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Open VS laparoscopic appendectomy: A comparative study

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Abstract

Background: Appendectomy is the most common surgical procedure performed in emergency surgery. Because of lack of consensus about the most appropriate technique, appendectomy is still being performed by both open (OA) and laparoscopic (LA) methods. Laparoscopic appendectomy is likely to have less postoperative pain, early discharge, decreased wound infection, better cosmesis and also early return to routine work. The advantages of laparoscopic appendectomy over open appendectomy are questioned over and over.

Objective: The primary objective of this study was to compare the laparoscopic approach and the conventional technique in the treatment of acute appendicitis.

Materials and Methods: The study included 200 cases, 100 open appendectomy cases and 100 laparoscopic appendectomy cases, which were randomly selected and were operated in department of surgery, Gandhi Medical College, Secunderabad. The following parameters were observed during follow up in comparison between two procedures, post operative pain; duration of analgesic use; post operative complications like vomiting, ileus, abdominal abscess and wound infection. Chi-square test and student t-test were used for statistical analysis.

Results: Pain score was relatively high for open group when compared to laparoscopic group. Post operative complications like vomiting and ileus were lower in laparoscopic group. There is significant reduction in incidence of post operative wound infection in laparoscopic group. Laparoscopic appendectomy was associated with a shorter hospital stay. The return to normal activity was low for laparoscopic group compared to open group. Operative time was significantly shorter in the open group.

Conclusions: The laparoscopic approach is a safe and efficient operative procedure in appendectomy and it provides clinically beneficial advantages over open method.

Keywords: Appendicitis, appendectomy, laparoscopic appendectomy, open appendectomy

Introduction

The appendix is a blind-ended tube connected to the cecum, from which it develops in the embryo. The most common diseases of the appendix (in humans) are appendicitis and carcinoid tumors. Appendicitis is inflammation of the appendix. Symptoms commonly include right lower abdominal pain, nausea, vomiting, and decreased appetite. However, approximately 40% of people do not have these typical symptoms ^[1, 2]. Appendicitis is caused by a blockage of the hollow portion of the appendix. This is most commonly due to a calcified "stone" made of feces. Inflamed lymphoid tissue from a viral infection, parasites, gallstone, or tumors may also cause the blockage. This blockage leads to increased pressures in the appendix, decreased blood flow to the tissues of the appendix, and bacterial growth inside the appendix causing inflammation. The combination of inflammation, reduced blood flow to the appendix and distention of the appendix causes tissue injury and tissue death. If this process is left untreated, the appendix may burst, releasing bacteria into the abdominal cavity, leading to increased complications ^[3]. The surgical procedure for the removal of the appendix is called an appendectomy. Appendectomy can be performed through open or laparoscopic surgery. The surgical procedure for the removal of the appendix is called an appendectomy ^[4, 5]. Appendectomy can be performed through open or laparoscopic surgery. When the surgeon uses the open approach, he makes an incision in the lower right section of the abdomen. Most incisions are less than 3 in (7.6 cm) in length. The surgeon then identifies all of the organs in the abdomen and examines them for other disease or abnormalities. The appendix is located and brought up into the wounds. The surgeon separates the appendix from all the surrounding tissue and its attachment to the cecum, and then removes it. The site where the appendix was previously attached, the cecum, is closed and returned to the abdomen.

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The muscle layers and then the skin are sewn together [6, 7, 8]. When the surgeon performs a laparoscopic appendectomy, four incisions, each about 1 in (2.5 cm) in length, are made. One incision is near the umbilicus, or navel, and one is between the umbilicus and the pubis. Two other incisions are smaller and are on the right side of the lower abdomen. The surgeon then passes a camera and special instruments through these incisions. With the aid of this equipment, the surgeon visually examines the abdominal organs and identifies the appendix. The appendix is then freed from all of its attachments and removed. The place where the appendix was formerly attached, the cecum, is stitched. The appendix is removed through one of the incisions. The instruments are removed and then all of the incisions are closed [6, 7, 8]. The primary objective of this study was to compare the laparoscopic approach and the conventional technique in the treatment of acute appendicitis.

Materials and methods

Place of Study: Department of surgery, Gandhi Medical College, Secunderabad.

Type of Study: Prospective and observational study on 200 appendectomy cases.

Inclusion Criteria: Patients with clinical diagnosis of acute or

recurrent appendicitis with necessary investigations.

Exclusion Criteria: Patients who didn't give consent, children below the age of 10 years, pregnant women and cases of complicated appendicitis were excluded from this study.

Methodology: The following parameters were observed during follow up in comparison between two procedures, post operative pain using a visual analogue pain scale and duration of analgesic used in number of days. Post operative complications like vomiting, ileus, abdominal abscess and wound infection. Patients in both study groups were discharged as soon as possible and duration of stay after surgery and duration of analgesics used after surgery in number of days is noted. Wound infection was defined as discharge of pus that required surgical drainage. Intrabdominal abscess was defined as a fluid collection diagnosed at Ultrasonography or computed tomography which contained pus at ultrasonographically guided aspiration. Presented proforma was used to collect the relevant information.

Statistical Methods: Chi-square test and student t- test were used for statistical analysis.

