International Journal of Advanced Biotechnology and Research (IJBR)
ISSN 0976-2612, Online ISSN 2278–599X,
Vol-9, Issue-2, 2018, pp512-517
http://www.bipublication.com

**Research Article**

# Comparison of post-operative pain between open and laparoscopic appendectomy

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## ABSTRACT

**Objective:**To compare the post-operative pain at various intervals of time that is six, twelve, eighteen, twenty four and thirty six hours post operatively.

**Material and methods:** The present study was conducted in the Department of Surgery, Jinnah Hospital Lahore, on patients presenting with appendicitis during the period of July 2016 to December 2016. Total 62 patients with diagnosis of appendicitis were randomized to either OA group or LA group. Post-operative pain and duration of hospital stay were analyzed.

**Results:** Sixty two patients were randomized with each group containing 31 patients. Pain at various intervals of time post operatively (6-12-18-24-36 hours) measured using a visualanalogue scale , was significantly less for patients treated laparoscopically ($p<0.0001$). The mean postoperative stay in LA group was 6.71 days (range five to 12 days) whereas in OA group, it was 7.74 days (range three to 13 days). Thus from the study we can say that the total hospital stay was less in case of LA as compared to OA.

**Conclusion:** Laparoscopic appendectomy is equally safe, and can provide less postoperative morbidity in experienced hands, as open appendectomy. Most cases of acute appendicitis can be treated laparoscopically. Laparoscopic appendectomy is a useful method for reducing hospital stay, post operative pain, complications and return to normal activity. With better training in minimal access surgery now available, the time has arrived for it to take its place in the surgeon's repertoire.

**Keywords:**Appendicitis; Appendectomy; Laparoscopy

## INTRODUCTION

Approximately seven percent of the population develop appendicitis in their life time[1] with peak incidence between the ages of 10 and 30 years[2] making appendectomy the most frequently performed abdominal operation[3]. Appendectomy through McBurney's grid iron incision[4] remained the procedure of choice for nearly a century until 1983 when Semm Kurt[5] offered an alternative, laparoscopic appendectomy (LA). Since then LA has been compared to open appendectomy (OA), but as McBurney's operation is well tolerated with less co-morbidity the benefits of LA have been difficult to establish.

The major benefits to patients undergoing LA are early hospital discharge, reduced post operative pain, decreased wound infection, early return to full activity and better cosmetic scar.[6, 7]. The unnecessary opening of the abdominal cavity and removal of normal appendix can be prevented by laparoscopy[8].Laparoscopy also allows better assessment of other intra-abdominal pathologies. The limitations of LA are technical difficulty, non-availability of equipment everywhere, longer

duration of operation, higher expense and increased incidence of intra-abdominal absesses.[9]. Due to the mentioned reasons LA has yet not gained wide spread acceptance.[10]

Laparoscopic Appendectomy is relatively a new technique and requires comparison to Openappendectomy to determine its advantages. The objective of this study was to compare the outcome of LA and OA in terms of postoperative pain, duration of hospital stay.

## MATERIAL AND METHODS

This comparative study was conducted at Department of Surgery Jinnah Hospital Lahore from July 2016 to December 2016. Total 62 patients with appendicitis having age range from 10 to 60 years were selected for this study. Patients with contraindication to general anesthesia (severe cardiac and /or pulmonary disease), appendicular mass/appendicular perforation, pregnancy, inability to give informed consent because of mental disability, generalized peritonitis, shock on admission, with history of cirrhosis and coagulation disorders were excluded from the study.

Selected patients were randomly divided into 2 equal groups i.e. Group A& B.In group A, Open Appendectomy was performed and in group B, Laparoscopic Appendectomy was performed. All the surgeries were performed by senior consultant surgeon having experience at least 5 years. During the post operative period each group is evaluated for pain. Evaluation of pain in post operative period is by visual analogue scale. On the numerical rating scale, the person is asked to identify how much pain they are having by choosing a number from 0(no pain) to 10(the worst pain imaginable). Evaluation is done at regular intervals that are 6-12-18-24-36 hours post operatively. The duration of hospital stay is calculated by date of admission and date of discharge.All the data was recorded in per-designed performa along with demographic profile of the patients.

