been more informative.
2. Observer bias- Different surgeons have examined the different patients included in the study, both in the preoperative and postoperative period.
3. Operator bias-experience and skills of different surgeons have influenced the surgical and postsurgical outcome.

CONCLUSION

Both laparoscopic and open methods of appendectomy are feasible, safe and effective for treating appendicitis. In our study, postoperative pain, wound infection and duration of hospital stay were less after laparoscopic surgery. However, the operative time for the laparoscopic method was longer. Therefore, in our study, laparoscopic appendectomy was found to enjoy an overall advantage in terms of postoperative recovery.

REFERENCES

- [1] Liang MK, Anderson RE, Jaffe BM, et al. The Appendix. Chap-30. Schwartz's Principles of surgery. 10th edn. New York: McGraw-Hill 2015: p. 1241-62.
- [2] Peiser JG, Greenberg D. Laparoscopic versus open appendectomy: results of a retrospective comparison in an Israeli hospital. *Isr Med Assoc J* 2002;4(2):91-4.
- [3] Airds. The New Aird's companion in surgical studies. 3rd edn. Portland: Churchill Livingstone 2005: p. 908-10.
- [4] Salam IM, Fallouji MA, el Ashaal YI, et al. Early patient discharge following appendectomy: safety and feasibility. *J R Coll Surg Edinb* 1995;40(5):300-2.
- [5] Pedersen AG, Petersen OB, Wara P, et al. Randomized clinical trial of laparoscopic versus open appendectomy. *Br J Surg* 2001;88(2):200-5.
- [6] Lord RV, Sloane DR. Early discharge after open appendectomy. *Aust N Z J Surg* 1996;66(6):361-5.
- [7] Kum CK, Ngoi SS, Goh PMY, et al. Randomized controlled trial comparing laparoscopic and open appendectomy. *British Journal of Surgery* 1993;80(12):1599-600.
- [8] Duff SE, Dixon AR. Laparoscopic appendectomy: safe and useful for training. *Ann R Coll Surg Engl* 2000;82(6):388-91.
- [9] Khalili TM, Hiatt JR, Savar A, et al. Perforated appendicitis is not a contraindication to laparoscopy. *Am Surg* 1999;65(10):965-7.
- [10] Yau KK, Siu WT, Tang CN, et al. Laparoscopic versus open appendectomy for complicated appendicitis. *J Am Coll Surg* 2007;205(1):60-5.
- [11] Frazee RC, Roberts JW, Symmonds RE, et al. A prospective randomized trial comparing open versus laparoscopic appendectomy. *Annals of Surgery* 1994;219(6):725-31.

- [12] Attwood SE, Hill AD, Murphy PG, et al. A prospective randomized trial of laparoscopic versus open appendectomy. *Surgery* 1992;112(3):497-501.
- [13] Shah RC. Key hole open appendectomy. *J Indian Med Assoc* 2004;102(10):565-7.
- [14] Ortega AE, Hunter JG, Peters JH, et al. A prospective randomized comparison of laparoscopic appendectomy with open appendectomy. *Laparoscopic Appendectomy Study Group. American Journal of Surgery* 1995;169(2):208-13.
- [15] Tate JTT, Dawson JW, Chung SCS, et al. Laparoscopic versus open appendectomy: prospective randomized trial. *Lancet* 1993;342(8872):633-7.
- [16] Heikkinen TJ, Haukipuro K, Hulkko A. Cost - effective appendectomy. Open or laparoscopic? A prospective randomized study. *Surgery Endosc* 1998;12(10):1204-8.
- [17] Tate JTT. Laparoscopic appendectomy. *BJS* 1996;83:1169-70.
- [18] McCall JL, Sharples K, Jadallah F. Systematic review of randomized controlled trials comparing laparoscopic with open appendectomy. *Br J Surg* 1997;84(8):1045-50.
- [19] Kamal M. Laparoscopic versus open appendectomy. *Pakistan J Med Res* 2003;42(1):15-20.
- [20] Villazon DO, Espinosa JA, Valdez CCA. Laparoscopic appendectomy. 9th World Congress of Endoscopic Surgery 2004;50-51. mediagraphic.com/pdfs/endosco/ce2004/ces041d.pdf
- [21] Utpal De. Laparoscopic versus open appendectomy: an Indian perspective. *Journal of Minimal Access Surgery* 2005;1(1):15-20.
- [22] Citone G, Perri S, Pugno V, et al. Laparoscopic appendectomy: an 8 year clinical experience. *Minerva Chir* 2001;56(1):13-21.
- [23] Cariati A, Brignole E, Tonelli E, et al. Laparoscopic or open appendectomy. Critical review of the literature and personal experience. *G Chir* 2001;22(10):353-7.
- [24] Long KH, Bannon MP, Zietlow SP, et al. A prospective randomized comparison of laparoscopic appendectomy with open appendectomy: clinical and economic analysis. *Surg* 2001;129(4):390-400.
- [25] Hellberg A, Rudberg C, Enochsson L, et al. Conversion from laparoscopic to open appendectomy: a possible drawback of the laparoscopic technique? *Eur J Surg* 2001;167(3):209-13.
- [26] Kald A, Kullman E, Anderberg B, et al. Cost-minimisation analysis of laparoscopic and open appendectomy. *Eur J Surg* 1999;165(6):579-82.
- [27] Bennett J, Boddy A, Rhodes M. Choice of approach for appendectomy: meta-analysis of open versus laparoscopic appendectomy. *Surg Laparosc Endosc Percuta Tech* 2007;17(4):245-55.
- [28] Udwardia TE, Udwardia RT. Laparoscopic appendectomy. *Natl Med J India* 1999;12(6):281-4.
- [29] Ignacio RL, Burke R, Spencer D, et al. Laparoscopic versus open appendectomy. What is the real difference Results of a prospective randomized double blinded trial. *Surg Endosc* 2004;18(2):334-7.
- [30] Mompean LJA. Laparoscopic versus open appendectomy: a prospective assessment. *Br J Surg* 1994;81(1):133-5.
- [31] Paranteau WH, Smink DS. Appendix, Meckel's and other small bowel diverticula. Chap - 31. In: Zinner MJ, Stanley AW, eds. *Maingot's abdominal operation*. 12th edn. New York: McGraw-Hill 2013: p. 623-48.
- [32] Reiertsen O, Larsen S, Trondsen E, et al. Randomized controlled trial with sequential design of laparoscopic versus conventional appendectomy. *Br J Surg* 1997;84(6):842-7.
- [33] Pandey S, Slawik S, Cross K, et al. Laparoscopic appendectomy: a training model for laparoscopic right hemicolectomy? *Colorectal Dis* 2007;9(6):536-9.
- [34] Khanna S, Khurana S, Vij S. No clip, no ligature laparoscopic appendectomy. *Surgical Laparoscopy, Endoscopy and Percutaneous Techniques* 2004;14(4):201-3.
- [35] Wu JM, Lin HF, Chen KH, et al. Impact of previous abdominal surgery on laparoscopic appendectomy for acute appendicitis. *Surg Endosc* 2007;21(4):570-3.
- [36] SO JB, Chiong EC, Chiong E, et al. Laparoscopic appendectomy for perforated appendicitis. *World J Surg* 2002;26(12):1485-8.
- [37] Tarnoff M, Atabek U, Goodman M, et al. A comparison of laparoscopic and open appendectomy. *JLS* 1998;2(2):153-8.