Research Article

Open appendicectomy stump: invaginate or not to invaginate?


1Assistant Professor of General Surgery, Smt NHL MMC, Ahmedabad, Gujarat, India
2Assistant Professor of General Surgery, GMERS Medical College, Sola, Ahmedabad, Gujarat, India
3Assistant Professor of Pediatrics, Government Medical College, Vadodara, Gujarat, India
4Assistant Professor of Pediatrics, Smt NHL MMC, Ahmedabad, Gujarat, India
5Intern Doctor, Smt NHL MMC, Ahmedabad, Gujarat, India
6Professor and Head of Unit, General Surgery, Smt NHL MMC, Ahmedabad, Gujarat, India

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*Correspondence:
Dr. Mukesh S. Suvera,
E-mail: drmukeshsuvera@gmail.com

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ABSTRACT

Acute appendicitis remains the most common abdominal surgical emergency. Appendicectomy is the standard treatment of acute appendicitis, which performed by open or laparoscopic approach. During open method, after removal of appendix, stump simple ligation or simple ligation and invagination. A prospective randomized study conducted at Smt SCL General Hospital, Smt NHLMC, Ahmedabad between October 2009 to September 2011 to evaluate the necessity of appendicular stump invagination during appendicectomy. A total 110 patients were studied and randomized into two group, Group I stump simple ligation, transfixation and invagination and Group II stump simple ligation and transfixation only. There was no statically significant difference in the rate of postoperative complication and post operative hospital stay between the two groups. The mean operating time was significantly shorter in group without invagination. The rate of postoperative paralytic ileus was more in group I. We conclude that simple ligation of the appendicular stump during appendicectomy is safe, simple and shortens operating time.

Keywords: Appendicitis, Ligation, Invagination, Alvarado (MANTRELS) score, Transfixation

INTRODUCTION

Acute appendicitis remains the most common abdominal surgical emergency in developed countries, most common in the second decade of life and affecting approximately 6-10% of the general population.1,2 By adulthood one in six people will have undergone removal of their appendix.3 It may occur at any age but is most common in person between 20 and 40 years of age.2 About 8% of people in Western countries have appendicitis at some time during their life, with a peak incidence between 10 and 30 years of age.4 Lifetime risk of appendicectomy 12% for men and 25% for women making it the most commonly performed operation in the world,4,6 with Approximately 7% of all people undergoing appendectomy for acute appendicitis.6 Appendicectomy remains the standard treatment of acute appendicitis, which is performed by both open and laparoscopic approaches.7 The length of the appendix varies from 2 to 20 cm, and the average length is 9 cm in adults.3 The pathophysiology of acute appendicitis has long been thought to be the result of luminal obstruction by a fecalith, hyperplastic lymphoid tissue, parasitic infestation, or tumor, with subsequent localized venous ischemia resulting in mucosal disruption followed by invasive bacterial infection; viral ulceration may also be
the cause of mucosal ulceration in certain patients.8 Infection limited to the appendix itself results in localized inflammation and simple, or suppurrative, appendicitis.8

A number of clinical and laboratory-based scoring systems have been devised to assist diagnosis. The most widely used is the Alvarado (MANTRELS) score.9 A score of 7 or more is strongly predictive of acute appendicitis.10 In patients with an equivocal score (5–6), abdominal ultrasound or contrast-enhanced CT examination further reduces the rate of negative appendicectomy.9 Abdominal ultrasound examination is more useful in children and thin adults, particularly if gynaecological pathology is suspected, with a diagnostic accuracy in excess of 90%.9

The technique of appendicectomy has been reported to vary from institute to institute, from unit to unit, from surgeon to surgeon, starting from skin incision to the simple ligation, transfixation and invagination of appendicular stump, and so on. After ligation and transfixation of the appendicular stump some surgeons invaginate the stump by purse-string stitch or doubly invaginate the stump, while others advocate simple ligation and transfixation only, no invagination of the appendicular stump. Many surgeons believe invagination of the appendicular stump is unnecessary.5

This prospective randomized study was conducted in our institute to evaluate, the necessity of the appendicular stump invagination during appendicectomy.

METHODS
The prospective randomized study was conducted at Smt SCL General Hospital, Smt NHL Municipal Medical College, Ahmedabad during October 2009 to September 2011. All patients who were diagnosed as acute appendicitis and underwent appendicectomy were eligible for the study. The diagnosis of acute appendicitis was made based on the Alvarado (MANTRELS) score and abdominal ultrasonography. Patients with perforated appendicitis, appendicular mass or abscess, incidental appendicectomy were excluded from the study. All patients who met the inclusion criteria were, after informed written consent, consecutively enrolled in the study.

In order to make a provisional diagnosis, a detailed history, thorough physical examination plus Blood investigation were carried out. Patients with features suggestive of acute appendicitis were scored using the Alvarado (MANTRELS) score. Those who scored 7-10 were considered as having acute appendicitis and those who scored 5-6 with abdominal ultrasonography show inflamed appendix considered as acute appendicitis.

All patients included in the study were randomized into two groups according to whether the appendicular stump was invaginated after ligation of the appendix or not. After confirmation of inclusion criteria the patients were then randomized into two groups using a balloting method; i.e., consecutive patients were asked to pick one of two sealed envelopes containing a folded paper on which one of the two methods was written. All patients were operated through a standard gridiron skin incision; the appendicular stump was ligated with silk 1-0 free tie and transfixed with silk 2-0 round body needle. In Group I after ligation and transfixation, invagination of stump done by purse-string suture with silk 2-0 on a round body needle applied 1-2 cm away from the base of appendix while in Group II only simple ligation and transfixation of appendicular stump. All operation carried out in by assistant professor, 3rd year resident doctors or under supervision, in case of it done by 1st year resident doctor. Operative time was recorded in each case. It was taken from the start of incision to the last skin suture. No any patients required to put drain in abdominal cavity. Abdomen was closed in layers with vicryl 1-0 and skin with ethilon 2-0.

