Laparoscopic Appendectomy: Results of a New Technique for Stump Management

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Objective: *The purpose of the present study was to review a new laparoscopic technique for treatment of appendicitis. An earlier pilot study indicated the safety of the technique in addition to saved time and cost.*
Material and Method: *The electronic records were analyzed on appendix surgeries performed at our hospital between January 1, 2007 and December 31, 2011.*
Results: *The 91 patients who had an appendiceal stump closure using clips (viz., the Hem-o-lock clip™) had a significantly shorter surgery and hospitalization than those whose appendiceal stump was closed using the standard loop strap (Endo-loop™).*
Conclusion: *The complications between groups were not significantly different and were treated in both groups using conservative management.*

Keywords: *Laparoscopic appendectomy, Appendiceal stump management, Appendicitis, Appendectomy*

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Appendicitis is commonly seen in surgical emergency[1] and appendectomy is the treatment of choice. Laparoscopic appendectomy has become the standard approach in the current era of minimally invasive surgery. The benefits for the patient include: small incisions, less scarring, early ambulation, low complications, shorter hospital stay and less time returning to work or regular daily living[2].

Closing the appendiceal stump is a challenging step, especially under the confines of a laparoscopic procedure. A new technique to close the stump has been developed using clips and was first reported in the Srinagarind Medical Journal, Khon Kaen University, in 2006[3]. According to the preliminary study, there was a low complication rate, low cost and short surgical time. The current study reports the results of clipping the appendiceal stump over the intervening years.

Objective

To report the results of a new technique to close the appendiceal stump during laparoscopic appendectomy.

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Material and Method

This was a retrospective, descriptive study of patients with an uncomplicated appendicitis who underwent laparoscopic appendectomy between January 1, 2007, and December 31, 2011, at Srinagarind Hospital, Khon Kaen University. Both in- and out-patient records of our electronic database were searched.

Operative time and hospital stay were compared for closing the stump (*i.e.*, between clipping

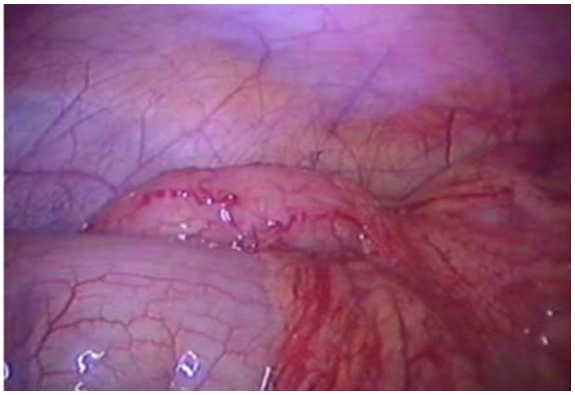

Fig. 1 Acute appendicitis

vs. ligation). The Levene's test for equality, the t-test for equality of means and the proportion test were used for the statistical analysis.

The present study was reviewed and approved by the Ethics Committee at the Faculty of Medicine, Khon Kaen University, Thailand.

Results

Ninety-one complete data records were found and included in the present study. Demographic data and results are presented in Table 1. The patients underwent either stump closure by clipping (Hem-o-lock™) or ligation (Endo-loop™). Clipping was performed to close the appendiceal stump in 68 patients and ligation in 23. There was no statistically significant difference in age between the two groups; however, the youngest patient in the clipping group was 5-years-old while the youngest in the ligation group was 12.

Abdominal pain prior to hospitalization was not different between groups: the mean for clipping was 12 hr 30 min vs. 17 hr for ligation.

The operative time for clipping was shorter than the ligation group ($p < 0.001$): the shortest time for clipping was 16 min.

Hospital stay was shorter in the clipping group than the ligation group ($p < 0.038$): the shortest hospitalization was 32 hr for clipping.

