

## A Comparative Analysis of Laparoscopic Versus Open Appendicectomy in a Tertiary Care Teaching Hospital

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### ABSTRACT

**Background:** This underdeveloped residuum of the caecum has no known function and is commonly termed as a 'vestigial' organ, yet diseases of the appendix loom large in surgical practice; and appendicitis continues to be the most common acute abdominal condition that requires immediate surgical treatment.

**Methods:** Study to be carried out over a period of 1 year on patient diagnosed with appendicitis and admitted to surgery ward at Teerthanker Mahaveer Medical College and Research Centre. Patients were enrolled on the basis of inclusion and exclusion criteria and written informed consent was taken from the patients before the commencement of study. Demographic data, clinical features, investigations, Technique, reintroduction of diet, postoperative pain, use of analgesia, hospital stay were documented and outcome recorded in a predesigned case record form.

**Results:** Proved that laparoscopic procedures cause less post-operative pain than their conventional counterparts. Analgesic requirement for post-operative analgesia was significantly less in LA (mean 4 inj. doses) compared to the OA (mean 5.9 inj. doses) Hospital stay was less for LA (2.23 days) than OA (3.4 days) Full recovery on the basis of return to normal activity was earlier in LA (6.53 days) as compared to OA (8.7 days).

**Conclusion:** LA holds a promising prospect and may replace OA in the near future as the method of choice for effective and qualitative clinical management of appendicitis in emergency and in elective set up.

**KEYWORDS:** Appendicectomy, Comparative, Laparoscopy.

### INTRODUCTION

This underdeveloped residuum of the caecum has no known function and is commonly termed as a 'vestigial' organ, yet diseases of the appendix loom large in surgical practice; and appendicitis continues to be the most common acute abdominal condition that requires immediate surgical treatment.<sup>1</sup>

Appendicitis is one of the best known medical entities and yet may be one of the most difficult diagnostic problems; to confront in an emergency, often requiring removal of the inflamed appendix.<sup>2,3</sup> Appendicectomy has been one of the commonest emergency procedures in surgery. Appendicectomy may be performed as a laparoscopic or as an open operation.

Open appendicectomy (OA) through laparotomy has been the gold standard for more than a century as far as surgical removal of appendix is concerned.<sup>4</sup> Minimal

invasive surgery has rapidly evolved as a major specialty in the past decade. Laparoscopic surgery has thoroughly changed the concept of general surgery over the last 15 years and surgeons have rapidly progressed from the diagnostic to the advanced procedures.

Recently several authors proposed that laparoscopic appendicectomy (LA) should be preferred for the treatment of acute appendicitis. Advantages of LA like less pain, faster recovery, fewer wound infections, improved cosmesis and less post-operative morbidity are obvious from the various randomized trial conducted worldwide comparing OA and LA. Review of the world literature suggests that definitely the trend is moving from open to LA.<sup>5</sup> Even though modern diagnostic facilities, surgical skills, fluids and antibiotics therapy has brought down the mortality from 50% (before 1925)

to less than 1/10,000 people, still the morbidity is more than 5-8%.

Reginald Fitz coined the term "Appendectomy" in 1886. Mc Burney popularized the concept of early surgery and the muscle splitting incision technique. LA has been well established by Semm.<sup>6</sup>

De Kok performed a laparoscopic assisted appendicectomy in 1977. In 1983, Kurt Semm performed first LA.<sup>6</sup> Schreiber in 1987 performed LA for acute appendicitis. Today there are different clinical trials with varied result.<sup>7</sup> Laparoscopic appendectomy may be feasible, but whether it confers any advantage to patients with appendicitis is not known. In this project, I have sincerely attempted to compare OA against LA. Therefore, this study was conducted to compare the effectiveness of laparoscopic and conventional "open" appendicectomy in the treatment of acute appendicitis.

**MATERIALS & METHODS**

To achieve the above aims, this study was conducted

at tertiary teaching institute, Teerthanker Mahaveer Medical College and Research Centre over a period of 1 year February 2013 to January 2014 in patients with clinical diagnosis of appendicitis.

85 patients presented with clinical diagnosis of appendicitis. Out of 85 patients, only 60 patients were selected on the basis of inclusion and exclusion criteria. 60 patients were equally distributed in equally in two treatment groups - OA and LA group. Those patients were excluded who had perforated appendicitis.

