

EXPERIENCE OF LAPAROSCOPIC APPENDECECTOMIES VERSUS OPEN APPENDECECTOMIES

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ABSTRACT

Objective: To compare the outcome of laparoscopic and open appendectomies in terms of operative time and post-operative morbidity.

Methodology: This prospective study was done from March, 2008 to March, 2009, at Surgical "C" Unit of Khyber Teaching Hospital, Peshawar. All consecutive appendectomies (open and laparoscopic) performed over this time were included. Demographic details, operative time, conversion, infective post-operative complications and delay in discharge were recorded. The patients were divided into two groups, laparoscopic appendectomies (LA) and open appendectomies (OA).

Results: A total of 165 appendectomies were performed, 72 in the LA group and 93 in OA group. Eighteen appendectomies were perforated at the time of operation. The patients' ages ranged from 12-65 years (median 24 years). Eighty were males and eighty five were females. Operative time in LA group was longer with mean duration of 45 minutes (range 35-75 minutes) compared with 35 minutes (range 30-55 minutes) in OA group. A glove finger was used as extraction bag in 59 (83%) in LA group. LA patients' wound infection was recorded in 12 patients, two out of 72 in LA and 10 out of 93 in OA group. The site of infection was the port of specimen extraction in LA group. Intra-abdominal abscesses complication was observed in one case in the OA group. LA group had shorter hospital stay (mean 1.5 days) than (OA) (mean 3.5 days), and early return to normal activity, 8-15(mean 10.5) days in LA and 15-25(mean 18.5) days in OA.

Conclusion: Laparoscopic Appendectomy (LA) is safe and has major benefits like less post-operative pain, decreased wound infection, early hospital discharge and earlier return to work than Open Appendectomy (OA). LA is recommended in all patients with acute appendicitis if laparoscopy is not contraindicated.

KEY WORDS: Appendicitis, laparoscopic appendectomy, outcome, wound infection.

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INTRODUCTION

Appendectomy is one of the most common General Surgical procedure and approximately 7% of the population develop appendicitis in their life time.^{1,2} Charles Mc Burney in 1889 advocated early operative intervention in acute appendicitis and later he performed the procedure and described Mc Burney's incision.¹ First

laparoscopic appendectomy was reported almost after a century by a German Gynaecologist, Kurt Semm in 1983.³

Laparoscopic appendectomies involve some advantages such as less pain, shorter hospital stay, rapid post-operative recovery, decreased wound infection, satisfactory exploration of the abdominal space and better cosmetic scar.²⁻⁵ Open procedure in appendectomy has been a well known procedure with its complications for many years. Laparoscopic appendectomy has appeared as the alternative approach for the open appendectomy. But some authors still state that LA is not superior to open appendectomy (OA), considering the operative time which is longer in LA, post-operative complication and the cost benefits.³ The limitations of LA are technical difficulty, non availability of equipment everywhere, longer duration of operation, higher expense and increased incidence of intra-abdominal abscesses and has not yet gained wide spread acceptance.^{6,7} However current studies report a shift in favour of laparoscopy, probably due to the increase in laparoscopic exposure and experience, a reasonable operative time, faster recovery and lesser wound complication rate and lesser risk of developing ileus.^{1,3,8} The aim of this study was to compare the outcome and morbidity of LA and OA in Patients with acute appendicitis.

METHODOLOGY

This prospective study was carried out in Surgical "C" Unit, Khyber Teaching Hospital, Peshawar from March, 2008 to March, 2009. All consecutive patients admitted with right iliac fossa pain who had an open or laparoscopic appendectomy were included. No randomization was carried out. The groups of surgeons included an associate professor and surgical resident, and an assistant professor with a resident. Both the consultants were trained in laparoscopic and open surgeries. The choice between open and laparoscopic approach was decided by the operating surgeon and informed consent was taken.

Data were collected in a specially designed proforma. The patients' demographic details,

clinical features, physical examination, routine biochemical analysis and ultrasonography (USG), operative findings, conversion to open surgery and post-operative complications were recorded. Operative time, use of post-operative analgesics and antibiotics were also recorded. At follow up visit, 15 days after discharge, the history regarding the general health and the time taken for return to normal activities was recorded. Operative area was examined for the evidence of wound infection, condition of scar and incisional hernia. Statistical analysis was performed using SPSS 10. Fisher's exact test, unpaired *t*-test and one sample *t*-test was applied to calculate *p*-values where applicable with 95% confidence interval. A *p*-value <0.05 was considered to be statistically significant.

