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Laparoscopic Versus Open Appendicectomy

Medical Science

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Dr. Kiran Kumar P. S. Associate Professor, Department of General Surgery, Basaveshwara Medical College & Hospital, Chitradurga. – 577501, India.

Dr. Mahesh G. S., MBBS MS. Associate Professor, Department of General Surgery, Basaveshwara Medical College & Hospital, Chitradurga. – 577501, India.

*** Dr. Kiran Kumar P. S., MBBS MS.** Associate Professor, Department of General Surgery, Basaveshwara Medical College & Hospital, Chitradurga. – 577502, India. * Corresponding Author

ABSTRACT

The aim of this study is to compare the safety and benefits of laparoscopic versus open appendectomy in a prospective randomized study.

Methods:

Two hundred fifty patients were analyzed following either laparoscopic or open appendectomy. The main outcome measures were postoperative complications. Secondary outcome measures included evaluation of pain and activity scores at base line preoperatively and on every postoperative day, as well as resumption of diet and length of hospital stay. Activity scores and quality of life were assessed on short-term follow-up.

Results:

There was no mortality. The overall complication rate was similar in both groups (17.5% versus 16% in the laparoscopic and open groups respectively), but some early complications in the laparoscopic group required a reoperation. Operating time was significantly longer in the laparoscopic group (60 minutes versus 40 minutes; P = 0.000) while there was no difference in the pain scores and medications, resumption of diet, length of stay, or activity scores. At 2 weeks, there was no difference in the activity or pain scores, Appendectomy for acute or complicated (perforated and gangrenous) appendicitis had similar complication rates, regardless of the technique (P = 0.181).

Conclusions:

Unlike other minimally invasive procedures, laparoscopic appendectomy did not offer a significant advantage over open appendectomy in all studied parameters except quality of life scores at 2 weeks. It also took longer to perform. The choice of the procedure should be based on surgeon or patient preference.

INTRODUCTION

Since its initial description by Semm[1] in 1983, laparoscopic appendectomy (LA) has struggled to prove its superiority over the open technique. This is in contrast to laparoscopic cholecystectomy, which has promptly become the gold standard for gallstone disease despite little scientific challenge.[2] Open appendectomy (OA) has withstood the test of time for more than a century since its introduction by McBurney[3]: the procedure is standardized among surgeons and, unlike cholecystectomy, OA is typically completed using a small right lower quadrant incision and postoperative recovery is usually uneventful.

Numerous prospective randomized studies,[5–26] meta-analyses,[27–30] and systematic critical reviews[31–34] have been published on the topic of LA, with a general consensus that the heterogeneity of the measured variables and other weaknesses in the methodology have not allowed to draw definitive conclusions and generalizations.[33,34]

With this in mind, we have designed a prospective randomized study (PRS) comparing LA to OA . [11,23]

MATERIALS AND METHODS

Patients with appendicitis were included in the study performed at Department of Surgery, Basaveshwara Medical College and Hospital, Chitradurga. The diagnosis of appendicitis was made on the following criteria:

History of right lower quadrant pain or periumbilical pain migrating to the right lower quadrant with nausea and/or vomiting, fever of more than 38°C and/or leukocytosis above 10,000 cells per mL, right lower quadrant guarding, and tenderness on physical examination.

All patients included were more than 15 yrs of age.

Patients were excluded if they had a history of symptoms for more than 5 days and/or a palpable mass in the right lower quadrant, suggesting an appendiceal abscess treated with antibiotics and possible percutaneous drainage. Patients with the following conditions were also excluded: history of cirrhosis and coagulation disorders, generalized peritonitis, shock on admission, absolute contraindication to laparoscopic surgery (large ventral hernia, history of laparotomies for small bowel obstruction, ascites with abdominal distension), contraindication to general anesthesia (severe cardiac and/or pulmonary disease), inability to give informed consent due to mental disability, and pregnancy.

Randomization

The qualifying patients were informed of the risk and benefits of each operation and asked to sign a detailed informed consent in their respective native language, approved by the ethical committee of the institution.

Baseline evaluation of the following parameters was performed before randomization once the informed consent was signed: measurement of pain on a visual analog scale (VAS) and measurement of activity using a scoring system.

Surgery

Patients received 1 g of ceftriaxone every 12 hours intravenously from the time of diagnosis until surgery. Patients found to have a complication (gangrenous or perforated appendicitis) during surgery were treated with "triple antibiotic" coverage: Ceftriaxone, amikacin and metronidazole until the white blood cell count was within normal limits and the temperature under 37.9°C for 24 hours. All patients recived 1 dose of antibiotics postoperatively. No urinary catheter was used. OA used a McBurney muscle-splitting incision 1.0 inch in the right lower quadrant. A double ligation of the stump was performed with an absorbable suture. If the appendix looked normal, it was removed, and the distal ileum was visualized to detect possible Meckel's diverticulitis. The abdomen and pelvis were irrigated with warm saline solution. The skin incision was closed with 3-0 monofilament polyamide. In the case of a perforated appendix, the skin wound was closed loosely.