Collected data was entered in SPSS version 20 and analyzed. Mean and SD was calculated for numerical data and frequencies were calculated for categorical data.

## RESULTS

In group OA and LA, male patients were 13 (41.9%) and 15 (48.4%) respectively. Female patients in OA group were 18 (58.1%) and in LA group were 16 (51.6%). (Table 1) Patients were on average 33.08 years old and ranged from 18 years to 60 years. Patients who underwent LA were older (LA: 33.61 years, OA: 32.54 years). The mean ages of patient undergoing OA and LA were 32.55 and 33.61 years respectively. The difference was not to be found statistically significant (p==0.689). (Table 2) All the patients in both the groups presented with pain in the right lower quadrant. Nausea was next common complaint present in 21 patients in OA Group and 17 patients in LA Group. Vomiting was present in five patients of OA group and eight patients in LA group. History of fever was present was present in six patients in A group and eight patients in LA group. (Table 3) The mean pain scores for LA were less compared to OA in the first 36 hours post operatively. The difference was statistically significant at the various intervals of time post operatively ($p<0.0001$) (Table 4) Hospitalization of less than 4 days was seen in one patient in OA group.

20 patients in OA group and 26 patients in LA were hospitalized between four to eight days. Duration of hospital stay of more than eight days was seen in 10 patients undergoing OA and five patients undergoing LA.

(Table 5) The mean postoperative stay in LA group was 6.71 days (range five to 12 days) whereas in OA group, it was 7.74 days (range three to 13 days). The difference was not statically significant (p=0.070). (Table 6) The mean operating time in OA group was 70.65 minutes and in the LA group was 105 minutes. The difference was found to be statistically significant ($p<0.0001$) (Table 7)

**Table 1**Gender distribution

| Gender | OA Group | | LA Group | |
|---|---|---|---|---|
| | Number | Percentage | Number | Percentage |
| Male | 13 | 41.9% | 15 | 48.4% |
| Female | 18 | 58.1% | 16 | 51.6% |
| Total | 31 | 100.0% | 31 | 100.0% |

**Table 2**Age distribution

| Age group (Years) | LA Group | | OA Group | |
|---|---|---|---|---|
| | Number | Percentage | Number | Percentage |
| 10-20 | 05 | 16.1% | 08 | 25.8% |
| 21-30 | 13 | 41.9% | 09 | 29.0% |
| 31-40 | 08 | 25.80% | 06 | 19.4% |
| 41-50 | 05 | 16.1% | 06 | 19.4% |
| > 50 | 0 | 0 | 02 | 6.5% |
| Total | 31 | 100.0% | 31 | 100.0% |

**Table 3**Presenting Symptoms

| Symptoms | OA Group | | LA Group | |
|---|---|---|---|---|
| | Number | Percentage | Number | Percentage |
| Pain Abdomen | 31 | 100.0% | 31 | 100.0% |
| Nausea | 21 | 67.74% | 17 | 54.83% |
| Vomiting | 05 | 16.10% | 08 | 25.80% |
| Fever | 06 | 19.35% | 08 | 25.80% |

**Table 4**Post-operative pain at different interval

| Duration (Hours) | OA Group | | LA Group | | p value |
|---|---|---|---|---|---|
| | Mean | S.D | Mean | S.D | |
| 06 | 9.52 | 0.42 | 6.95 | 0.61 | <0.0001 |
| 12 | 9.22 | 0.31 | 6.88 | 0.62 | <0.0001 |
| 18 | 8.16 | 0.35 | 6.50 | 0.52 | <0.0001 |
| 24 | 7.95 | 0.43 | 4.45 | 0.47 | <0.0001 |
| 36 | 7.20 | 0.46 | 4.11 | 0.51 | <0.0001 |

**Table 5**Duration of hospital stay

| Hospital stay | OA Group | | LA Group | |
|---|---|---|---|---|
| | Number | Percentage | Number | Percentage |
| <4 | 01 | 03.2% | 00 | 00.0% |
| 4 to 8 | 20 | 64.5% | 26 | 83.8% |
| >8 | 10 | 32.2% | 05 | 16.1% |

