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RESEARCH ARTICLE

LAPAROSCOPIC VERSUS OPEN APPENDECTOMY: WHICH IS THE BETTER OPTION?

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ABSTRACT

Background: Currently, laparoscopic appendectomy is widely practiced for the management of acute appendicitis. It is not clear whether open or laparoscopic appendectomy is more appropriate.

Aim: Our aim is to compare the safety and advantages of laparoscopic versus open appendectomy.

Methods: 120 patients were analyzed, out of which 60 patients underwent laparoscopic appendectomy (LA) and 60 patients underwent open appendectomy (OA). Comparison was based on length of hospital stay, operating time, post operative morbidity, requirement of post operative analgesia as well as resumption of regular diet.

Results: the median length of stay was shorter after LA which was 3 days where as in OA it was 5 days ($P < 0.05$). The operative time was shortened (OA:25 minutes (median), LA 30 minutes (median) with ($P = 0.29$)) for patients undergoining open appendectomy compared to laparoscopic appendectomy which is not significant. The rate of wound infection and complication (LA 3%, OA 8% , $P < 0.05$), was significantly lower in patients undergoing LA. There was no mortality.

Conclusion: LA is safe and superior to OA with respect to early discharge, lesser post operative pain, decreased wound infection, early return to work, lesser hospital stay and better cosmetic results.

INTRODUCTION

Acute appendicitis is a common indication for abdominal surgery with a life term incidence of between 7 to 9 percent (Addis *et al.,* 1990; Kumar ?). Appendectomy is one of the operations which are most commonly performed by the general surgeons. Open appendectomy has been the gold standard for the treatment of acute appendicitis since its introduction by Charles Mc Burney in 1889 (Mc Burney, 1894). Laparoscopic appendectomy was first performed by Semm in 1983 (Semm 1983). 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. At present, although there is no consensus regarding the superiority of the laparoscopic approach over the conventional technique there is trend towards greater utilization of laparoscopic appendectomy (Sauerland *et al.,* 2004; Merhoff *et al.,* 2000). The present study was designed to compare the advantages of laparoscopic appendectomy over conventional open appendectomy with a review of the literature.

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MATERIALS AND METHODS

- Data was collected prospectively on patients with acute and recurrent appendicitis who underwent open or laparoscopic appendectomy from surgery department of Bowring and Lady Curzon hospital Bangalore. All patients operated for acute appendicitis and patient who underwent interval appendectomy were included in the study. Patients diagnosed to have appendicular mass/abscess either clinically/ultrasound abdomen/intra operatively were excluded from this study. Patients who underwent any other surgery with appendectomy (laparoscopic/open) were excluded from this study.
- The patients were divided into two groups. The first group included patients undergoing laparoscopic appendectomy (LA) and the second group included patients undergoing open appendectomy (OA). The patients were explained in detail about the operative procedure and its complications in their own language and consent was taken. The patients who fall under ASA IV and physiologically compromised, having to creation of carbon dioxide were excluded from the study.
- All patients were investigated where blood counts, renal parameters and ultrasound abdomen was done. Open appendectomy group underwent through a Mc

Burneys or Lanz's incission. Laparoscopic Appendectomy group was done using a standard 3 trocar approach. Intra operative findings like adhesions, free fluid, dilatation, congestion and contents were noted. Position of the appendix was noted.

- The parameters recorded are operating time from skin to skin in minutes, post operative complications (ie., wound/port sight infections, intra peritoneal abscess, hematoma, feacal fistula etc.), time until resumption of regular diet, hospital stay in days, time required to return to normal work, duration of analgesia requirement.
- While discharging, the patients were given discharge cards and were asked to come for follow up after two week and findings were recorded. They were further interviewed and examined six weeks after the operation. Then on, the regular follow ups were made at the intervals of one month to there months.

RESULTS

120 patients were included in the study of which 60 patients underwent laparoscopic appendectomy while other 60 patients underwent open appendectomy. In patients who opted for laparoscopic appendectomy inflamed appendix was noted in 45 patients, there were adhesions in 15 patients while there was no perforations. In patients who opted for open appendectomy, inflamed appendix was noted in 39 patients, there were adhesions in 18 patients while perforation was found in 3 patients (Table 1).

Table 1. Pathology of appendix as noted during surgery

Gross pathology	LA(n=60)	OA(n=60)
Inflamed appendix	45	39
Adhesion	15	18
Perforation	0	03

There was shorten operating time in patient undergoing open appendectomy (25 minute median) compared to laparoscopic appendectomy (30 minute median) which was not significant. (p=0.29). The rate of wound infection was significant higher in patients undergoing open appendectomy than laparoscopic appendectomy, 8% vs 3% respectively (Table 2).

