### **Original Research Article**

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# Outcomes of laparoscopic versus open appendectomy: a comparative study

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#### **ABSTRACT**

**Background:** The advantages of laparoscopic appendicectomy over open appendicectomy were questioned because the recovery period with open appendicectomy was brief. In this study, the two techniques were compared with respect to post-operative pain and duration of us of an analgesic, complications such as vomiting, ileus, intraabdominal abscess, wound infection, length of post-operative stay, and return to routine work.

**Methods:** 50 patients who met the inclusion criteria were included in the study was subjected to either of the two procedures after randomisation and statistical analysis was done.

**Results:** The patients who underwent laparoscopic appendicectomy had less post-operative pain with lesser analgesic use, less post-operative complications such as vomiting, ileus, wound infection, shorter hospital stay and early return to routine work.

Conclusions: Laparoscopic appendicectomy is a better procedure in selected patients with acute or recurrent appendicitis.

**Keywords:** Acute appendicitis, Laproscopic appendectomy, Openappendectomy, Quality of life

#### INTRODUCTION

Acute appendicitis is the most common indication for abdominal surgery with a life-time incidence between 7 to 9 percent. Appendectomy is one of the operations which are most commonly performed by the general surgeons. Open appendectomy (OA) has been the gold standard for the treatment of acute appendicitis since its introduction by Mc Burney C.<sup>3</sup> Unfortunately the diagnosis of acute appendicitis is often difficult, mainly clinical and always challenging. An accepted negative appendicectomy rate for presumed appendicitis ranges from 15% to 20%, even higher in women of childbearing age (20% to 30%). Laparoscopic appendicectomy (LA) has evolved since the first performed by a German Gynaecologist Semm K.<sup>6</sup> Laparoscopic appendicectomy

has gained acceptance as a diagnostic and treatment method for acute appendicitis with the technological advances of the past two to three decades. Since then, this procedure has been widely used. In spite of its wide acceptance, there remains a continuing controversy in the literature regarding the most appropriate way of removing the inflamed appendix.

Minimal access surgery has been proved to be a useful surgical technique. The application of the recent technology and skills can now provide a better and a cheaper choice of treatment. Despite a lot of randomized trials which have compared laparoscopic and open appendectomy, the indications for laparoscopy in patients with suspected appendicitis remains controversial and clinical trials comparing LA versus OA, a consensus

concerning the relative advantages of each procedure has not yet been reached.<sup>3,7-9</sup>

In this scenario, the present study was underscored to evaluate the comparative outcome of LA and OA with respect to post-operative pain and duration of us of an analgesic, complications such as vomiting, ileus, intraabdominal abscess, wound infection, length of post-operative stay, and return to routine work.

#### **METHODS**

This is a prospective study, which included 100 patients, with a diagnosis of acute or recurrent appendicitis, admitted in surgical wards of Chigateri hospital, Davangere. From this, 50 patients included into the study, 25 patients were assigned for laparoscopic approach and the remaining 25 patients were assigned for the traditional open technique.

Children <9 years, pregnant women, patients with appendicular mass on clinical examination and patients undergoing appendicectomy as a part of other procedures were excluded from the study. The traditional (open) appendicectomy technique involved utilizing a McBurney's (grid iron) incision or a Lanz incision. Laparoscopic surgery was performed with standard three port technique placed (1) in the umbilical region with a (10 mm) optic, (2) in the leftside iliac fossa (10 mm), and (3) 2 cm above the pubis (5 mm), after having initiated pneumoperitoneum.

The patients were followed up daily till discharge and then weekly for 4 weeks, in outpatient department. The parameters compared were post-operative pain, assessed using visual analogue scale, duration of analgesic use; in number of days, post-operative complication such as vomiting, ileus, intra-abdominal abscess and wound infection. The patients were discharged at the earliest, when they were fully mobilized and didn't require any analgesic. Wound infection was defined as discharge of pus that needed surgical drainage. Intra-abdominal abscess was defined as a fluid collection diagnosed on ultrasonography or computed tomography which required guided aspiration.