Every patient was given only three doses of intravenous injection ceftriaxone and metronidazole, first dose being the preoperative one. Analgesic and antacid given intravenously on initially till sips orally started. Post operative fever, vomiting if any noted. Oral fluids were started after 12 to 24 hours, once patient passed flatus and bowel sounds were audible. Operative site was examined on 3rd and 7th post operative day for any sign of infection, which was recorded. Patients were followed up for at least six months to check for the development of any complications. Data collected and analysis done.

RESULTS
A total of 133 patients with acute appendicitis scoring 5-9 by the Alvarado (MANTRELS) score were eligible for the study. Out of these, 13 patients were excluded from the study. 8 patients because of loss to follow up, 2 patients because of perforated appendix, and 1 patient each because of refuse to consent for the study, appendicular abscess and mass respectively. Hence, 110 patients, 63(57.3%) females and 47 (42.7%) males (F: M= 1.3:1) aging between 17 and 43 years were enrolled and consented to participate in the study. The majority of patients were of a younger age in both groups with a modal age group in their second decade. The patients were randomly divided into two groups. Group-I comprised of 56 patients, simple ligation, transfixation and invagination of the appendicular stump by a purse-string method was done in these patients. Ligation and transfixation of the appendicular stump was done in the remaining 54 patients (Group-II). No randomized patients withdraw from the study. All 110 patients were included in the subsequent analysis. The two groups were similar with respect to age, sex, degree of appendiceal inflammation, anatomical location of appendix and antibiotic treatment. Table 1 shows patients characteristics in various ways.
Table 1: Patients characteristics.

<table>
<thead>
<tr>
<th>Patients Characteristics</th>
<th>Group I</th>
<th>Group II</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age in years</td>
<td>28.36±5.5</td>
<td>27.11±4.9</td>
<td>0.213</td>
</tr>
<tr>
<td>Gender (M/F ratio)</td>
<td>Males 23</td>
<td>24</td>
<td>0.847</td>
</tr>
<tr>
<td></td>
<td>Females 33</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Mean duration of illness (days)</td>
<td>3.77±1.6</td>
<td>3.65±1.3</td>
<td>0.663</td>
</tr>
<tr>
<td>Mean operating Time (Minutes)</td>
<td>46.36±5.2</td>
<td>37.26±5.4</td>
<td>0.000</td>
</tr>
<tr>
<td>Mean Length of stay (days)</td>
<td>3.67±0.9</td>
<td>3.31±0.7</td>
<td>0.029</td>
</tr>
</tbody>
</table>

Study shows mean operating time in minute was less in Group-II compare to Group-I. Mean length of Hospital stay also less in Group II patients.

Table 2: Post-operative complications.

<table>
<thead>
<tr>
<th>Post-operative complications</th>
<th>Group I</th>
<th>Group II</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wound Infections</td>
<td>3</td>
<td>2</td>
<td>0.677</td>
</tr>
<tr>
<td>Fever</td>
<td>4</td>
<td>3</td>
<td>0.733</td>
</tr>
<tr>
<td>Vomiting</td>
<td>2</td>
<td>1</td>
<td>0.580</td>
</tr>
<tr>
<td>Paralytic Ileus in Hours</td>
<td>24-48</td>
<td>6</td>
<td>0.092</td>
</tr>
<tr>
<td></td>
<td>48-72</td>
<td>1</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td>&gt;72</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>Peritonitis</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>Residual Abdominal Abscess</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>Intestinal Obstructions</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>Other Complications</td>
<td>Nil</td>
<td>Nil</td>
<td></td>
</tr>
</tbody>
</table>

Postoperative wound infection was noticed in 3(2.7%) patients in Group-I and 2(1.8%) in Group-II. The difference between the two groups was not statistically significant. (P > 0.05).

DISCUSSION

Invagination of appendicular stump during appendicectomy has traditionally been practiced by many surgeons in many centres despite lack of evidence from randomized clinical trials to justify its benefit.10,14

The reasons given for this invagination of appendicular stump are safety against slipping of ligature from the stump or blow out of appendicular stump, less chances of peritonitis from spillage of pathogens from remaining the stump, less incidence of post operative wound infection, better healing of gut by formation of granulation tissue and collagen from the serosal layer of caecum,1 on the other hand, who do simple ligation only found it simpler, less time consuming and leaving intact the anatomy of caecal wall,11 with no difference in the incidence of postoperative wound infection or paralytic ileus. However, there are reports of more residual abscesses over the wall of caecum due to invagination of stump, besides the deformation (filling defect) may lead to the suspicion of a neoplasm.10,12 Simple ligation of appendicular stump has been reported to obviate these misinterpretations.1 In agreement with other randomized clinical studies10-15 our study showed no advantages of invagination of the appendix stump over simple ligation.

The present study showed no statistically significant differences in the rate of postoperative complications and postoperative hospital stay between the two groups which is in consistent with other trials.10,14 In this study, the mean operating time was significantly shorter in the group without invagination, a finding consistent with that reported by others.10,13,16 Like in other studies11,12 no case of postoperative peritonitis, residual abscess and intestinal obstruction due to adhesions was noticed in both groups during the postoperative period and follow up.

CONCLUSION

The study has shown that simple ligation with transfixation of the appendicular stump is safe, simple, shortens the operating time. It produces no deformation of the caecal wall, as in invagination it may be mistaken for a caecal mass or it may act as a lead point for ileocecal intussusception. Simple ligation with transfixation of appendicular stump is therefore recommended as standard procedure in open appendicectomy.

REFERENCES


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