Table 2. Post operative complication

Complication	LA (n=60)	OA (n=60)
Wound / port infection	3%	8%
Intra peritoneal abscess	-	-
Intestinal obstruction	-	-
Bowel / Bladder injury	-	-
Fecal fistula	-	-

Length of hospital stay ranged from 2 days to 7 days. The median length of stay was shortened after LA which was 3 days where as in OA it was 5 days. ($P < 0.05$) The total analgesia requirement in LA was significantly less as compared to OA group (median 2 days vs 7 days). ($P < 0.05$). The time to return to normal activities delayed for open appendectomy group (median 7 days) as compared for LA (median 3 days). ($P < 0.05$). The overall morbidity in Patients undergoing laparoscopic appendectomy was much less as compared to OA group patients (Table 3). Table 3. Comparison of Major Parameters. Analgesic requirement in days (parentral + oral) Median

DISCUSSION

Recent studies have shown significant advantages of laparoscopic appendectomy with respect to the length of hospital stay, less postoperative pain, rapid post operative recovery, less wound complications, better cosmetic results and with rapid return of normal activities (Fogli *et al.,* 2002: Towfigh *et al.,* 2006). In addition to the clinical benefits described in several studies, the laparoscopic approach allows a full exploration of the peritoneal cavity, thus representing an important diagnostic tool in case there is only suspicion of acute appendicitis (Loh and Tailor, 1992). These findings have been challenged by other authors who argued that the advantages of LA are marginal compared to OA performed by an experienced surgeon through a short cosmetically accepted incision, which is associated with minimal complications and hospital stay (Klinger *et al.,* 1998; Honsen *et al.,* 2005; Long 2001). Bearing in mind that laparoscopic appendectomy unlike other laparoscopic procedures has not been found superior to open surgery for acute appendicitis, we designed the present study to determine the possible benefits of laparoscopic approach. The median operative time in our study was 30 minutes for LA and 25 minutes for OA. This is comparable with study conducted by Utpal De (2005). However study conducted by Euler *et al.* (1999) and A g Pederson *et al.* (Pedersen *et al.*, 2001) has longer operating time both for LA and OA.

Most studies report a median hospital stay of 2-5 days irrespective of laparoscopic or open procedure . Although some recent retrospective cohort studies or chart reviews found laparoscopic appendectomy associated with significantly shorter hospital stay (Temple *et al.*, 1999; Vallina *et al.*, 1993). Even meta analysis report controversial findings. Sauerland and associates summarized the results of 28 RCT and almost 3000 patients reported a significant decrease in length of hospital stay in patients undergoing LA (Guller *et al.*, 2004). Similar results were found by Gollab and colleagues, (Guller *et al.*, 2004) whereas another meta analysis failed to show a statistically significant difference in length of hospital stay between LA and OA. (Guller *et al.*, 2004; Nazzal *et al.*, 1997). The present study revealed a significantly shorter hospital stay for patients undergoing laparoscopic appendectomy. Although the infection of the surgical wound is not per se a life threatening condition, it worsens the quality of life in the early postoperative period and prolongs the recovery time. The reduction of wound infection rate is a significant advantage of LA (Li *et al.*, 2010; AC Moberg *et al.*, 2005). The extraction of specimen with a bag and through a trocar port rather than directly through the surgical wound as in open procedures,

can explain this reduction in incidence. The present study confirmed a significant lower incidence of post operative wound infections in laparoscopic group (LA: 3 %, OA: 8%, $P < 0.05$). On the other hand in some studies it is noted that the incidence of intra abdominal abscess was three fold higher after LA as compared to OA. We did not have any post operative intra abdominal abscess in our study. In our study, the difference of duration of post operative ileus between the two different approaches was statistically significant. Recovery of bowl function was faster in LA group (1 day vs 3 days, $P < 0.05$). Factors such as reduced manipulation of the ileum and the cecum in the hands of a skilled surgeon, as well as a minor abdominal trauma and less pain due to the smaller extension of the incision of the trocars, and an early postoperative mobilization of the patient can be invoked to explain these data (Vernon *et al*., 2004; Lintula Het *et al*., 2001). We quantitatively assessed the post operative pain by means of requirement of analgesia. The requirement of analgesia was significantly less in LA group. Meta analysis by Li *et al*. (2010) also supported this study mainly due to the less invasive nature of the procedure. This study was not blinded so the assessment of the pain may not be accurate.

Conclusion

On analyzing the data, we have found a definite difference in outcome between open appendectomy and laparoscopic appendectomy in our study. Laparoscopic appendectomy was found to be superior than open appendectomy with respect to fewer wound infection rate, early resumption of oral feeds, less post operative pain, lesser use of analgesics, less post operative hospital stay and early return to normal activities. The added advantage of laparoscopic appendectomy is its improved diagnostic accuracy. Provided that surgical experience and equipment are available, laparoscopic appendectomy is safe and equally efficient compared to conventional appendectomy.

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