Opioid analgesia was needed for post-

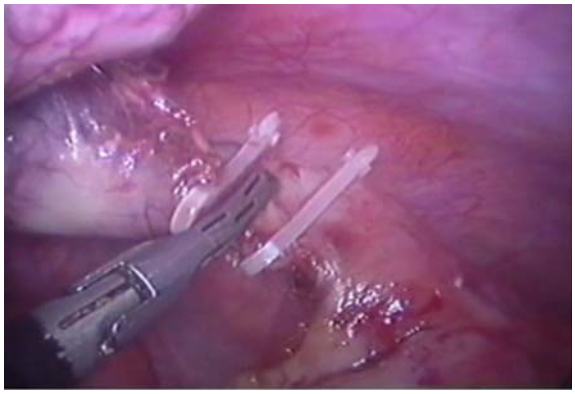

Fig. 3 Clipped & cut appendix

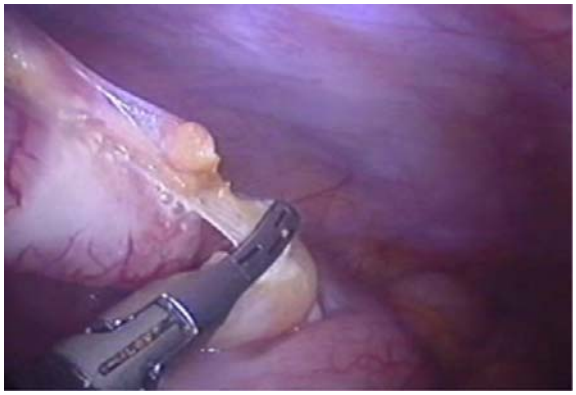

Fig. 2 Mesoappendix cut using Harmonic Scapel®

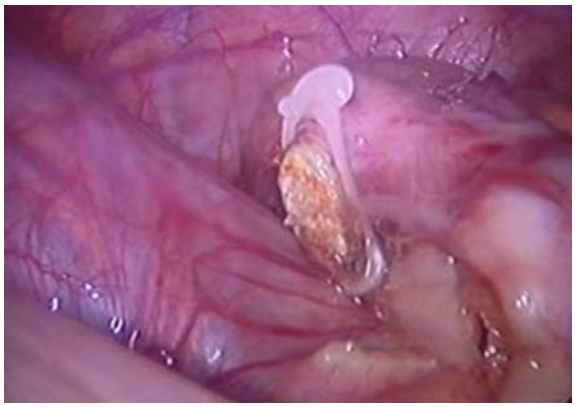

Fig. 4 Hem-o-lock clip used to secure stump

Table 1. Age, operative time, length of hospital stay & complications by technique

Factor	Hem o lock Clip™		Endo Loop™		p-value ($p < 0.05$)
	Male n = 30	Female n = 38	Male n = 8	Female n = 15	
Average age (yrs)	32 (5-75)		26 (12-46)		0.136
Operative time (min)	38 (16-90)		66 (25-130)		<0.001
Hospital stay (hr)	60 (32-108)		76 (38-174)		0.038
Complications	- Wound infection 1 - Intra abdominal collection 1		- Wound infection 1		0.744

Yrs = Years, Min = Minute, Hr = Hour

Fig. 5 Immediate post-op (male)

Fig. 6 One-week follow-up (female)

operative pain by all patients in the ligation group; compared to 76% who needed opioid and 24% who needed non-opioid in the clipping group.

Two complications were found in the clipping group: a wound infection in one and a small amount of intra-peritoneal collection detected by CT scan in the abdomen in another. A wound infection was also found in the ligation group. In both groups, all complications were successfully treated conservatively, without re-operating. There was no statistical difference between groups in the rate of complications ($p < 0.744$) (Table 1).

Discussion

The authors reviewed the results for appendiceal stump closure between ligation (a common method) and clipping (the new method) in patients who underwent laparoscopic appendectomy. The authors found that the method of stump closure depended upon the surgeon's preference. Even though there was no randomization of the kind of procedure, the distribution of patients between methods was not significantly different between groups.

The duration of the operation and length of hospital stay were not significantly different between the two methodological groups. In the current study, the respective hospital stay was 60 vs. 76 hr in the clipping vs. the ligation group; longer than other studies for which stays were between 24 and 48 hrs[4,5].

A total of three non-severe complications occurred among the authors included patients and the difference between groups was not statistically significant. A wound infection rate of 4.34% vs. 1.47% occurred in the ligation vs. clipping group in our study. By comparison, Suh et al reported a wound infection rate of 2.8% in a laparoscopic appendectomy series with 318 patients.

Conclusion

Laparoscopic appendectomy tends to be more accepted because of its efficacy, less pain for the patient, shorter hospital stay, and better cosmetics than conventional appendectomy. The present study presented the efficacy and safety of the new Hem-o-lock™ "clipping" technique to secure the appendix stump, as compared to the Endo-loop™ method.

Acknowledgement

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Potential conflicts of interest

None.

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ผลการผ่าตัดไส้ติ่งด้วยการส่องกล้อง โดยใช้วิธีการปิดโคนของไส้ติ่งด้วยวิธีใหม่

เกรียงศักดิ์ เจนวิถีสุข, เอกรินทร์ โชติกวาณิชย์, โอวตือ แซ่เซียว, ไชยยุทธ ธนไพศาล, สุริยะ พันธุ์ชัย, กฤษฎา เปานาเรียง

วัตถุประสงค์*: เพื่อรายงานผลการผ่าตัดรักษาไส้ติ่งอักเสบด้วยการส่องกล้อง โดยใช้วิธีการปิดโคนของไส้ติ่งด้วยวิธีใหม่ ซึ่งมีการศึกษานำร่องก่อนหน้านี้แล้วว่าสามารถทำได้ ประหยัดเวลาและปลอดภัย*

วัสดุและวิธีการ*: โดยศึกษาจากเวชระเบียนอิเล็กทรอนิกส์ของผู้ป่วยที่ได้รับการผ่าตัดไส้ติ่งโดยวิธีส่องกล้อง ในช่วงเวลา 1 มกราคม พ.ศ. 2550 ถึง 31 ธันวาคม พ.ศ. 2554*

ผลการศึกษา*: ผู้ป่วยเข้ารับการผ่าตัดไส้ติ่งด้วยการส่องกล้องทั้งหมด จำนวน 91 ราย พบว่ากลุ่มที่ปิดโคนของไส้ติ่งโดยการใช้คลิป (Hem-o-lock clip™) ใช้ระยะเวลาการผ่าตัด และระยะเวลาการอยู่รักษาในโรงพยาบาลน้อยกว่ากลุ่มที่ปิดโคนของไส้ติ่งด้วยวิธีมาตรฐานเดิม ที่ใช้ห่วงคล้อง (Endo loop™) อย่างมีนัยสำคัญทางสถิติ*

สรุป*: ภาวะแทรกซ้อนระหว่าง 2 กลุ่ม ไม่แตกต่างกัน โดยสามารถรักษาภาวะแทรกซ้อนได้ ด้วยการรักษาแบบประคับประคอง ซึ่งไม่ต้องผ่าตัดใหม่*