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Original Research Article

Laparoscopic appendectomy for acute appendicitis: an observational study from a peripheral hospital with limited facilities in Kashmir, India

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ABSTRACT

Background: Appendectomy is one of the most commonly performed procedures in abdominal surgery and the laparoscopic approach is gradually replacing the conventional laparotomy for acute appendicitis.
Methods: A total of 108 patients with acute appendicitis who underwent laparoscopic appendectomy at JLNM Hospital Srinagar over a period of five years were evaluated in terms of feasibility and safety of the procedure at the District level hospital. It was an observational study.
Results: The age of the patient ranged between 16 and 43 years, with 68 males and 40 females. Most (76.85%) of the patients had un-ruptured inflamed appendix. The mean operative time was 43 minutes with no intra-operative complications. Two patients required conversion to open surgery. Mean duration of hospital stay was 1.7 days. Eight patients had post-operative complications which were managed conservatively.
Conclusions: Laparoscopic appendectomy is safe and feasible in expert hands, and can be done using low cost, readily available basic laparoscopic instruments and suture materials at hospitals with limited facilities.

Keywords: Acute appendicitis, Emergency, Laparoscopic appendectomy

INTRODUCTION

Acute appendicitis is the most common indication for intra-abdominal emergency surgery, and appendectomy is one of the most commonly performed procedures in abdominal surgery.[1] Laparoscopic appendectomy was first introduced by Semm in 1983 and is gradually evolving as the 'gold standard' in the treatment of acute appendicitis, especially in the obese, elderly, and in cases where the diagnosis is uncertain.[2] Several studies and a systematic review have demonstrated at least equivalence for laparoscopic and open appendectomy.[3] Advantages of laparoscopic approach include less postoperative pain, reduced wound infections, faster recovery and shorter hospital stay. Disadvantages of the laparoscopic operation are, besides longer procedure times, a marginally higher intra-abdominal abscess rate and higher costs.[4,5] The increase in cost is attributed to increased operative time for laparoscopic procedures, as well as to the higher cost of specialized instrumentation such as endoscopic stapler, endoscopic clip, Ligasure, and Harmonic scalpel. The cost of surgery also increases by the use of commercially available pre-tied endo-loop ligature for securing the appendicular stump.[6,7]

The aim of this study was to evaluate the safety and outcome of Laparoscopic Appendectomy (LA) using low cost, readily available basic laparoscopic instruments and suture materials at a district level hospital with limited facilities for laparoscopic procedures.

METHODS

The present study included 108 patients who underwent laparoscopic appendectomy for acute appendicitis at a District level hospital (Jawaharlal Nehru Memorial Hospital) in Kashmir, India, from June 2013 to December 2018. The diagnosis was based on clinical history, examination, baseline investigations including CBC as well as abdominal ultrasound. Only the patients in the age group of 16 years and 50 years were included in the study. Patients with preoperative diagnosis of appendicular abscess were excluded. Patients with comorbidities where laparoscopy would increase the risk were excluded. All the patients diagnosed as acute appendicitis were operated either immediately or in the very first elective list. Each patient was given preoperative dose of antibiotics (combination of ceftriaxone and sulbactam 1.5 grams) intravenously. The patient was positioned supine. After induction of general anaesthesia, pneumoperitoneum was established using a 10 mm or 11 mm supra umbilical port inserted by the open method. A 10 mm, 30 degree telescope was used to explore the peritoneal cavity via the umbilical port.

Thereafter, under direct vision, a 10 mm suprapubic port and a 5 mm were inserted in the right lower quadrant, just above the McBurney's point. After placement of laparoscopic ports, a slight head down and right-sided up position was employed. The surgeon and assistant stood on the patient's left, and the monitor was positioned towards the patient's right hip. The telescope was then shifted to the suprapubic port, and the other two used as working ports, the umbilical port being the main working port.

After confirmation of the diagnosis, the appendix was then held and retracted using grasper or Babcock forceps, and the mesoappendix dissected using either blunt dissection with Maryland dissector or electrocautery. Appendicular artery thus isolated was clipped with 9 mm LT-clips and divided. Appendix was dissected free of mesoappendix up to the base, which was secured either with two self-made 2-0 vicryl endoloops or by applying a 2-0 vicryl trans-fixation intra-corporeal suture. The specimen was removed via the umbilical port in an endo-bag made from size- 7 surgical glove. Abdominal cavity was irrigated with N/S as required and a small 24 Fr tube drain was kept in pelvis and brought out through a small incision in right flank in selected patients. Post-operatively, all the patients received an additional antibiotic (Metrogyl 500 mg IV twice daily) against gram negative anaerobes. Ethical approval was obtained from the ethical committee.

RESULTS

During five-year period, 108 patients with acute appendicitis were included in the study at JLNM Hospital, Srinagar, Kashmir. The age of the patient ranged between 16 and 43 years, with 68 males and 40 females. The patients' demographics are shown in Table 1.

Table 1: Patients demographics.

