The handmade endoloop technique

A simple and cheap technique for laparoscopic appendectomy

Fahrettin Yildiz, MD, Alpaslan Terzi, MD, Sacid Coban, MD, Nazif Zeybek, MD, Ali Uzunkoy, MD.

ABSTRACT

المقارنة بين أساليب استئصال الزائدة الدودية بالمنظار

الأهداف: نقدم هنا وصفًا لأسلوب جراحي معدل، وهو أسهل وأقل تكلفة من أساليب استئصال الزائدة الدودية بالمنظار. تتم هذه العملية بال-ENDOLOOPS الأصليين الصناعيين، حيث يتم في كل حالة، يتم إجراء زرقاء متعددة على وصلة الزائدة الدودية، بما يتيح إغلاق وصلة الزائدة الدودية بالمنظار. أجريت هذه الدراسة، والتي يتوقع أن تحقق نجاحاً جيداً، في هيئة جراحية عمومية في كلية طب حرا، تركيا، وفادلاً بعدة 2006، وحتى فبراير 2008. وقد قدرنا مدى سلامة هذا النوع من الجراحة ومدى فاعليته في حالة خطرة من حالات الإصابة بالزائدة الدودية، والتي كانت على النحو التالي: 57 من المرضى في العقدة الداخلية المصنوعة يدوياً و41 مريضاً بناءً على العقدة الداخلية التطبيقية على مدى 19 شهراً الماضية. وقد تم قياس كل من: زمن الجراحة، المضاعفات المحتملة ونتائج المريض، وال önüne للدواء. والسكر. والمطهرات المضافة. وقد تم التحكم في صورة العدد المستقل لكل حالة، في ذلك بعد ذلك مقايرتها، ونلاحظ بعض تجليبيات المبتكرات. التي تم الحصول عليها استخدام اختبارات جيدة مناسبة.

النتائج: يبلغ متوسط التكلفة التي يتحملها المريض من علاج زراعة الزائدة الدودية بالمنظار 81 دولارًا أمريكيًا بالنسبة لاستئصال الزائدة الدودية بالمنظار، في حين لم تتجاوز التكلفة حدود 8 دولارات أمريكيًا عند استخدام الأسلوب الجراحي الذي تم وصفه في هذا المقال. وبشكل عام، لم تظهر فروق ذات دلالة إحصائية عند مقارنة المجموعتين فيما يتعلق ببعض المضاعفات، بعدما تم استخدام التحضير، ونسبة العمليات، وكذلك الحالة الفيرونيك. حيث يتضمن هذا الإجراء الجراحي بكونه بسيطًا وآمنًا، إضافًاً إلى كونه منخفض التكلفة.

الخاتمة: يتمكن هذا الإجراء الجراحي بكونه بسيطًا وآمنًا، إضافًاً إلى كونه منخفض التكلفة.

Objectives: To compare 2 laparoscopic appendectomy techniques.

Methods: We describe a modified technique, the handmade endoloop technique, for closing the base of the appendix. This prospective study was carried out at Harran University Medical Faculty, Sanliurfa, and Gulhane Military Medical Academy, Ankara, Turkey from September 2006 to February 2008. We evaluated the safety and efficacy of the procedure in 98 acute appendicitis cases: 57 patients handmade endoloop patients, and 41 endoloop technique patients. Operative time, postoperative complications, need for analgesics, and procedure cost were measured for both groups. The endoloops and sutures used to manage appendectomy were listed at current prices, summarized as number consumed per case, and compared. Data were analyzed by appropriate test.

Results: The average price of material used for closing the base of appendix was 81 American Dollars (USD) for laparoscopic appendectomy with endoloop, and 8 USD for the technique described by this article. Overall, postoperative complications, operative time, and the need for analgesics did not show a statistical difference in comparing both groups.

Conclusion: This procedure is simple, safe, and cheap.