Observations and results

Demographic and preoperative clinical data

Table 1: Demographic and Preoperative Clinical Data

| Characteristic | Open Appendectomy | Laparoscopic Appendectomy |
|-------------------|-------------------|---------------------------|
| Frequency | 100 | 100 |
| Gender | | |
| Male | 65 | 45 |
| Female | 35 | 55 |
| Mean Age | 25.8 ± 9.1 | 22.3 ± 7.3 |
| Co-morbidities | | |
| Hypertension | 5 | 3 |
| Diabetes Mellitus | 4 | 2 |
| COPD | 3 | 2 |
| CAD | 2 | 2 |

Table 1 depicts that in the present study 65(65%) patients of open appendectomy and 45(45%) patients of laparoscopic appendectomy were males. 35(35%) patients of open appendectomy and 55(55%) laparoscopic appendectomy

were females. The mean age of the patients in two groups was 25.8 ± 9.1 years and 22.3 ± 7.3 years, respectively.

Duration of surgery

Table 2: Duration of Surgery

| | Appendectomy | |
|--------------------------|--------------|--------------|
| | Open | Laparoscopic |
| Mean Duration Of Surgery | 46.3 ± 11.0 | 66.9 ± 22.1 |

Table 2 shows that open appendectomy is less time consuming than laparoscopic appendectomy.

Post operative complications

Table 4: Post Operative Complications

| Complication | Appendectomy | | P Value |
|-------------------|--------------|--------------|---------|
| | Open | Laparoscopic | |
| Vomiting | 20(20%) | 10(10%) | <0.05* |
| Abdominal Abscess | 5(5%) | 0(0%) | >0.05 |
| Wound Infection | 17(17%) | 4(4%) | <0.05* |
| Ileus(Hours) | 31.1± 8.1 | 18.3± 7.4 | <0.05* |

Post operative pain score

Table 3: Post Operative Pain Score

| | Appendectomy | | Statistical Analysis | |
|------------|--------------|--------------|----------------------|---------|
| | Open | Laparoscopic | T Value | P Value |
| Pain Score | 2.5 ± 0.3 | 1.4 ± 0.4 | 6.88 | <0.05* |

*P value significant

*P value significant

Table 3 depicts that in the present study average pain score was 2.5 ± 0.3 in open group as compared to 1.4 ± 0.4 in laparoscopic group with p value <0.05 which was statistically significant.

Table 4 depicts that post operative complications like vomiting and ileus were lower in laparoscopic group. There is significant reduction in incidence of post operative wound infection in laparoscopic group.

Post operative hospital stay**Table 5:** Post operative Stay

| Hospital Stay | Appendicectomy | |
|---------------|----------------|--------------|
| | Open | Laparoscopic |
| 1 day | 0 | 14 |
| 2 days | 0 | 43 |
| 3 days | 13 | 30 |
| 4 days | 68 | 13 |
| 5-9 days | 8 | 0 |
| 10-15 days | 11 | 0 |
| P Value | <0.05* | <0.05* |

*P value significant

Table 5 shows that laparoscopic appendicectomy significantly reduced the hospital stay ($P < 0.05$).

Discussion

Acute appendicitis is the most common indication for abdominal surgery with a life-time incidence between 7 to 9 percent. Appendicectomy 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. Laparoscopic appendicectomy (LA) has evolved since the first performed by a German Gynecologist Semm K. 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 [4]. In spite of its wide acceptance, there remains a continuing controversy in the literature regarding the most appropriate way of removing the inflamed appendix. In the present study 65(65%) patients of open appendicectomy and 45(45%) patients of laparoscopic appendicectomy were males. 35(35%) patients of open appendicectomy and 55(55%) laparoscopic appendicectomy were females. The mean age of the patients in two groups was 25.8 ± 9.1 years and 22.3 ± 7.3 years, respectively. Table 2 shows that open appendicectomy is less time consuming than laparoscopic appendicectomy. Similar observations have also been reported by other studies [10, 11]. A meta-analysis of randomized controlled trial has been reported with outcomes for 3000 patients. The mean operating time was 18 minutes longer for laparoscopic appendicectomy [12]. A prospective randomized trial comparing laparoscopic appendicectomy with open appendicectomy was conducted in 158 patients by Hansen *et al.* [13] reported that despite of longer operating time, the advantages of make it a worthwhile alternative for patients with acute appendicitis. In the present study average pain score was 2.5 ± 0.3 in open group as compared to 1.4 ± 0.4 in laparoscopic group with p value < 0.05 which was statistically significant. The similar studies done showed the incidence of emesis was lesser and post operative ileus lesser in laparoscopic group [14, 15]. Post operative complications like vomiting and ileus were lower in laparoscopic group. There is significant reduction in incidence of post operative wound infection in laparoscopic group. The return to normal activity was low for laparoscopic group compared to open group. Similar findings were observed in other studies also [16, 17]. Marzouk M *et al.* [18] showed laparoscopic appendicectomy significantly improved the postoperative wound infection rate. There was no wound infection in the laparoscopic group, whereas in open group the infection rate was 7.6. Laparoscopic appendectomy was associated with a shorter hospital stay. Other studies have shown similar findings [19, 20].

Conclusions

The laparoscopic appendicectomy was better than the open appendicectomy with respect to pain score, lesser use of analgesics and post operative complications. Post operative recovery was good in respect with duration of hospital stay, return to normal work. The only drawback of laparoscopic appendicectomy was with the duration of surgery. Overall laparoscopic appendicectomy is better than open appendicectomy in selected patients with acute or recurrent appendicitis. The laparoscopic approach is a safe and efficient operative procedure in appendectomy and it provides clinically beneficial advantages over open method.

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