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Securing Appendicular Stump in Laparoscopic Appendectomy in Inflamed Caecum by Purse String Sutures

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Abstract

Background: *There are various methods to close during LA, an appendicular stump. Yet, there is agreement on the best method for closing the appendicular stump is yet unknown appears ambiguous.*

Objectives: *To evaluate the outcomes of laparoscopic appendectomy (LA) using purse string invaginating sutures (PS)*

Methods: *It was a retrospective record based study. Medical histories of laparoscopic surgery patients and analyses of appendectomy were done in the past. Children under the age of fourteen experienced concurrent other than an appendectomy, or had undergone conversion were not allowed to perform open surgery. There were 880 patients recorded and included in this investigation for a period of 3 years but 60 were lost to follow up. Each individual had undergone clinical a diagnosis that satisfied the criteria for surgical therapy and acknowledged having read the consent forms. Every action were conducted by senior residents or attending surgeons who knew how to perform laparoscopic appendectomy. The decision the type of surgical method used to close a stump was determined by the preference of the surgeon.*

Results: *Among them, 460 were females and 360 were males so the study was female preponderance. All patients were in the purse string suture. There were no significant differences in age, gender, BMI, initial body temperature, white blood cell count, co-morbidities, and previous abdominal surgery. Purse string suture shows complications in 8.9% of participants (73out of 820) among them wound infection is most common followed by intra-abdominal infection with prolonged abdominal pain.*

Conclusion: *Our study did not find any benefit of purse string suture in laparoscopic appendectomy in terms of postoperative infection rates and our institution has begun to consider other techniques like Hem-o-lock over PS as initial approach. Therefore, we do not recommend purse string suture in laparoscopic appendectomy.*

Keywords: *Laparoscopic appendectomy, Intracorporeal knotting, Purse string invaginating Sutures, Acute appendicitis.*

Introduction

Recently, abdominal crises frequently require laparoscopy similar to an acute appendicitis [1]. It's been demonstrated that when compared to open approach procedure, laparoscopic appendectomy (LA) has many benefits, including faster recovery time's recovery, reduced hospital stays, and a lower surgical rate infection site [2]. There are various methods to close during LA, an appendicular stump. Yet, there is agreement on the best method for closing the appendicular stump is yet unknown appears ambiguous. There are various techniques to remove the stump of endo-loop, Hem-o-lock polymeric clips, and other appendices knotting inside the body and even purse string sutures. Purse traditional surgery that was done in an open setting was string suturing appendectomy. There are researches that don't support any claims favouring a purse string suture.[3,4]Due to the fact that only one surgeon performs the purse-string suturing and inversion of the appendix stump during laparoscopic appendectomy, the process frequently takes time. We provide a unique method for inverting the appendix stump. The process is very similar to that of open surgery. The treatment takes an extra five minutes to invert the appendix's stump.

Material and Methods

It was a retrospective record-based study. Medical histories of laparoscopic surgery patients and analyses of appendectomy were done in the past. Children under the age of fourteen experienced concurrent other than an appendectomy or had undergone conversion were not allowed to perform open surgery. There were 880 patients recorded and included in this investigation for a period of 3 years but 60 were lost to follow up. Each individual had undergone clinical a diagnosis that satisfied the criteria for surgical therapy and acknowledged having read the consent forms. Every action were conducted by senior residents or attending surgeons who knew how to perform laparoscopic appendectomy. The decision the type of surgical method used to close a stump was determined by the preference of the surgeon.

Age, gender, body mass index (BMI), baseline body temperature, WBC count, and the amount of time since the commencement of right iliac fossa are among the demographic details of the patients. Retrospective data on pain, co-morbidities (diabetes, cardio-vascular illnesses, cirrhosis, chronic renal disease, or immunosuppressive status), acute appendicitis detected by ultrasound or CT scan, and prior abdominal surgery was gathered. ASA score, operating time, intraoperative appendicitis grading based on Gomes Score [2], number of complicated appendicitis including gangrenous, perforated, purulent

appendicitis with abscess and/or localized/diffuse peritonitis and delayed appendicitis, intra-abdominal lavage, and drain usage were reviewed.

After discharge, the patients were followed-up at the outpatient department at 1-week interval for estimation of complications and full recovery. Their postoperative outpatient records were reviewed, and telephone interviews were further carried out to ensure at least a follow-up period. This study was approved by hospital institutional review board.

Surgical Technique

All of the patients received one dosage of second-generation cephalosporin as an antibiotic prophylactic treatment before surgery. The traditional three-step laparoscopic appendectomy procedure was used port strategy. A Foley catheter was placed into the bladder before the trocar was implanted. Then, using the open approach, a 10-mm trocar (Johnson and Johnson's, USA) was placed beneath the umbilicus. Carbon dioxide (CO2) was used to apply pneumoperitoneum, and the intra-abdominal pressure was set at 10–12 mmHg. A 10-mm trocar was then applied to the right iliac fossa while working under direct view after a 5-mm trocar was first placed into the suprapubic region. Standard rigid 5-mm laparoscopic equipment and a rigid 30-degree laparoscope were used. Patients were positioned in a left-tilted reverse Trendelenburg position. In the purse string suture method, two intracorporeal knots were formed at the base of the appendix before the appendix was removed as previously mentioned, leaving the appendix stump. Afterwards a 3/0 vicryl purse-string suture was applied. Around the appendix's base, there is 1.0 cm. Since the initial knot could not be secured, two ends of the string were lifted by the grasper through the 10 mm trocar, and the stump was then forced into the cecum by the other grasper through the 5 mm trocar. The first knot was tied once the stump had completely infiltrated the cecum. The purse-string suture was then finished with a second knotting. Patients were discharged once their body temperature and white blood cell count returned to normal and can tolerate normal diet.

