

Research Article

A comparative study of simple ligation and simple ligation with invagination of appendicular stump

Syed Rizwanuddin Qazi*, Anil Vishwasrao Darokar, Varsha Nitin Bijwe, Rajiv Mangalmurti Mulmule, Kishor Krishnarao Bele

Department of Surgery, Dr Panjabrao Deshmukh Hospital, Amravati, India

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*Correspondence:

Dr. Syed Rizwanuddin Qazi,
E-mail: dr.rizwanqazi_94@hotmail.com

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ABSTRACT

Background: Acute appendicitis is the most common abdominal emergency. During open appendicectomy the best treatment of the appendicular stump has not been defined. This is a randomized control trial of simple ligation and simple ligation with invagination of appendicular stump.

Methods: The diagnosis of acute appendicitis was based on the MASS (Modified Alvarado Score System). ECG and X-Ray chest were done when needed. All the patients were operated under spinal anesthesia.

Results: Total 313 patients were operated and randomly divided into two groups, in group A appendicular stump was treated with simple ligation (n=166) and group B underwent ligation and invagination (n=147). Post-operative complications like pyrexia, vomiting, serous discharge, wound infection, peritonitis, residual abscess and post-operative pain in right iliac fossa are comparable in both the groups. Mean operating time in group A was shorter but statistically insignificant. The incidence of paralytic ileus was 3 (1.81%) and 8 (5.44%) patients in group A and group B respectively and was statistically significant.

Conclusions: During open appendicectomy simple ligation of appendicular stump is recommended as it is safe, simple and having shorter operative time.

Keywords: Acute appendicitis, Appendicectomy, Appendicular stump, Simple ligation, Invagination

INTRODUCTION

Acute appendicitis remains the most common abdominal surgical emergency affecting approximately 6-10% of general population.¹ It may occur at any age but is most common in persons between 20 and 40 years of age.^{1,2}

Since the first description of the appendectomies appendicular stump was treated differently. A simple ligation was the preferred method of treatment in the first operations until question arise about its effectiveness.³ Some authors stressed the risks of infection, loosening of

the ligature, source of contamination in peritoneal cavity and greater risk of adhesion formation around the unburied stump suggesting that the stump should be covered or buried by suture.³

The first studies comparing the techniques of simple ligation and ligation and burial were retrospective and showed superiority of simple ligation.⁴⁻⁶ The randomized and controlled prospective studies on the subject show equivalence between the two techniques⁷⁻¹⁰ or superiority of simple ligation with shorter duration of operation⁹ or lower incidence of wound infection.¹¹

Despite lack of evidence in many randomized clinical trials to justify the routine invagination of appendicular stump during appendicectomy, many surgeons in many centres, including ours still advocate this technique of invagination of appendicular stump.

This study was carried out to compare the rational and usefulness of invagination or non-invagination of appendicular stump after appendicectomy.

METHODS

Between the period during 1st January 2013 to 31st July 2015 with a diagnosis of appendicitis 313 patients were operated. Ethical committee approval was taken for the studies. Study design was observational descriptive study. Patient were divided into two groups.

Operation performed on odd days of the week (Monday, Wednesday, Friday, Sunday) were put in group A in which simple ligation of the appendicular stump was done while operation performed on even days of the week (Tuesday, Thursday, Saturday) were put in group B in which simple ligation with burial of stump was performed.

The inclusion criteria of the patient was diagnosis of acute appendicitis by MASS (5-9), patient's acceptance for the study, patient fit for spinal anesthesia and histopathological confirmation of diagnosis. The exclusion criteria were appendicular perforation, appendicular abscess, appendicular mass, coecal oedema, incidental appendicectomy associated with other abdominal pathologies and interval appendicectomy.

The diagnosis of acute appendicitis was based on the MASS (Modified Alvarado Score System).

ECG and X-Ray chest were done when needed.

All the patients were operated under spinal anesthesia.

In surgical procedure in group A after opening the peritoneal cavity by Mc Burney's incision the appendicular stump was simply ligated with 2-0 vicryl, while in group B - after simple ligation the appendicular stump was invaginated by seromuscular purse string suture with 2-0 vicryl on atraumatic needle 1cm around the base of appendix.

Every patient was given 3 doses of antibiotics in the form of injection ceftriaxone IV and injection amikacin IV depending on the weight of the patient. First dose was given pre-operative after confirmation of diagnosis, second dose intraoperative and third dose was given 12 hours post-operative. Injection aqueous diclofenac was given as an when required for pain relief post-operative.