From the Department of General Surgery (Yildiz, Terzi, Uzunkoy), Harran University Medical Faculty, Sanliurfa, and the Department of General Surgery (Coban), Gaziantep University Medical Faculty, Gaziantep, and the Department of General Surgery (Zeybek), Gulhane Military Medical Faculty, Ankara, Turkey.

Received 28th October 2008. Accepted 5th January 2009.

Address correspondence and reprint request to: Dr. Fahrettin Yildiz, Department of General Surgery, Harran University Medical Faculty, Sanliurfa 63500, Turkey. E-mail: fahrettinyildiz@outlook.com
Laparoscopic appendectomy is preferred by many surgeons due to numerous documented advantages of this approach. Studies have shown advantages of laparoscopic appendectomy to include precise operative diagnosis, lower morbidity, decreased intra-abdominal scarring, shortened length of stay, and fewer intraoperative and postoperative complications. However, increased cost often is cited against the general use of laparoscopic appendectomy. The most important reason that contributes largely to the elevated cost of laparoscopic appendectomy is the disposable equipment used during the procedure. The use of the endoloop or endostapler, as disposable equipment, in laparoscopic appendectomy for closing the base of appendix is more common. To diminish the cost of laparoscopic appendectomy, several methods have been essayed, such as the one- or 2-trocar techniques, instrument-assisted knotting, and closure of the stump by clip applier rather than endoloop suture or endostaplers. The objectives of the present study were to establish the feasibility of the closure of the appendiceal stump during laparoscopic appendectomy. We carried out the following prospective study, because we believe that using the handmade loop knot, which has been used in many open procedures, is a safe method for closure of the appendiceal stump during laparoscopic appendectomy.

Methods. This prospective study was carried out at Harran University Medical Faculty, Sanliurfa and Gulhane Military Medical Academy, Ankara, Turkey from September 2006 to February 2008; and 98 consecutive laparoscopic appendectomies were performed. We consulted with the Chair of the local Research Ethics Committee of Harran University Medical Faculty on the procedures. The patients were verbally informed about the details, risks, and benefits of the technique, and consents were obtained under the supervision of Bioethics consultant in some cases. The choice of the approach was made by the operating surgeon with the approval of the patients. Patients in the study included one group of 57 patients (group I) who underwent laparoscopic appendectomy with a handmade endoloop technique for closing the base of the appendix. A second group included 41 patients (group II) who underwent laparoscopic appendectomy technique by using endoloop. All of the patients received the same preoperative antibiotics according to the institutional protocol. In both techniques, access to the peritoneum was carried out and the peritoneum was opened in direct vision, than the 10-mm, reusable first trocar was placed in the subumbilical position. Two reusable 5-mm ports were placed in the left iliac fossa position and median suprapubic position. After the initial laparoscopic evaluation of the abdominal cavity, the appendicular mesentery was dissected meticulously by unipolar forceps. Ligation of the appendicular base was carried out using 3 endoloops (Ethicon Endosurgery, Cincinnati, Ohio, USA), placing 2 of them in the proximal portion of the appendicular base and one a few millimeters distally, in the endoloop group. In the other group, we formed a loop using no. 2.0 Vicryl as shown in Figure 1, and by pulling one end of the loop, the knot has slid down the base of the appendix. To form the loop, firstly, we made one short limb and one long limb. We formed a loop with the long limb and wrapped the limb 4 times around both limbs by passing posteriorly and then anteriorly. Then we passed the terminal end of the long limb inside the loop that we had formed beforehand. Finally, we tightened the loop. As no literature reports on the safety and the efficacy of the handmade endoloop, we examined the efficacy and safety of the handmade endoloop on the rubber material of several consistencies over 500 times and witnessed no slippage. While using the knot, it was easy to seat it correctly and slide. Once the knot is in place and tightened well, it does not unravel. This is inserted into the abdominal cavity, and the loop is moved over to the base of appendix, which was ligated by 3 manually made loops, placing 2 of them in the proximal portion of the appendicular base, and one a few millimeters distally. Then, in both groups, appendectomy was performed by cutting the appendix between the 2 proximal knots and the distal knot, using endoscopic scissors and retrieved through the umbilical