A standard technique for laparoscopic appendectomy was used with 10mm trocar in the infra-umbilical position. Pneumoperitonium was established with CO₂ gas. Two 5mm ports were used, one in left iliac fossa and the other in supra-pubic position. The appendix was identified; the base was tied and divided between two endo-loops with laparoscopic scissors. A glove finger was used for extraction in most cases for delivering the appendix. This was not found to affect the rate of infection in this study, (however further research is needed in this regard). The appendicular stump was not buried routinely. In case of perforation a careful washout was performed. Open appendectomies were performed through a gridiron incision in the right iliac fossa by muscle splitting and peritoneal incision.

All patients had received prophylactic antibiotics with anaerobic coverage at induction and two doses post-operatively, while gangrenous or perforated appendix had a five day course of antibiotics. Pain intensity assessment was done on 0-10 Numeric Rating Scale (Pain: Clinical Manual for Nursing Practice. Baltimore: V.V.Mosby Company 1993). Mild pain responded to oral analgesics, moderate pain required a single dose of injectable analgesics, while severe pain needed a combination of analgesics and sedatives, as well as repeated doses.

Table-I: Comparison of Outcome and Morbidity in LA and OA Groups (n=165)

| Outcome(Category) | Laparoscopic Appendectomy(LA) n=72 | Open Appendectomy (OA) n=93 | P-value |
|---------------------------|------------------------------------|-----------------------------|------------|
| Mean operative time (min) | 45(Range 35-75) | 35(Range 30-55) | <0.0001* |
| Conversion | 10 (13.88%) | | <0.0001** |
| Post-operative pain | 24(33.33%) | 65(69.89%) | <0.0001*** |
| Wound infection | 2 (2.77%) | 10 (10.75%) | 0.0693*** |
| Post-operative fever | 5(6.94%) | 22(23.65%) | 0.0052*** |
| Paralytic ileus | 2 (2.77%) | 12 (12.90%) | 0.0240*** |
| Intr-abdominal abscesses | 0 | 1(1.07%) | 1.0000*** |

* Calculated by Unpaired *t*-test** Calculated by One Sample *t*-test*** Calculated by Fisher's Exact test $p < 0.05$ is considered significant

RESULTS

The study included 165 patients. There were 80 males and 85 female patients with the median age of 24 years (range 12-65 years). LA was performed in 72 (43.63%) and OA in 93 (56.36%) patients. There was no significant difference in the age, clinical presentation or laboratory findings between the two groups. Of these 165 patients, 122 (73.93%) had acute appendicitis, 18 (10.9%) appendices were perforated at the time of operation as shown in Table-II.

Operative time in the LA group was significantly longer ($p < 0.0001$ with confidence interval of 95%) with the median duration of 45 minutes (range 35-70 min) and 35 min (30-55 min) in the OA. There were two (2.77%) cases of superficial wound infection in the LA group and 10 (10.75%) in the OA group ($p = 0.0693$ with confidence interval of 95%) which was not quite significant.

Pain and febrile morbidity was significantly high in the OA group than LA group ($p < 0.0001$ and $p = 0.0052$ respectively, with confidence interval of 95%) with requirement of injectible analgesics and antibiotics for longer duration. Per-operative findings are shown in Table-II. Perforated appendices were more in the OA

group. In the LA group 48 inflamed, four perforated and 20 normal appendices. In the OA group, 74 inflamed, 13 perforated and 5 normal appendices were removed. LA was successfully done in 62 (86.12%) patients. Conversion to an open procedure was necessary in 10 (13.88%) for failure to progress due to adhesions in seven patients, gangrenous base of appendix in two and intra-operative bleeding in two patients.

Most of the post-operative complications were observed after OA as compared to LA. The mean hospital stay was 1.5 days for LA group and 3.5 days for OA group ($p < 0.0001$ with confidence interval of 95%), with early return to normal activity in LA than OA group ($p < 0.0001$ with confidence interval of 95%) as shown in Table-III. There were no major complications or mortality.

