

Comparison of the methods of intracorporeal knot and hem-o-lok clip to cover the stumps in laparoscopic appendectomy

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Abstract

Aim: Laparoscopic appendectomy (LA) is used in acute appendicitis treatment in many centers today. Various methods such as intracorporeal knot, endoloop, stapler and hem-o-lok clip are used to close of the appendix stump during LA. All of these methods has several advantages and disadvantages. In this study, we aimed to compare the effect of the intracorporeal knot method with hem-o-lok clip method to close of the appendix stump in LA.

Material and Methods: Operative data, complications and follow-up results of 143 patients which treated with LA between January 2012 and December 2017 were evaluated retrospectively.

Results: Sixty-four patients (44.7%) were males and 79 (55.2%) were females. Seventy-five patients (52.4%) were treated with 2/0 polyglactin (coated vicryl, ethicon) sutures and 68 patients (47%) were treated with hem-o-lok clip XL (weck hem-o-lok polymer ligation system) for intracorporeal knot to close of the appendix stump. Patients were compared according to the duration of operation, the duration of hospitalization and postoperative complications and there were no statistically significant difference between the data of the cases according to the groups ($p = 0.197$, $p = 0.902$, $p = 0.503$, respectively).

Conclusion: We identified that both techniques for appendix stump closure are effective and safe methods in LA.

Keywords: Acute Appendicitis; Appendix Stump; Laparoscopic Appendectomy.

INTRODUCTION

Acute appendicitis is the most common cause of acute operations with diagnosis of acute abdomen. Open appendectomy is a procedure that has been used in the surgical treatment of acute appendicitis for many years. In recent years, however, laparoscopy has begun to be widely used by surgeons, and laparoscopic appendectomy (LA) has begun to replace the open appendectomy (1). Acute appendicitis was first described by McBurney in 1894, and the operation procedure has been used widely since then (2). In the early 1980s with the widespread use of laparoscopy, LA was described by Semm in 1983. Because of the advantages such as less postoperative pain, rapid healing, shorter hospital stay, better visualization of the lower quadrants of the abdomen, it has become a more widely used method (1,3).

Closure of the stump of appendix in LA is crucial to

prevent serious complications that may develop after the operation in LA, methods such as stapler, endoloop, titanium clip, non-absorptive polymer clip (hem-o-lok clip), handmade lasso, intracorporeal knot and ligasure use have been defined to close the stump of appendix (4,5). The ideal method should be safe, easy to implement and cheap.

For these reasons, we compared the intracorporeal knot with hem-o-lok clip techniques, both of which we regard safe and easy-to-apply, in the closure of stump of appendix.

MATERIAL and METHODS

LA cases operated with acute appendicitis diagnosis in our clinic from January 2012 to December 2017 were retrospectively reviewed. In our study, in 143 patients, 2/0 polyglactin (coated vicryl, ethicon) or Hem-o-lok clip XL (weck hem-o-lok polymer ligation system) technique

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was used as a suture for the intracorporeal knot. The operation time, hospitalization time and postoperative complications of these patients were evaluated.

Complete blood count and routine biochemical results of all patients were evaluated after anamnesis and physical examination. Abdominal ultrasonography and abdominopelvic computed tomography imaging were performed in suspicious cases. Patients were operated with the diagnosis of acute appendicitis.

Under general anesthesia, all patients were injected carbon dioxide under the umbilicus with Veress needle and pneumoperitoneum was formed. A total of 3 trocars with sizes of 10 mm from below the umbilicus for the camera, 10 mm from the left lower quadrant for dissection and 5 mm from the suprapubic area, were inserted for the operation. After trocar insertion, the patient was given Trendelenburg and left lateral position. After exposing the ileocecal region, the appendiceal mesothelium was suspended with the aid of an endoscopic retainer and appendiceal mesenteric dissection was applied to the appendicular veins. A bipolar electrothermal vascular closure device was used at the dissection of the appendix near the root. After the appendiceal vessels were separated, the appendiceal stump was ligated intracorporeal knot or hem-o-lok clips, and cut. In intracorporeal knot technique we ligated the suture on the root of appendix using 2/0 vicryl suture intra-abdominally. The appendix was taken out through 10 mm trocar after it was put into an endobag or sterile glove. Drain was not used except the cases of peri-appendicular abscess, purulent peritonitis and fecal peritonitis. A diet regime was initiated on the first day postoperatively without complication. Patients, whose vital signs were stable during the follow-up at the ward, were discharged with suggestions.