Figure 1 - When the suture is pulled from A, it slides down and ligates the base of the appendix. (I - photographic image of the “prepared-knot”, and II - graphical image of the preparation of the knot).
Results. During the 19 months period, 98 patients who underwent laparoscopic appendectomy for appendicitis were studied. Table 1 shows the demographic details and outcomes of both groups. Two patients in group I had a conversion to an open procedure; one for failure to progress, and one gangrenous base of appendix. Five of the specimens (13.5%) were normal on histological examination. The recorded complications included 2 patients who had perforated appendicitis with peritonitis. The young female required laparoscopic drainage of interloop abscesses. This patient required prolonged hospitalization for 4 days, until afebrile status was achieved. The other patient had a wound infection at the umbilical trocar site, requiring a wound exploration for an organized abscess and was discharged after 72 hours of hospitalization and treated on an outpatient basis. In group II, 3 patients required conversion from laparoscopic to open, 2 due to dense adhesions secondary to prior operation, and one due to gangrenous base of appendix. Three of the specimens (7.3%) were normal on histological examination. One patient in group II developed an intraabdominal abscess, and percutaneous drainage of abscesses was achieved. The other recorded complications included 2 patients with superficial wound infections treated on an outpatient basis. There were no cases of stump blowout or cecal fistulae in either group. Laparoscopic appendectomy using endoloop incurred significantly more intraoperative equipment charge than group I. In all cases of group II, 3 endoloops were applied on the appendiceal stump at a cost of 81 USD (27 USD x 3). In laparoscopic appendectomies with handmade endoloop procedures, only a single package of Vicryl ligatures-2.0 was enough to form the 3 loops, at a cost of 8 USD.

Discussion. It is reported that laparoscopic appendectomy has advantages such as accurate preoperative diagnosis, less wound infection, less need for postoperative analgesia, earlier discharge, earlier return to normal activities, and better cosmetic effect. However, laparoscopic operative procedures are still more expensive than open surgery, and this is one of the main drawbacks. The cost of laparoscopic appendectomy is based on the disposable equipment, such as endostaplers, endoloops, and trocars. In our study, we used 3 endoloops for closing the base of the appendix in group II at a cost of 81 USD. In group I, only a single package of Vicryl ligatures-2.0 was enough for closing the base of the appendix by 3 loops, at a cost of 8 USD. The cost was a significant difference between the groups. In some studies, it is concluded that one endoloop was as safe as using 2 or more if the appendix is inflamed minimally. Nevertheless, in most studies, 2 endoloops were placed at the base of the appendix, and another endoloop, clips, or ligature is used to ligate the appendix distal to the endoloops before dividing the appendix. In our study, we also preferred placing 2 ligatures in the proximal portion of the appendicular base, and one a few millimeters distally. The operating room time was similar between both groups, due to the similarity of the techniques. Moreover, the time spent for tying the loop was approximately 5 seconds. In addition, there were no significant differences in length of hospital stay and complication rates in both groups. As reported for endoloops in the literature, we also noticed no slippage in both groups during the intraoperative and postoperative periods, which could lead to complications, after precisely ligating the base of appendix in all cases. The technique provided satisfactory results. The absence of any stump blowout or fistula, or any communication between the stump and an abscess in either group was in favor of their comparability in securing the stump. The small number of the study population forms the main limitation of this study. The lack of control cases operated on with open appendectomy may also be regarded as a limitation; however, significant cost advantage makes the handmade endoloop the preferred operative method.

In conclusion, laparoscopic appendectomy by closing the base of appendix using the handmade endoloop technique may be a more cost-effective technique,
potentially offsetting the cost difference between laparoscopic appendectomy and open appendectomy without any impact on surgical outcomes.

**Acknowledgment.** We are grateful for the Ethical Consultation of Dr. Sahin Aksoy, Faculty of Medicine, Department of Medical Ethics and History of Medicine, Harran University, Sanliurfa, Turkey.

**References**


**Related topics**