

A New Knot Pusher Used in Laparoscopic Appendectomy; Karman Cannula

Laparoskopik Apendektomide Kullanılan Yeni Bir Düğüm Oturtucu; Karman Kanülü

**Barış Mantoğlu¹, Fatih Altıntoprak², Emre Gönüllü¹, Emrah Akın¹,
Kayhan Özdemir¹, Ali Muhtaroglu²**

¹ Sakarya Educating and Research Hospital, Department of General Surgery

² Sakarya University, Faculty of Medicine, Department of General Surgery

Yazışma Adresi / Correspondence:

Barış Mantoğlu

Sağlık Bakanlığı Sakarya Üniversitesi Eğitim ve Araştırma Hastanesi Genel Cerrahi A.B.D. 54100 Sakarya/TURKEY

T: +90 505 815 93 79 E-mail : barismantoglu@gmail.com.tr

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Orcid :

Barış Mantoğlu <https://orcid.org/0000-0002-2161-3629>

Fatih Altıntoprak <https://orcid.org/0000-0002-3939-8293>

Emre Gönüllü <https://orcid.org/0000-0001-6391-4414>

Emrah Akın <https://orcid.org/0000-0003-0224-3834>

Kayhan Özdemir <https://orcid.org/0000-0002-8041-198X>

Ali Muhtaroglu <https://orcid.org/0000-0001-5412-2175>

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Abstract

Objective	Laparoscopic appendectomy is now becoming the gold standard for the treatment of acute appendicitis. Besides, high-cost devices used during the process, the reliability, availability, and cost of the materials used in closing the appendix stump are also important. In this study, we aim to prove that the appendix stump can be secured reasonably and effectively by the guidance of the Karman cannula with a hand-prepared knot.
Materials and Methods	In our descriptive study, the Karman cannula used as a knot pusher which can be easily found in every operating room in laparoscopic appendectomies performed between March 2018 and September 2018 in our clinic.
Results	157 males (64,9%) and 85 females (35,1%) included in the study. All patients underwent laparoscopic appendectomy, and the mean operation time was 31.9 ± 10 minutes. All patients discharged on the first postoperative day. Surgical site infection observed in five (2%) patients.
Conclusion	The Karman cannula can be used as a safe and inexpensive knot pusher in laparoscopic appendectomies.
Keywords	Laparoscopic Appendectomy; Stump closure; Knot Pusher; Karman Cannula

Öz

Amaç	Laparoskopik apendektomi günümüzde, akut apandisit tedavisinde altın standart olma yolunda ilerlemektedir. Bunun yanı sıra işlemin gerçekleşmesi sırasında maliyeti yüksek cihazlar kullanılmaktadır. Apendiks güdüğünün kapatılması noktasında da kullanılan malzemelerin güvenilirliği, bulunabilirliği ve maliyeti önem arz etmektedir. Bu çalışmada, apendiks güdüğünü elle hazırlanmış düğüm ve Karman kanülünü düğüm oturtucu olarak kullanarak, apendiks güdüğünün güvenli bir şekilde kapatılabileceğini göstermeyi amaçladık.
Gereç ve Yöntemler	Tanımlayıcı türde olan çalışmamızda, kliniğimizde Mart 2018 ve Eylül 2018 tarihleri arasında yapılan laparoskopik apendektomilerde, apendiks güdüğünü kapatmak için kullandığımız ve her ameliyathanede kolaylıkla bulunabilen Karman kanülü düğüm oturtucu olarak kullanıldı.
Bulgular	Çalışmaya 157 erkek (%64,9) 85 kadın (%35,1) toplam 242 hasta dahil edildi. Tüm hastaların ameliyatları laparoskopik olarak yapıldı ve açık ameliyata konversiyon olmadı. Ortalama ameliyat süresi 31,9 ± 10 dakikaydı. Hastaların tümü post operatif birinci gün taburcu edildi. Beş hastada (%2) cerrahi alan enfeksiyonu oluştu.
Sonuç	Karman kanülü laparoskopik apendektomide diğer güdük kapama yöntemleri gibi güvenli ve ucuz bir düğüm oturtucu olarak kullanılabilir.
Anahtar Kelimeler	Laparoskopik apendektomi; Güdük kapama; Düğüm oturtucu; Karman kanülü

INTRODUCTION

Acute appendicitis is a common surgical emergency condition, and appendectomy is one of the most frequently performed surgical emergency procedures all over the world.¹ Laparoscopic appendectomy (LA), which was first described by Semm in 1983, and in 1987 Schreiber carried out LA for acute appendicitis, has increased in popularity, and its ability to offer a definitive outcome advantage over open appendectomy remains unproven.^{2,3} However, we can not ignore the advantages of LA, such as better cosmesis, short hospital stay, early return to work, some studies have shown equal advantages of both techniques. As it is known, LA is performed with featured instruments. Malfunction or absence of any of these devices may complicate or make it impossible to perform LA. For sure that the endpoint of LA is to ligation of appendicular meso and closure of appendicular stump. While the appendicular meso, which is ligated by mostly ligasure, harmonic, clips, and electrocautery, the stump is closed with stapler, hem-o-lok clips, extracorporeal or intracorporeal knots. The Karman cannula is a soft, flexible cannula (or curette) popularized by Harvey Karman in the early 1970s and specially used in gynecological operations. This study aims that the Karman Cannula is a safe, feasible and a cost effective device while closing the appendicular stump with a self-prepared knot as a knot pusher.