DISCUSSION

Appendectomy for acute appendicitis is a common emergency surgery.^{9,10} Open appendectomy has been the gold standard treatment, although a safe operation but a potential for complications exists like wound infection, intra-abdominal adhesions and bowel obstruction.¹⁰

Table-II: Per-Operative Findings in LA and OA Groups

| Severity | Laparoscopic Appendectomy (LA) | Open Appendectomy (OA) | Total |
|-------------------------|--------------------------------|------------------------|-------|
| Acute appendicitis | 48 (66.66%) | 74 (79.56%) | 122 |
| Perforated appendicitis | 4 (5.55%) | 14 (15.05%) | 18 |
| Normal appendix | 20 (27.77%) | 5 (5.37%) | 25 |
| Total | 72 | 93 | 165 |

Table-III: Comparison of Hospital Stay and Return To Normal Activity in LA and OA Groups

| Category | Laparoscopic Appendectomy (LA) n=93 | Open Appendectomy (OA) n=93 | P-value |
|---|-------------------------------------|-----------------------------|----------|
| Hospital stay(days) | 1-3(mean=1.5) | 2-6(mean=3.5) | <0.0001* |
| Time of return to normal activity(days) | 8-15(mean=10.5) | 15-25(mean=18.5) | <0.0001* |

* Calculated by Unpaired *t*-test $p < 0.05$ is considered significant

The popularity of the LA has increased since its conception but it is still far from attaining the status of 'Gold Standard'. The advantages of LA are quicker and less painful recovery, fewer complications, superior cosmesis and better assessment of other intra-abdominal pathologies.¹¹ However longer operative time, higher cost, and 3 different small cuts instead of a tiny Mc Burney's incision and a need for a competent surgeon are the disadvantages for Laparoscopic approach.³ Different authors in their large series of LA demonstrated that it could be applied for most cases of appendicitis with a higher degree of success, less pain, early bowel movements, short hospital stay, faster return to routine activities, low rates of complications and speed as fast as OA.^{2,3,12}

In this study the mean operative time in LA was longer as compared to OA group (45min versus 35min). This is comparable to other studies reporting 10.7 to 30 min shorter mean operative time for OA group.^{11,13,14}

The incidence of conversion to OA in this study was 13.88%, while others have reported a conversion rate of 6% and 11%.^{2,10} This high rate of conversion decreases with the surgeon's experience, though others have also reported similar conversion rates.¹⁵ Injectable analgesic requirements in LA group was lesser than OA group as reported by other studies.²

The wound infection rates of LA and OA groups were 2.7% and 10.7% respectively and are comparable to other studies reporting 4% and 16% and 0-6% and 5-11% in LA and OA groups respectively.^{2,10,13} The site of infection was the port of specimen extraction in LA group and in cases where appendix was perforated. In OA group wound infection was more after surgery for perforated appendicitis. The higher

incidence in perforated appendicitis may be due to increased bacterial contamination.

The cases were conservatively treated with wound leavage, dressing and antibiotics. The development of post-operative intra-abdominal abscesses after appendectomy is rare but is a serious complication and is associated with significant mortality. Some reports have suggested an increased risk of intra-abdominal abscesses after LA, whilst others have reported the opposite.¹⁰ In our study one case of OA group developed an intra-abdominal abscess, diagnosed by ultrasound scan on 12th post-operative day and was managed conservatively using broad spectrum antibiotics and ultrasound guided aspiration. Khan MN, et al. has reported one case of intra-abdominal abscess in each of LA and OA groups which were treated conservatively. Good surgical technique and proper use of antibiotics is crucial to reduce the incidence of post-operative intra-abdominal abscesses.^{10,16}

In our study, the mean period of hospital stay was shorter in LA group (1.5 days) than OA group (3.5 days) and this difference is slightly higher than that reported in other studies.^{13,14,17} Mean period of return to normal activity was 8 days earlier in LA group than OA group and is comparable to the figures reported by Kumar B, et al. and Pederson AG et al.^{2,18} The advantage of LA in this study has been reduced risk of wound infection, shorter hospital stay, early return to normal activity and better cosmetic results.

This study has some limitations. Patients were not randomized and the choice of procedure was operator dependant. Randomized controlled trials would have definitely enhanced the value of the study.

CONCLUSION

In comparison to OA, the advantages of diagnostic laparoscopy in patients with abdominal pain, combined with the benefits of laparoscopic appendectomy of shorter hospital stay, decreased wound infection rate, decreased analgesic requirement, earlier return to work and cosmesis, suggest that all patients with suspected appendicitis should be considered for laparoscopic appendectomy.

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