Factors and variables recorded include: Demographic data, clinical features, investigations, technique, post-operative pain, post-operative use of analgesia, complications, scar size, return of bowel movements, starting of oral liquids, hospital stay, functional index, time to subjective full recovery and days of sick leave have been documented and outcome has been recorded in a predesigned case record form. Return to normal activity and work was determined by questioning during post-operative clinic.

**Table 1: Demographic details**

Parameters	Laparoscopic Appendicectomy group	Open Appendicectomy group
Total no. of patients	30	30
Male (%)	14 (46.67)	14 (46.67)
Female (%)	16 (53.33)	16 (53.33)
Age (years)	25.5 (16-37)	25.63 (16-36)

**Table 2: Comparison of Laparoscopic Vs Open appendicectomy**

	Laparoscopic Appendicectomy	Open Appendicectomy
Day 1	3.73	4.26
Day 3	1.76	1.96
Day 7	1.07	1.23
Day 14	0.43	0.47
Day 21	0.27	0.27
Day 28	0.13	0.10
Functional Index	0.16	1.23

**Table 3: Analgesic use in Laparoscopic Vs Open appendicectomy**

	Laparoscopic Appendicectomy	Open Appendicectomy
Analgesic (No. of injections)	4	5.9

**Table 4: Recovery of patients in Laparoscopic Vs Open appendicectomy**

Parameters	Laparoscopic Appendicectomy	Open Appendicectomy
Return of Bowel activities	0.71 days	1.70 days
Starting of oral liquids	0.71 days	1.70 days
Wound related complications	6.67%	16.67%
Scar size (cm)	2.11	6.13

**Table 5: Post-operative recovery**

	Laparoscopic Appendicectomy	Open Appendicectomy
Hospital stay	2.23 days	3.4 days
Full recovery	6.53 days	8.7 days
Sick leave	6.54 (3-7) days	8.23 (7-14) days

## RESULTS

Sixty patients with similar characteristics of appendicitis were recruited to either open (50%) or laparoscopic (50%) appendicectomy. [Table 1]

The maximum number of cases was observed in the age group of 25-36 years with a female (32) to male (28) ratio of 1.14:1. The average age of patients undergoing LA was 25.5 years while it was 25.63 years for those undergoing OA [Table 1].

Post-operative pain. (upto 7 days) [Table 2] It has been shown that those patients who underwent successful laparoscopic appendectomy have a better post-operative recovery. The reduced trauma to the abdominal wall is a very significant factor in post-surgical discomfort. The better mobility of the abdominal musculature and the earlier ambulation, reduce the risk of the early post-operative complications of pneumonia and embolism. Patients had less post-operative pain with LA than OA during 1st week post-operatively.

Patients subjected to OA had more post-operative pain at 28 days after operation. This was measured by VAS. 24 h after surgery pain scores were 3.73 in LA and 4.26 in OA. After 3 days average VAS scores were 1.76 for LA and 1.96 for OA. After 1 week, in LA group VAS was 1.7 and 1.23 in OA group. Thereafter it was not significant.

Patients undergoing OA had low but persistent post-operative pain 4 weeks post-operatively but this may well be of no clinical significance given the values are low.

Analgesic requirement for post-operative pain [Table 3] relief in LA was about 4 inj. doses compared to 5.9 inj. doses in OA group. Functional index [Table 2] measured at 1 week was 1.16 in LA and 1.23 in OA which was quite insignificant. Staring of oral liquids [Table 4] was earlier in LA group than in the OA group. Oral fluids were started in 0.71 days in LA and in 1.7 days in OA patients.

Wound related complications [Table 4], were seen more in the OA group. Wound infection regarding skin was almost negligible in LA, as the appendix was pulled into the trocar before removing. This maneuver minimizes the chances of wound infection to the skin. The risk of wound infection is less in laparoscopic appendectomy compared to the open procedure.

Incidence of 6.67% in the LA group as compared to 16.67% in OA group. Complications commonly seen were wound gaping, seroma, cellulites and fat necrosis. Scar size [Table 4] was more in patients who underwent OA as compared to LA. Regarding cosmetic benefit, most patients in the LA group were highly satisfied by their scar size (almost hidden) as compared to the OA group.

Hospital stay [Table 5] was 2.23 days in LA group while it was 3.4 in the OA group. Thus increase in length of hospital stay in OA was reduced significantly in LA.