Variables	N (%)
Mean age in years (range)	28.5 (16-43)
Sex	
Males	68 (62.96)
Females	40 (37.03)
Appendix	
Unruptured	83 (76.85)
Ruptured with	23 (21.29)
Localised peritonitis	
Ruptured with	2 (1.85)
Diffuse peritonitis	

The operative outcome of patients in this study is depicted in Table 2. The mean operative time was 43 minutes. None of patients had intra-operative complications. Two patients required conversion to open surgery to complete the operation. One of these patients had an appendicular lump which could not be managed laparoscopically, while the second one required conversion in view of a complex iatrogenic bowel injury.

Table 2: Operative outcome of laparoscopic appendectomy.

Variables	N (%)
Mean operating time in min (range)	43 (26-90)
Intraoperative complications	0 (0)
Conversion	2 (1.85)
Mean length of hospital stays (days)	1.7
Complications	
Port-site infection	3 (2.77)
Intra-abdominal abscess	1 (0.92)
Prolonged Ileus (>24 hours)	4 (3.7)

The mean duration of hospital stay was 1.7 days ranging between 1-5 days. Three patients had minor port-site sepsis which was managed with daily dressings and oral antibiotics. Orals were resumed after 36 hours in four patients with prolonged post-operative ileus, while majority were started with liquids within 6-12 hours. One patient developed an abdominal abscess which was drained using a pig-tail catheter under CT-guidance. No mortality was seen in the present study and majority of the patients expressed their satisfaction to the procedure.

DISCUSSION

Laparoscopic surgery has gradually improved, and advanced surgical procedures being conducted. Laparoscopy enabled surgeons to decrease the rate of infection and complications that are often associated with the open procedure. This has been demonstrated for appendicectomies in a number of studies.[1,3,9,10]

The higher cost of laparoscopic appendectomy is based on the disposable equipment's, such as disposable

trocars, laparoscopic endo-stapler, endo-loops or tissue-sealing devices.[11,12] These devices may not be necessary in laparoscopic appendectomies, which can be performed by using reusable trocars, routine electrosurgical device, readily available LT clips and self-made endo-loops, thus reducing the overall cost of the procedures.[13,14] The closure of the appendiceal stump is an important step during a LA, because most of the postoperative complications are caused by its inappropriate management. The development of life-threatening events such as stercoral fistulas, postoperative peritonitis and sepsis is included in these complications. Studies advocate the use of an endo-stapler, endo-loops, intracorporeal suturing, extracorporeal sliding knot (GESK), titanium clips, polymeric clips and bipolar end coagulation. All alternatives have advantages and disadvantages for the different clinical stages of acute appendicitis, but endo-loops and endo-stapler are used most frequently.[6,11,15]

Endo-loops can be made of silk or polyglactin and can be of various thicknesses. The use of endo-loops has been reported by several authors to be safe in closing the appendix stump and it has a lower cost as compared with staplers.[16] Commercial endo-loops, however, are far more expensive than handmade loops. Although suture closure of the appendix base (as in open surgery) is cheap, it has a disadvantage of prolonging the operation time.[17] To do this, a knot can be prepared within the abdomen or prepared extracorporeally and pushed into the abdomen. Intracorporeal tie knot requires more experience and suturing skills. Some studies have shown that suture closure of the appendix base is as safe as other methods.[17,18] In this study, authors used either a hand-made 2-0 vicryl endo-loops (Roaders Knot) or a 2-0 vicryl trans-fixation intra-corporeal suture for securing the base of the appendix and found both techniques to be safe and cost-effective in setting, although the duration of surgery was marginally prolonged in those where the technique of trans fixation and intra-corporeal knotting was used. The ideal method for closure of appendicular stump should be fast and safe and not associated with long-term complications. Appendix stumps with a diameter of up to 10 mm could be safely closed with endo-loops as well as with intracorporeal suturing and knotting.

Mean operative time in this study was 43 minutes ranging between 26-90 minutes, which was consistent with number of studies where endo-loops or intracorporeal knotting was used to secure the appendicular base.[14,19] Conversion to open surgery may be required in any laparoscopic procedure. In this study only two patients (1.85%) required conversion to open appendectomy although some study reported a rate of conversion from 10 to 39.7%.[20]

No major complication was noted in this series, although a total of eight (7.4%) patients developed minor post-operative complications including port site sepsis, prolonged ileus and intra-abdominal abscess, all of which were managed conservatively. Duration of hospital stay ranged between 1-5 days (mean 1.7 days) in the present study which is consistent with various studies irrespective of the technique of securing the base in laparoscopic appendectomy.[8,11-14,18] There was no mortality during this study. This is consistent with the majority of previous research studies carried on the same topic. The overall reported mortality of appendectomy is very low and was estimated in a review of a large administrative database at 0.05% for LA and 0.3% for open appendectomy, reinforcing the fact that appendectomy in the absence of peritonitis is a safe procedure, regardless of the technique performed.[21]

This study demonstrates that laparoscopic appendectomy, though technically demanding in few patients with complicated appendicitis, can be safely done even in a peripheral health set-up with acceptable morbidity rate. In conclusion, LA is safe and feasible in expert hands, and can be done using low cost, readily available basic laparoscopic instruments and suture materials at hospitals with limited facilities.

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