**Table 6**Mean Hospital stay

| Procedure | Mean S.D | Mean Hospital stay | p value |
|---|---|---|---|
| OA Group | 7.74 | 2.41 | |
| LA Group | 6.71 | 1.99 | 0.0705 |

**Table 7** Operating time

| Groups | Mean S.D | Operating time (minutes) | p value |
|---|---|---|---|
| OA Group | 70.65 | 15.10 | |
| LA Group | 105 | 13.90 | <0.0001 |

## DISCUSSION

With the introduction of laparoscopy, the surgical approach to appendectomy took a new turn and a large number of surgical procedures were attempted with this new technique. In 1983, Kurt Semm a German gynecologist described the first L.A [5]. Laparoscopicappendectomy like other laproscopically adapted procedures did not gain wide spread acceptance because the benefits of laproscopic approach are still clear. Unlike

laparoscopic cholecystectomy (LC), LA is not regarded gold standard.

In the study both the groups had similar characteristics. The mean age for OA group was 32.51 years and for the LA was 33.61 years. The male to female ratio in both the groups were same.

The evaluation of pain for the patients who took part in the study was based on VAS. It was observed that the post operative pain measured at 6 hours, 12 hours, 18 hours, 24 hours, 36 hours was significantly lower after the laparoscopic procedure than the open procedure. These results are comparable with most of the results presented on the literature.[11-13]

However some of the studies did not show any difference between open and laparoscopic procedure.[14-15] Study by R.C.Ignacio et al (2004)[14] concluded that Perceived post operative pain on day one and day seven were not statistically different between the two LA and OA. Patients studied by NamirKatkhouda et al (2005)[15] experienced similar severity of pain on post operative day one, two, three and two weeks.

It was observed during the study that the patient who underwent LA had a better post operative recovery. The reduced trauma to the abdominal wall played a very significant factor in post surgical discomfort. The better mobility of the abdominal musculature and early ambulation reduces the risk of early post operative complications.

The question whether laparoscopic appendectomy decrease the length of hospitalization has been a great debate.[16-17]The literature provides contradictory results. Most studies report a median hospital stay of two to five days irrespective of laparoscopic or open approach. Although some recent retrospective cohort studies or chart reviews found LA to be associated with significant shorter hospital stay.[19-20] Other retrospective investigations reported no significant differences. [21-22] Similarly, some randomized controlled trials associated LA with decreased hospital stay.[23-24] However, other report no significant difference between LA and OA.[11,13,18] Even meta analyses report controversial findings. Sauerland[25] and associated summarized the results of 28 randomized trials and almost 3000 patients and reported significant decrease in length of hospital stay in patients undergoing LA. Similar results were found by Golub[12] and colleagues, whereas another meta analysis failed to show a statistically significant difference in the length of hospital stay between OA and LA. The current literature describes that the difference may be affected by hospital factors or social habits rather than reflecting differences resulting from operative technique.[21]

The present study revealed shorter hospital stay for patients undergoing LA. Significant variation in operating time was noted in various controlled studies.[11,19,21] Some studies noted shorter operating time for patients undergoing OA while others revealed no difference. In present study more operating time was noted for LA.

This may be due to the inclusion of additional steps for set up like adjusting different tubes, cables and video apparatus around patient, insufflation, trocar entry under direct vision and diagnostic laparoscopy. In teaching institution participating residents generally have less experience. Time spent teaching the residents (post graduates) naturally slows the progress of the operation. The other reason is because of the learning curve during the earlier phase of the study. Laparoscopic operating time should improve with increasing experience.

During the study it was noticed that the patient who underwent laparoscopic procedure developed bowel sounds earlier compared to open group post operatively. This allowed for the early resumption of diet in laparoscopic group.

There was no conversion from LA to OA in the present study. In the present study 31 patients underwent LA. In the literature the conversion rate varies from 1% to 22%[13,26]. The reasons for conversion are strong infiltration and adhesion around caecum, bleeding from the appendicular artery and retrocaecal location of appendix.

## CONCLUSION

In our study we find an advantage of LA over OA.Laparoscopic appendectomy was found to be

associated with shorter hospital stay and decreased post-operative pain. Therefore LA can be safely used for appendicitis unless laparoscopy is contraindicated.

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