Materials and methods

Between March 2018 and September 2018, we performed 242 laparoscopic appendectomies in Sakarya University Educating and Research Hospital General Surgery Clinic with Karman cannula. Patients under the age of 16 and over 75 and pregnant patients were not included in this descriptive study. Under general anesthesia, after 1cm infra-umbilical incision, pneumoperitoneum was performed with a Veres needle and a 10 mm trocar introduced into the abdomen. A 10 mm, 30 degrees laparoscope was inserted, and other trocars (5 mm trocar at the suprapubic area and 12 mm trocar at 7 cm right to the umbilicus) were inserted under vision. After the exploration of the whole abdomi-

nal cavity and confirmation of the diagnosis, Meso-appendix was ligated and divided with a harmonic scalpel (Ethicon Endo-Surgery Inc., Cincinnati, OH, USA). A Karman cannula was taken, and a hole was made with a needle at the top of the cannula (figure 1-2).

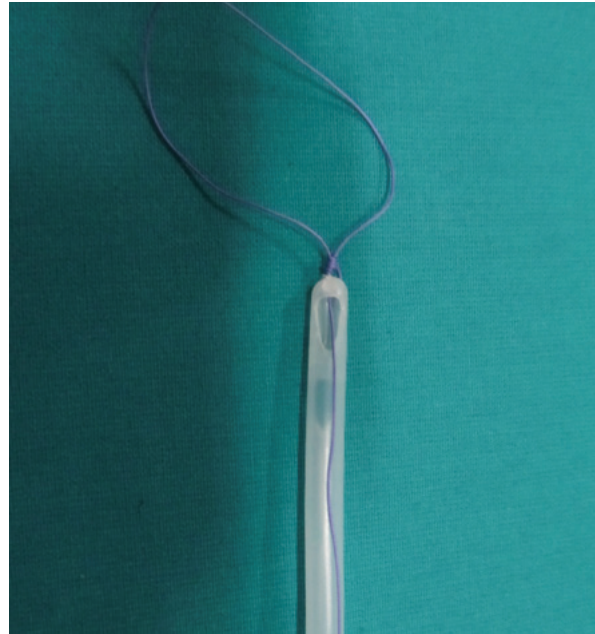


Figure 1: Prepared loop with Karman Cannula

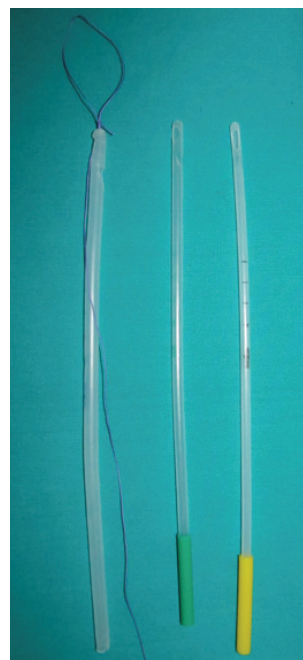


Figure 2: Different sized Karman Cannulas

Two extracorporeal loops were prepared with Vicryl 0/suture and pushed the knot with the help of Karman cannula No: 8 to the base of the appendix (figure 3). The reason we prefer Karman Cannula number 8 is that it is the most suitable cannula that has the stiffness to create a safe force during pushing of the knot. Cannulas with a cannula number less than 8, can be bent when excessive amounts of repulsion and tension are applied, which may pose a problem in securing the knot securely. After an appendectomy, the appendix was taken out from the abdominal cavity with an endo-bag. Ethics committee approval of our study was obtained from our university (Ethics committee approval no: 71522473/050.01.04/80). Signed informed consent forms were obtained from all patients. Data were analyzed by descriptive statistics, percentage and numbers were used for categorical data.