## DISCUSSION

LA has gained lot of attention around the world. However, the role of laparoscopy for appendicectomy, one of the commonest indications, remains controversial. Several controlled trials have been conducted, some are in favour of laparoscopy, others not.<sup>8</sup>

The goal of this study was to ascertain that if the LA is superior to conventional, and if so what are the benefits and how it could it be instituted more widely. There is also diversity in the quality of the randomized controlled trials.

The main variable in these trials are following parameters:

Post-operative pain

Amount of narcotic/analgesic used (post- operatively).

Hospital stay (days).

Time to full recovery (days).

### Post-operative pain

It is proved that laparoscopic procedures cause less post-operative pain than their conventional counterparts. Scores were significantly less in patients undergoing LA as compared to patients undergoing OA. Though different studies have not demonstrated such effect on post-operative pain, or the measure of pain was on the basis of the requirement of analgesics, a general opinion of less post-operative pain in LA as compared to OA was noted.<sup>9,10</sup>

Another interesting observation has been the patient's perception of pain after appendectomy. Those who underwent laparoscopic appendectomy were more vocal of pain although it was of a lower intensity. However, after 48 h they had a better sense of wellbeing. This could have arisen from the expectation that laparoscopic procedures are painless or a lower level of endorphins released or the peritoneal injury from the pneumoperitoneum. It is likely that laparoscopic technique causes less pain due to multiple (usually three) but ultimately smaller skin lesion.

### Post-operative analgesia

Analgesic administered as per demand of the patient showed that requirement of post-operative analgesia was significantly less in LA group (mean 4 inj. doses) compared to the OA group (mean 5.9 inj. doses). The reduced trauma to the abdominal wall is a very significant factor in post-surgical discomfort. The better mobility of the abdominal musculature and the earlier ambulation, reduce the requirement of analgesics and the risk of the early post-operative complications of pneumonia and embolism; probably due to smaller wound and lesser retraction and handling of tissues.

### Hospital stay

LA has significant advantages over open appendectomy with respect to length of hospital stay, rate of routine discharge, and post-operative in-hospital morbidity. In the present study hospital stay was less for LA group (2.23 days) than OA (3.4 days) and this result is well

matched when compared to other series. Longer hospital stay in OA is because of late return of bowel activities and delay in starting of oral liquids. Also greater chances of wound related complications in OA may prolong the hospital stay. Thus hospital stay has decreased significantly in patients who underwent LA than open surgery.

#### **Time to full recovery (days)**

In the present study, full recovery on the basis of return to normal activity was seen earlier in LA group (6.53 days) as compared to OA group (8.7 days).

Appendectomy has been the treatment of choice for acute appendicitis. Though OA is considered as the gold standard, LA has gained lot of attention around the world.<sup>11</sup> However, the role of laparoscopy for appendectomy, one of the commonest indications, remains controversial. Several controlled trials have been conducted, some are in favour of laparoscopy, others not. Laparoscopic appendectomy is equally safe, and can provide less post-operative morbidity in experienced hands, as open appendectomy. Most cases of appendicitis can be treated laparoscopically. Laparoscopic appendectomy is a useful method for reducing hospital stay, complications and return to normal activity. Since quality of life of the patients was an important aim of this study, monitoring the postoperative pain, postoperative requirement of analgesics showed laparoscopic procedures to have more advantage and give superior results.

#### **CONCLUSION**

The present study of randomized clinical trial of LA versus OA is summarized below:

- LA is associated with less post-operative pain and reduced analgesic requirement as compared to OA group.
- LA is associated with faster recovery and early restart of oral intake than OA.
- Significantly low wound related complications and infections are reported in LA than OA.
- LA patients showed better post-operative comfort, convalescence and less morbidity when compared to OA.
- There is an early return to normal activities and work in patients with LA in contrast to OA.
- Wounds of LA had better cosmetic benefit than OA wounds.
- LA is associated with a shorter hospital stay and sick leave than OA group.
- LA has been shown to be useful in overweight and obese patients.

With better training in minimal access surgery now available, the time has arrived for it to take its place in the surgeon's repertoire. Laparoscopic procedures hold promise by decreasing the loss of earning days by an

early return of normal activity and shorter hospital stay. Hence it is beneficial in a developing country like ours where majority of the patients are daily wage workers.

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