Oral fluids were started once the patient passed flatus and/ or bowel sounds became audible.

Check dressing was done after 48 hours.

Stitches were removed on 7th post-operative day.

Patients were followed 15 days, 1 month, 3 months, 6 months and 1 year after discharge.

RESULTS

351 patients with a diagnosis of appendicitis (MASS score 5-9) were operated in this study. 38 patients were excluded from the study. Out of these 17 patients had caecal oedema, 5 patients had perforation and 16 patients lost the follow up. Total 313 patients were included in the study. Of which 123 were operated in emergency where as 190 patients were operated on elective basis. Age ranged from 14 years to 75 years. Mean age of patients in group A was 29.36 years and in group B was 28.64 years.

Table 1: Statistics of patients.

| | Group A | Group B |
|--------------------------|--------------|--------------|
| Total | 166 | 147 |
| Male | 87 (52.41%) | 79 (53.74%) |
| Female | 79 (47.59%) | 68 (46.26%) |
| Mean age | 29.36 years | 28.64 years |
| Mean duration of illness | 2.8 days | 2.7 days |
| Mean operating time | 39.6 minutes | 43.8 minutes |
| Mean hospital stay | 8.3 days | 8.6 days |

Table 2: Clinical manifestation.

| Clinical manifestation | Group A (166) | Group B (147) |
|------------------------|---------------|---------------|
| Vomiting | 48 (28.91%) | 37 (25.17%) |
| Anorexia / Nausea | 102 (61.44%) | 98 (66.67%) |
| Fever | 17 (10.24%) | 12 (8.16%) |
| Pain in RIF | 166 (100%) | 147 (100%) |
| Blumberg sign | 31 (18.67%) | 26 (17.69%) |

48 (28.91%) patients of group A and 37 (25.17%) patients of group B presented with vomiting. Fever as a symptom in 17 (10.24%) and 12 (8.16%) patients of group A and group B respectively. Pain in right iliac fossa was the presentation in all patients in both groups followed by anorexia/ nausea in 102 (61.44%) patients of group A and 98 (66.67%) patients of group B.

Table 3: Patients presentation in the hospital after occurrence of symptoms.

| Time | Group A (166) | Group B (147) |
|---------------|---------------|---------------|
| 1 – 12 hours | 07 (4.22%) | 08 (5.44%) |
| 13 – 24 hours | 12 (7.23%) | 12 (8.16%) |
| 25 – 36 hours | 31 (18.67%) | 29 (19.73%) |
| 37 – 48 hours | 42 (25.30%) | 35 (23.81%) |
| >48 hours | 74 (44.58%) | 63 (42.86%) |

Table 4: Duration of surgery.

| Time | Group A (166) | Group B (147) | P value |
|------------------------|------------------|------------------|---------------|
| Minimum | 24 minutes | 26 minutes | |
| Maximum | 78 minutes | 74 minutes | |
| Mean operating time | 39.6 minutes | 43.8 minutes | 0.684 (NS) |

Mean operating time in group A (39.6 minutes) was lesser than group B (43.8 minutes) but found to be statistically not significant.

Table 5: Post-operative complications.

| | Group A (166 patients) | Group B (147 patients) | P value |
|---|------------------------------|------------------------------|--------------------------|
| Pyrexia | 7 (4.22%) | 8 (5.44%) | 0.6125 (NS) |
| Vomiting | 9 (5.42%) | 11 (7.48%) | 0.456 (NS) |
| Paralytic ileus | | | |
| 24-48 hrs | 3 (1.81%) | 8 (5.44%) | 0.03 (S) |
| 48-72 hrs | 1 (0.60%) | 3 (2.04%) | |
| >72 hrs | 0 (0.00%) | 0 (0.00%) | |
| Peritonitis | 0 (0.00%) | 0 (0.00%) | - |
| Wound infection | 6 (3.61%) | 8 (5.44%) | 0.435 (NS) |
| Serous discharge | 7 (4.22%) | 6 (4.08%) | 0.9525 (NS) |
| Residual abscess | 0 (0.00%) | 0 (0.00%) | - |
| Intestinal obstruction due to adhesion | 0 (0.00%) | 0 (0.00%) | - |
| Pain in Right iliac fossa | 4 (2.41%) | 4 (2.72%) | 0.4241(NS) 0000000000 |

The incidence of post-operative pyrexia 7 (4.22%) and 8 (5.44%), wound infection 6 (3.61%) and 8 (5.44%), serous discharge 7 (4.22%) and 6 (4.08%) patients of group A and B respectively.