#### **RESULTS**

50 consecutive patients clinically diagnosed with acute appendicitis was selected, 25 underwent open appendicectomy and 25 underwent laparoscopic appendicectomy randomly. In this study 13 (52%) patients of open appendicectomy and 11 (44%) patients of laparoscopic appendicectomy were males. 12 (48%) patients of open appendicectomy and 14 (56%) laparoscopic appendicectomy were females.

There were more females in laproscopic group. The age of patients ranged from 13 years (youngest) to 53 years

(oldest) with a mean age of 25.08 years in open and 23.36 years in laproscopic group.

The mean operative time for open appendicectomy was 54.2±20.29 min and that for laparoscopic appendicectomy was 71.20±26.55 min. This study showed that open appendicectomy is less time consuming than laparoscopic appendicectomy.

The average pain score was  $2.72\pm0.98$  in open group as compared to  $1.28\pm0.46$ ) in laparoscopic group with p <0.05 which was significant.

Duration of analgesics used parental and oral in days were on an average 6.44±1.71 and 2.28±0.98) for open and laparoscopic group respectively. Again, this difference was significant (p <0.05). Above analysis revealed that both pain and analgesics used were significantly reduced in laparoscopic compared to open appendicectomy.

Wound infection was more common after open 4 (16%) than laparoscopic 1 (4%) and the difference was significant (P<0.05). Serous Discharge were more common after open 10 (40%) than laparoscopic 2(8%) and the difference was significant (P<0.05).

In open appendicectomy the postoperative stay in the hospital had a mean of  $7.68\pm2.38$  while in lap appendicectomy mean was  $2.84\pm0.90$  which shows that laparoscopic appendicectomy significantly reduced the hospital stay (P<0.05) (Table 1).

Table 1: Duration of hospital in both the operative techniques.

Operative technique	Duration of hospital stay
Open appendectomy (OA)	7.68±2.38
Laparoscopic appendectomy (LA)	2.84±0.9*

Comparison was made between OA versus LA. The p<0.05 (\*) was found to be statistically significant.

In this study for open appendicectomy mean time to return to start daily activity or work their routine work was 20.80±6.28. In lap appendicectomy it was 13.52±2.24. The difference was significant (P<0.05).

#### **DISCUSSION**

The advance in surgical technology and to be more specific, laparoscopic surgery has allowed the General Surgeon to extend his surgical reach to super specialty. Due to controversy over potential benefits of laparoscopic appendicectomy we have undertaken this study to analyze our experience in this field.

The relative advantages of laparoscopic and open appendicectomy was measured primarily in terms of post-operative pain, duration of analgesics used. Postoperative complications like vomiting, ileus, wound infection, post-operative recovery in the form of duration of stay, and return to normal work was assessed.

In this study, comparison with respect to duration of surgery, laparoscopic appendicectomy had taken a mean of 71.20±26.55 min and open appendicectomy had taken a mean of 54.20±20.29 min (p<0.001). Similar observations have also been reported by other studies. <sup>10-13</sup> Previous literature suggests that the operating time of laparoscopic appendicectomy was found to be more than that of open appendicectomy. In considering operating time, the exact identification of the timing of the start of the procedure and its conclusion vary. In general, the time should be calculated from the insertion of first trocar to the end of skin suturing. <sup>14</sup>

In this study pain score was 2.72±0.89 for open group as compared to 1.28±0.46 in laparoscopic group (P<0.05). This was because of longer incision, stretch of muscles and wound infection. Similar observations have also been reported by other authors. Thus the post-operative analgesic required was more in open group as compared to laparoscopic group. Similar results have also been found in the following study. 16

It was being found that laparoscopic procedures cause less postoperative pain thus requiring less analgesics after laparoscopic appendicectomy. In this study analgesic required for open was 6.44 days as compared to 2.28 days for laproscopic group. In one study done by Ortega AE et al linear analogue pain scores were recorded in 135 patients blinded to the procedure of operation by special dressing and pain score was very less in laparoscopic group compared to open.<sup>11</sup>

In this study duration of post-operative hospital stay was significantly low for laparoscopic group 2.84±0.9 as compared to open group 7.68±2.38. The longer hospital stay in open group compared to laparoscopic group also has been reported by others similar studies. <sup>12,17,18</sup>

In this study, the return to normal activity was early for laparoscopic group 13.52±2.24 days as compared to open group 20.80±6.28 days. Other studies have also shown that laparoscopic group patients returned to normal work earlier. <sup>19-21</sup>

It has been shown that those patients who underwent laparoscopic appendicectomy had a better postoperative recovery. The reduced trauma to the abdominal wall is a very significant factor in postsurgical discomfort. The better mobility of the abdominal musculature and the earlier ambulation, reduced the risk of postoperative complications of pneumonia and embolism.