Statistical Analysis

The statistical analysis was performed using SPSS for windows version 22.0 software (Mac, and Linux). The findings were present in number and percentage analyzed by frequency, percent, and Chi-squared test. Chi-squared along with T-test was used to find the association among variables. The critical value of P indicating the probability of significant difference was taken as <0.05 for comparison.

Results

	Purse string suture	*p* value
	n = 820	
Age (years)	41.1 + 18.7	0.08
Female gender (*n*)	460 (56.3%)	0.70
BMI	22.6 + 3.5	0.28
Initial body temperature (celsius)	37.2 + 0.7	0.49
White blood cell count	13.3 + 4.4	0.90
Time to onset of pain (days)	1.5 + 1.3	0.20
Co-morbidities (*n*)	116 (21.6%)	0.76
Previous abdominal surgery (*n*)	65 (12.3%)	0.40
Diagnostic imaging		0.01*
CT scan	440 (55%)	
Ultrasound	380 (45%)	

Table 1- Demographic and Clinical details of Study participants

As per table 1 out of 880 patients, 60 were loss to follow up so the study was done in 820 patients. Among them, 460 were females and 360 were males so the study was female preponderance. All patients were in the purse string suture. There were no significant differences in age, gender, BMI, initial body temperature, white blood cell count, co-morbidities, and previous abdominal surgery. But it was significant in the diagnostic imaging ($p<0.05$). CT scan was commonly used in 55% of patients. Mean age of patient is 41.1 years.

	Purse string suture	*p* value
	n = 820	
ASA score	1.7 + 0.6	0.04*
Complicated appendicitis[a] (*n*)	116 (11.7%)	0.80
0[b]	18 (3.3%)	
1	372 (44%)	
2	243 (26.6%)	
3a	60 (11.2%)	
3b	20 (3.7%)	

4a	7 (1.3%)	
4b	9 (1.7%)	
5	9 (1.7%)	
Operative time (min)	71.4 + 44.6	0.40
Intraoperative lavage (*n*)	137 (25.5%)	0.27
Lavage volume (ml)	149.3 + 129.1	0.025*
Drain usage (*n*)	208 (38.7%)	0.02*
Length of drainage (days)	2.92 + 1.64	0.77
Hospital stay (days)	3.72 + 2.35	0.01*

Table 2- Operative characteristics of Study participants

As per table 2 Complicated appendicitis: gangrenous, perforated, purulent appendicitis with abscess and/or localized/diffuse peritonitis and delayed appendicitis b Gomes Score: the appendix was graded as to different levels based upon its visual appearance: grade 0 (normal looking), 1 (redness and edema), 2 (fibrin), 3a (segmental necrosis), 3b (base necrosis), 4a (abscess), 4b (regional peritonitis), and 5 (diffuse peritonitis). In terms of severity of inflammation, the suppurative type was the most frequent type and there were similar percentages of complicated appendicitis in all the patients. There were no significant differences in operative time and intraoperative lavage among the patients. Patients in had similar percentage of drainage usage but it was significant. PS group had shortest length of hospital stay when compared to the other groups not seen in tables (3.72 ± 2.35 days in PS).

	Purse string suture	*p* value
	n = 820	
Complications	73 (8.9%)	0.38
Wound infection	29 (5.4%)	0.63
95% confidence interval	[3.5–7.3%]	
Intra-abdominal infection	17 (3.2%)	0.67
95% confidence interval	[1.7–4.6%]	
Bowel obstruction	1 (0.2%)	1.00
Prolonged abdominal pain	14 (2.6%)	0.67
Prolonged diarrhoea	5 (0.9%)	0.32

Others	1 (0.2%)	0.30
Image-guided percutaneous drainage	1 (0.2%)	0.06
Readmission	4 (0.7%)	0.85
Reoperation	1 (0.2%)	1.00
Mortality	1 (0.2%)	1.00

Table 3- Complications due to Purse string sutures

As per table 3 purse string suture shows complications in 8.9% of participants (73out of 820) among them wound infection is most common followed by intra-abdominal infection with prolonged abdominal pain. Mortality was seen in 1 patient. But it was not significant.

Discussion

The purse string suture surgical method most frequently employed to close the stump during LA (PS) [5,6]. Prospective investigations and meta-analyses, however, have found that this procedure do not significantly outperform one another in terms of operation duration, pre- and postoperative complication rates, or length of hospital stay as compared to other procedures [7,8]. In this investigation, we were unable to demonstrate that PS had lower infection and complication rates than IK or HL methods.

Purse string sutures, particularly in cases of simple appendicitis, were observed to increase the rate of wound infection. purse-string suture application combined with invagination it is substantially more difficult and demanding to sew laparoscopically into the cecum to seal an appendicular stump during LA [9]. Due to cecal oedema, purse string sutures were sometimes even inapplicable in severe situations. However, our study was unable to demonstrate any improvement in intra-abdominal infection caused by purse string sutures.

Moreover, studies have shown that the usage of drains have prolonged hospital stays [10,11]. The Hem-o-lock polymeric clips technique was found to be feasible, safe, and cost-effective ligation technique of the appendicular stump [12,13].

It may be challenging to apply them since an inflamed appendix is often bulkier [4]. Yet, the Hem-o-lock clips method produced results that were comparable to those of purse string suture and intracorporeal knotting. Moreover, research has demonstrated that none of groups have experienced

intraoperative problems or mortality [14]. Nonetheless, the PS group of patients did experience death in our trial, raising questions about the safety of the treatment.

Conclusions

Our study did not find any benefit of purse string suture in laparoscopic appendectomy in terms of postoperative infection rates and our institution has begun to consider other techniques like Hem-o-lock over PS as initial approach. Therefore, we do not recommend purse string suture in laparoscopic appendectomy.

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