LA was performed using 3 ports, with the laparoscope positioned at the umbilicus. one 10-mm port at umbilicus and two 5 mm ports, one at left iliac fossa and other at suprpubic region. The abdominal cavity was explored to locate the appendix and rule out other possible diagnoses. The appendix and the mesoappendix were divided with Bipolar coagulation. The right lower quadrant, the right colic gutter and the subhepatic space in the case of purulence were irrigated and the fluid was suctioned. The appendix was removed in a laparoscopic bag. Fascial defects in the port sites were closed using 0 Vicryl suture. The skin incisions were closed in every case using 3-0 monofilament polyamide. Nonsuction drainage was left in situ in cases of abscess.

Postoperative Course

Strict criteria were followed for the reintroduction of nutrition. Bowel sounds were checked every 6 hours. Once present, the patients were started on a clear liquid diet and advanced to regular diet when the liquid diet was tolerated and flatus observed. Patients were discharged when they tolerated a regular diet.

Outcome Parameters

The following parameters were recorded:

- Anesthesia time in minutes from the time of induction to reversal and operating time skin to skin in minutes.
- Complications (intraabdominal abscesses were defined by the presence of fever and elevated WBC and evidenced by computed tomography; wound infections were defined as redness and drainage from the wound requiring opening of the skin incision and packing).
- Pathology based on reports (acute, gangrenous, or perforated appendicitis).
- Time until resumption of diet (clear liquid and regular diet) in hours and hospital stay in days.
- A 10- score Activity Assessment Scale was used to measure activity on every postoperative day. This measured the patient's ability to perform 10 activities: lying in bed, sitting, getting in or out of bed or chair, walking around inside, walking outside or at work, sedentary activities, light physical activities, moderate physical activities, vigorous activities, sexual activity. All items had response categories scaled from 1 through 5, with verbal descriptors for each item. The response categories for activity were (1) no difficulty at all; (2) a little difficulty; (3) some difficulty; (4) a lot of difficulty; (5) not able to do it. The Activity Assessment scale is the sum of the 10 items, with higher scores indicating poorer activity.
- Postoperative pain was assessed by visual number analogue scale. The item was scaled from 0 to 10, with 0 being no pain and 10 being the most intense pain imaginable.
- At 2 weeks, patients were seen in the wound clinic and checked for complications (wound infection, intra-abdominal abscess formation, and any other complication).

RESULTS

Two hundred sixty eight patients were randomized to either laparoscopic or OA. Eighteen were excluded from the study (15 refused treatment assignment and 3 were pregnant). 250 were available for the analysis.

Demographics

The 2 groups were similar with respect to age, sex, and preoperative white cell count.

Morbidity

There was no mortality in this study. There was no significant difference in the overall complication rates (17.5% in the LA group versus 16.1% in the OA group) ($P = 1.00$) two major complications in the laparoscopic group required a reoperation: 2 postoperative bleeding from an injury to the inferior epigastric artery from the left lower quadrant trocar and the other from the appendiceal artery. Both patients had an uneventful recovery. In the open group, none of the complications required a reoperation.

There were no differences in infectious complications between the laparoscopic group (7 wound infections and 6 intraabdominal abscesses) and the open arm (9 wound infections and 4 intraabdominal abscesses). There were also no significant differences in the wound infection rates (6.2% versus 6.7%; $P = 1.00$) and the abdominal abscess rates (5.3% versus 3%; $P = 0.51$) between the LA and the OA respectively.

Clinical Outcomes

The operative time and the total anesthetic time were significantly longer in the laparoscopic group. Nine patients in the laparoscopic group were converted to an open procedure (8%). The indications for conversion were inability to insufflate in 1, unclear anatomy or difficult dissection in the remaining 8. There was no difference in the time to resumption of liquids or solid food between the 2 groups. The length of hospitalization was the same for both groups.

Ninety percent (225/250) of patients were discharged on or before day 3.

Pathology

There were 5 normal specimens (1 in the OA and 4 in the LA group), 155 acute appendices (82 in the OA and 73 in the LA group), and 90 complicated with gangrene or perforation (47 in the OA and 43 in the LA group). No significant differences were noted between the 2 procedures (0.153). Appendectomy for acute or complicated (perforated and gangrenous) appendicitis had similar complication rates regardless of the technique ($P = 0.181$).

Postoperative Pain

Preoperatively, the severity of pain experienced and its influence on activity were similar for both groups Postoperatively, both groups experienced a similar severity of pain on postoperative days 1, 2, 3, and at 2 weeks. Narcotic medication usage to control postoperative pain was also equivalent between the 2 groups. There was no significant difference between the total number of parenteral doses of narcotics or the number of doses of oral analgesics used between the 2 groups. The impact of the patient's pain and its limitation on various daily activities were again similar throughout the postoperative period.

Activity

There was no difference between the 2 groups with respect to the performance of routine daily activities and the limitation imposed by the surgery on such activities on day 1, day 2, day 3, and at 2 weeks postoperatively.

Quality of Life

There was no difference between the 2 groups with respect to the quality of life.

Conclusion

Our study demonstrates that LA is comparable to OA in all studied outcome parameters.

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