#### **CONCLUSION**

Laparoscopic approach has a diagnostic value in detecting any other associated intra-abdominal pathology

which is not be possible with open approach. Laparoscopic appendicectomy is a safe and feasible option for open appendicectomy.

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institutional ethics committee

#### REFERENCES

- 1. Samelson SL, Reyes HM. Management of perforated appendicitis in children-revisited. Arch Surg. 1987;122:691-6.
- 2. Editorial. A sound approach to the diagnosis of acute appendicitis. Lancet. 1987;i:198-200.
- 3. McBurney C. The incision made in the abdominal wall in cases of appendicitis, with a description of a new method of operating. Ann Surg. 1894;20:38.
- 4. Van LV, Jose MV. Laparoscopic versus conventional appendicectomy. Ann Surg. 1993;218:685-92.
- Nana AM, Ouandji CN, Simoens C, Smets D, Mendes da Costa P. Laparoscopic appendectomies: results of a monocentric prospective and nonrandomized study. Hepatogastroenterol. 2007;54:1146-52.
- 6. Semm K. Endoscopic appendectomy. Endoscop. 1983;15:59-64.
- 7. Long KH, Bannon MP, Zietlow SP. A prospective randomized comparison of laparoscopic appendectomy with open appendectomy, clinical and economic analyses. Surg. 2001;129:390-400.
- 8. Martin LC, Puente I, Sosa JL, Bassin A, Breslaw R, McKenney MG, Ginzburg E, Sleeman D. Open versus laparoscopic appendectomy. A prospective randomized. Ann Surg. 1995;222:256-62.
- 9. Guller LU, Hervey S, Purves H, Lawrence H. versus open appendectomy: outcomes comparison based on a large administrative database. Ann Surg. 2004;239:43-52.
- 10. Heikkinen TJ, Haukipuro K. Cost-effective appendicectomy. Open or laparoscopic? A prospective randomized study. Surg Endose. 1998;12:1204-8.
- 11. Ortega AE, John Hunter G, Jeffrey Peters H, Lee Swanstrom L, Schirmer B. A prospective randomized comparison of laparoscopic appendicectomy with open appendicectomy. Am J Surg. 1995;169:208-13.
- 12. Yong JL, Law WL, Lo CY, Lam CM. A comparative study of routine laparoscopic versus open appendicectomy. JSLS. 2006;10:188-92.
- 13. Geeta KR, Bhavatej AK. Laparoscopic appendicectomy versus open appendicectomy: a comparative study of clinical outcome and cost analysis Institutional experience". Indian J Surg. 2009;71:142-6.

- 14. Palanivelu C. Laparoscopic appendiectomy. Text book of surgical laparoscopy, Shrinivas Fine Art Limited; 2002:411-24.
- 15. Sweeney KJ, Kane FB. Moving from open to laparoscopic appendicectomy. BJS. 2003;20:257-8.
- Addiss DG, Shaffer N, Fowler BS, Tauxe RV. The epidemiology of appendicitis and appendectomy in the United States. Am J Epidemiol. 1990;132:910-25
- 17. Attwood SE, Hill AD. Prospective and randomized trials laparoscopic versus open appendicectomy. Surg. 1992;112:497-501.
- 18. Wei HB, Huang JL, Zheng ZH, Wei B, Zheng F, Qiu WS, et al. Laparoscpic versus open appendicectomy: A prospective randomized comparison. Surg Endosc. 2010;24:266-9.

- 19. Tate JJT, Chung CS. Conventional versus Llaparoscopic surgery for acute appendicitis. Br J Surg. 1993;80:761-4.
- 20. Kum CK, Ngoi SS. Randomized controlled trial comparing laparoscopic and open appendicectomy. Br J Surg. 1993;80:1599-60.
- 21. Gary MS. Introduction of laparoscopic appendicectomy to rural centres. Can J Rural Med. 1996;2:176-8.

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