DISCUSSION

Total 351 patients were operated during study period of which 17 (4.84%) had caecal oedema, 5 patients had perforation and 16 patients lost the follow up. These patients were excluded from the study. 313 patients were included in the study of which 166 and 147 patients were in group A and group B respectively. In group A simple ligation was done and in group B simple ligation with burial of appendicular stump was done.

Neves LJ observed the involvement of the caecum by inflammation of appendicitis in 2.8% of cases. In literature, the involvement of the caecum is a common

condition and can occur in upto 4.8% of cases of acute appendicitis.¹²

74 (44.58%) and 63 (42.86%) patients of group A and group B presented to the hospital after 48 hours of initial symptoms. In our hospital, patients mainly come from surrounding rural areas. Most of the patients received treatment from private practitioners and then were referred to this hospital.

In present study mean operating time in group A was 39.6 minutes and in group B 43.8 minutes. The mean operative time was 4.2 minutes less in group A as compared to group B. However it was not statistically significant.

Neves LJ et al showed the operative time was on average 5.5 minutes greater in cases in which it was ligated and invaginated compared to simple ligation.¹²

Chalya PL et al also showed mean operating time was significantly shorter in the group without invagination, a finding consistent with that reported by others.¹³⁻¹⁶

Singh G et al showed the mean operating time was significantly less in the group without invagination.¹⁷

In present study post operative vomiting was present in 9 (5.42%) and 11 (7.48%) patients of group A and group B respectively.

Minhas Q et al observed 10% patients in stump ligation group had postoperative nausea and vomiting where as 26.67% in stump ligation with invagination group had similar symptoms.¹⁸

Singh G et al showed post operative nausea and vomiting in 3.92% and 2% cases respectively.¹⁷

In present study the incidence of wound infection was 6 (3.61%) and 8 (5.44%), serous discharge 7 (4.22%) and 6 (4.08%) patients of group A and group B respectively. It was not statistically significant.

Neves LJ et al observed the most common complication was wound infection, present in 9.7% of cases.¹² The infection rate in similar studies ranged between 3.0% and 18.4%.^{9,10} High rate¹⁰ is justified by the fact that it was not used prophylactic antibiotics.

There is no significant difference in the incidence of wound infection between the two groups, supporting other recent research.⁶⁻¹⁰

In present study paralytic ileus was present postoperatively at 24 to 48 hours in 3 (1.81%) and 8 (5.44%) patients, ileus at 48 to 72 hours in 1 (0.60%) and 3 (2.04%) patients of group A and group B respectively. It was statistically significant in study of 102 patients Singh G et al, showed no significant difference in post

operative paralytic ileus and wound infection.¹⁷ In a study of 60 patients by Minhas Q et al, incidence of superficial surgical site infection in simple ligation 6.7% and simple ligation and invagination of stump 13.3%. Paralytic ileus was 0% and 1% respectively.¹⁸

In present study the incidence of peritonitis, Residual abscess and intestinal obstruction due to adhesion was 0% in both the groups.¹⁷

Neves LJ et al observed the incidence of intra abdominal abscess was 0% and 1.56% in simple ligation and burial group respectively but statistically insignificant.¹² The current literature shows that there is no difference in the incidence of intracavitary abscesses after simple ligation or ligation and burial of stump.⁷⁻⁹

Like in other studies no case of post operative peritonitis, residual abscess and intestinal obstruction due to adhesions was noticed in both groups during the postoperative period and follow up.^{13,17-20}

There are reports of residual abscess on the wall of caecum due to burial of stump beside deformation (filling defect). It may lead to the suspicion of caecal neoplasm and unnecessary investigations.

Present study showed persistent pain in right iliac fossa after appendectomy in 4 (2.41%) and 4 (2.72%) patients in group A and group B respectively.

Singh G also reported persistent dull aching pain over the operated site in both the groups in the follow up.¹⁷

So in our study no statistically significant differences in the rate of postoperative complications and postoperative hospital stay between the two groups was observed which is in consistent with other trials.^{15,21,22}

CONCLUSION

The present study showed that the technique of simple ligation of the appendicular stump is safe, simple with shorter operating time and having minimal post operative complications. It produces no deformation of the caecal wall that subsequently may be mistaken for a caecal neoplasm. Simple ligation is therefore recommended as standard procedure in appendectomy.

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