RESULTS

A total of 143 patients who underwent LA between 2012 and 2017, 64 (44.7%) males and 79 (55.2%) females, were included in the study. Of these 143 patients, 68 (47.5%) were applied hem-o-lok clip and 75 (52.4%) were applied intracorporeal knot closure with 2-0 vicryl. While the mean age of the patients was 37.5 ± 13.2 , it was 39.7 ± 12.7 in the hem-o-lok clip group (HCG) and 35.5 ± 13.49 in the intracorporeal knot group (ING), ($p = 0.053$). The duration of the operation was 40.24 ± 7.3 minute in the ING and 41.95 ± 8.5 minute in the HCG ($p = 0.197$). The duration of hospitalization was 2.04 ± 0.4 in the HCG and 2.05 ± 0.5 in the ING ($p = 0.902$). In the ING, trocar site abscesses occurred in 1 patient, trocar site hematomas developed in 1 patient, and trocar site abscess was detected in only 1 patient in the HCG ($p = 0.503$). Two patients with trocar abdominal abscess underwent drainage and antibiotherapy was started. The trocar site hematoma developed in one patient was resorbed spontaneously. There was no statistically significant difference between the data of the cases according to the groups ($p > 0.05$), (Table 1).

Table 1. Characteristics of patients according to operation type

Groups	Hem-o-lok clip	Intracorporeal knot	p value
Sex (Male/Female)	35(%51.4) / 33(%48.5)	29(%38.6) / 46(%61.3)	
Age (year)	39.7±12.7	35.5±13.49	0.053
Duration of operation (minute)	41.95± 8.5	40.24±7.3	0.197
Duration of hospitalization (day)	2.04± 0.4	2.05±0.5	0.902
Postoperative complications	1	2	0.503

DISCUSSION

Acute appendicitis is the most frequent cause of surgical acute abdomen applied to the emergency rooms with abdominal pain and the incidence is 3-50% (6,7). LA has been a good alternative for open appendectomy, which is the gold standard since the first appendectomy in the late 19th century, as it has relatively less pain, better cosmetic results and fewer hospitalizations during the post-operative period since the 1990s (8,9). One of the most important parts of the operation of appendectomy is the closure of appendix stump. Closure of the appendix stump is important to avoid serious complications such as fistula, peritonitis and sepsis that can develop after the operation (10). The ideal method to close the appendix stump should be safe, accessible, technically easy and cost-effective. This led surgeons to seek different approaches in LA. In LA, the intracorporeal knot may be technically difficult or not completely reliable. For this reason, methods such as stapler, endoloop, titanium clip, non-absorptive polymer clip, hand-made lasso, intracorporeal knot or ligasure use have been defined in order to close the appendiceal stump with LA (4,5). In this study, clinical and experimental studies on intracorporeal knot and hem-o-lok clip methods which are used to close the appendix stump during LA were investigated and the superiority of these methods to each other was evaluated.

Closure of the appendiceal stump with suture in LA can be done in a similar way to open surgery. Intracorporeal knot requires more experience than other methods. Studies have shown that this method is safe (11-13). Despite the fact that it is a cheap method to close appendiceal stump by using intracorporeal knot, it has been reported that operation time may be extended until sufficient experience is obtained (11,13).

Another method of closing the appendiceal stump during LA was 'closure with clips' which is used in 1991 by Cristalli (14). Titanium or non-absorbable polymer (hem-o-lok) clips are frequently used nowadays. The most important feature of using clips is that it is easy to implement. Thus, the operation time can be shorter. It has been shown in the studies that it is as safe as other methods (15,16). However, in our study, there was no significant difference

between the intracorporeal knot and hem-o-lok clip technique when compared with the duration of operation. We thought that this is the result of surgical experience. Furthermore, it has been suggested that non-absorbable polymer (hem-o-lock clip) clamps should be preferred to metallic clamps because of a better grip on the tissue and less risk of slipping (17). In an experimental study on rats, the effects of endoloop, stapler and polymer clip application on foreign body reaction and inflammation were investigated and polymer clips were shown to be superior to other methods (18). However, in some studies, it has been reported that the use of clips reduces the reliability in cases where the appendix base diameter is large and there is an intense inflammation (17,19). In our study, there was no difference regarding reliability between the intracorporeal knot and the use of the hem-o-lok clip.

When literature data are evaluated, it is seen that there is no difference in terms of complication and reliability between both methods. However, the choice of which method to use will depend on the training, experience and hospital facilities of the surgeon.

There are limitations that our work brings with it because it is a retrospective study. Since the patients had no follow-up after discharge, we did not have any data about possible complications after discharge. Also, in our study, no comparison was made in terms of cost. According to literature data, intracorporeal knot technique is safe and cost-effective and hem-o-lok clip technique is safe and relatively cheap (20-22).

CONCLUSIONS

LA is not the gold standard yet. However, due to its advantages it has begun to be preferred over conventional surgery. The goal in stump closure technique during LA is to be safe, fast, easy to implement and low cost. In this study, no difference was found between two stump closure techniques in terms of length of stay, duration of operation, and complications. Both techniques for stump closure in LA are effective and safe methods.

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