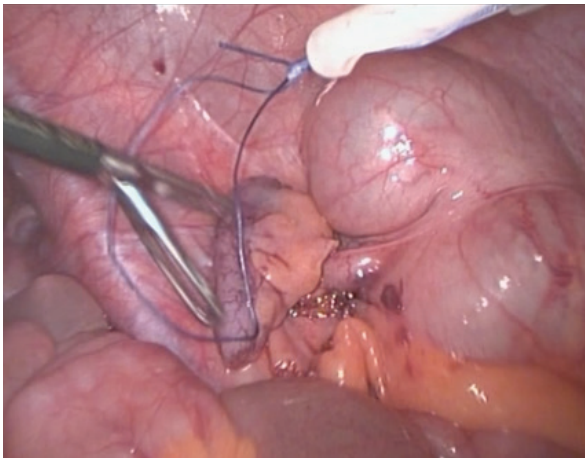


Figure 3: Intraoperative view

Results

There were 157 men (64,9 %) and 85 women (35,1 %) in this study. The mean age was 31.8 ± 5 years. The average operation time was 31.9 ± 10 minutes. The histopathological diagnosis was phlegmonous appendicitis in 146 patients (60,4%), catarrhal in 25 patients (10,3%), gangrenous in 44 patients (18,2%) and lymphoid hyperplasia in 27 patients (11,1%). In 11 patients, a soft drainage tube was placed to the right paracolic area according to condensed fluid collection to avoid intrabdominal abscess and taken

out at the first operative day. All patients were discharged on the first operative day. Port site infection developed in 5 patients and treated with appropriate antibiotic and drainage procedures (2%). (Table 1)

Variables	Detailed Variables	n	Mean \pm Standard deviation and percentiles
Age	Male+female	242	$31,8 \pm 5$
Gender	male	157	64,9%
	female	85	35,1%
Surgery Type	Laparoscopic	242	100%
	Open	0	0%
Operative time		242	$31,9 \pm 10$ m
Hospitalization		242	1 day
Pathology	Phlegmon	242	146 60,4%
	Catharal	242	25 10,3%
	Gangrenous	242	44 18,2%
	Lymphoid Hyperpalsia	242	27 11,1%
Complication	Surgical site infection	242	5 2%

Discussion

Even LA has not yet been the gold standard of acute appendicitis because of many advantages such as faster recovery, shorter hospital stay, and diagnostic advantage of the whole abdominal cavity, and simplifying the appendectomy in obese patients will surely become the LA as a gold standard soon.⁴ As it is known, the main steps of LA are to ligate and cut appendicular meso, and closure of stump. Using a stapler, endoloops, titanium clips or polymer clips while closing the appendicular stump is surgeon dependent.^{5,6,7} Nowadays using hem-o-lok clips to close the appendicular stump has been reported.^{8,9} The TICAP-study (titanium clips for appendicular stump closure) also introduced a new titanium clip specially produced for the closure of the appendix stump.¹⁰ While the unit prices of these materials are quite high, hem-lok clips, staplers, thick suture material endo-loops, titanium clips can be preferred as safe methods.¹¹ In our cases, we preferred to use hand-prepared endoloop when closing the appendix

stump. Another advantage of hand-prepared loops is that it allows the selection of suture material according to the width of the appendix stump. Some limitations notably increased the width of bases of the appendix due to acute inflammation, which may not permit safely closer of the stump.¹² At this point, the stump should be covered with a reliable material so that it does not cause fistula or leakage from the stump. When the appendix is highly inflamed, especially when the thickness of the appendicular stump exceeds 10 mm, the use of polymer or titanium clips may not be appropriate, but the use of stapler is considered the best method; nevertheless, the stapler stands out with its high cost.^{13,14,15} Cost-effectiveness is an essential part of LA. Using endo-staplers is feasible in the base width of appendicitis.^{13,16} Most surgeons use a linear stapler (endo GIA) or an endo loop to secure the appendix stump. Two systematic reviews have compared these two techniques. The endo loop technique was significantly less costly, and endo loops may safely be used even the appendicular stump is the width.^{13,17} Nevertheless, endoloop prices vary between 20 € -30 € per unit in our country; besides this, linear stapler and hem-o-lok unit prices are between 200€-300€ and 25€-35€ respectively, and the social security institution's reimbursement for a laparoscopic appendectomy is 160€. Considering the above data, there is a cost of 40€-300€ for the closure of the appendix stump. In addition to the suitability of hand-prepared endoloop cost (less than 1€ per unit, including Karman Cannula), the appendicular stump requires a propelling device for safe closure. Although some hospitals have stainless steel knot pushers, the absence of this tool should not interfere with hand-made endoloop use, and the operation can be completed safely with the Karman cannula usage, which we have above described and can be found in every operating theater. Appendicular stump leakage or fistula may be the result of failure to securely close the appendix stump.^{18,19} With the Karman cannula, we safely used the endo-loops we prepared, and none of our patients had any complications.

In LA, pre-prepared endo loops and surgeon prepared

endo loops can be used. In our study, endo-loops were prepared with 0/ vicryl by the surgeon, and Karman cannula was prepared as a knot pusher, and that makes these knots most cost-effective (approximately 1€-per unit) the knots safely pushed to the appendix stump with this instrument.

Conclusion

As a result, we, the surgeons who perform surgery, should consider the costs of our operations and take appropriate measures accordingly. In this study, we used Karman cannula as a knot pusher in 242 patients successfully and Karman cannula can be used safely in laparoscopic appendectomies.

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