COMPARISON OF LIGATURE VS CLIPPING OF APPENDICEAL STUMP IN LAPAROSCOPIC APPENDECTOMY IN TERMS OF LEAKAGE

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ABSTRACT

Introduction: Acute appendicitis is one of the most common surgical emergencies with an incidence of roughly 6-12%.

Objective: To compare ligature with clipping of appendiceal stump in laparoscopic appendectomy in terms of leakage.

Setting: Surgical unit Hayatabad Medical Complex Peshawar.

Study Period: July 2013 to July 2015.

Methods: This randomized control study was conducted after taking permission from local ethical and research committee. A total of 620 (310 in each group) patients were observed with group A (clipping) and group B (ligature). Moreover consecutive, non- probability sampling technique was used for sample collection.

Results: In this study age distribution was analyzed as in group A (Clipping), mean age was 27 years with SD ± 2.31 and in Group B (Ligature), mean age was 30 years with SD ± 3.36. In group A (Clipping) 56% patients were male and 44% patients were female. Where as in Group B (Ligature), 60% patients were male and 40% patients were female. In group A (Clipping) 2% patients had stump leakage while in Group B (Ligature) 4% patients had stump leakage.

Conclusion: Our study concludes that there is no difference between ligature and clipping of appendiceal stump in laparoscopic appendicectomy in term of leakage as the incidence of leakage in ligature was 4% while in clipping it was 2%.

Key Words: Ligature, clipping, appendiceal stump, leakage.

INTRODUCTION

Acute appendicitis is one of the most common surgical emergencies with an incidence of roughly 6-12%[1]. Appendicectomy is the treatment of choice for acute appendicitis[2]. For more than a century open appendicectomy has been a safe and effective treatment for acute appendicitis[3]. The modern era of minimal invasive techniques has led to the use of laparoscopic surgery to perform appendicectomy[3].

The advantages of laparoscopic appendicectomy are reduced wound infection, less post-operative pain, faster recovery and shorter hospital stay[4]. In comparison to open appendicectomy, it is time consuming and costly[4]. During laparoscopic procedure appendicular stump closure is a challenging step because its inappropriate management can lead to stump leakage with all its consequent complications[2]. Endoloop, endostapler, metal clips, bipolar endo-coagulation, polymeric clips and invaginating intracorporeal sutures are some of the techniques used for appendiceal stump closure[5].

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Appendiceal stump leakage can be diagnosed either per operatively by visualizing leakage, post operatively by the drainage of feco-purulent material through a drain placed in the pelvis or by clinical examination of the abdomen (looking for sign of peritonitis).

Limited studies are available in our setup regarding laparoscopic appendicectomy in terms of appendiceal stump management and previous studies shows conflicting data. There is thus a need to carry out further trials comparing the two techniques for appendiceal stump management. Therefore this study was done to compare ligature with clipping of appendiceal stump in laparoscopic appendectomy in terms of leakage thus decreasing the morbidity of the patients due to this grave complication.

OPERATION DEFINITIONS

(a) Ligature of appendiceal stump:

Application of an extracorporeal pre-tied sliding knot to both sides of the dissection line of the appendix.

Clipping of appendiceal stump:

Application of clips to the base of the appendix with a reusable specific clip applicator.

(b) Laparoscopic appendicectomy:

Appendix removal through laparoscope irrespective of the number of ports used.

(c) Stump leakage:

Drainage of feco-purulent material from the appendiceal stump postoperatively through a drain placed in the pelvis irrespective of the amount, visualized with naked eye examination within 07 days of surgery.

MATERIAL AND METHODS

This randomized control study was conducted at Surgical unit, Hayatabad Medical Complex, Peshawar from July 2012 to July 2014 after taking permission from local ethical and research committee. A total of 620 (310 in each group) patients were observed and consecutive, non-probability, sampling technique was used for sample collection. Inclusion criteria were all patients with acute appendicitis; 18 to 60 years of age of both genders undergoing laparoscopic appendicectomy were included. Any patient with acute perforated or gangrenous appendicitis, local or diffuse peritonitis, previous abdominal surgery, pregnancy and obesity (BMI greater than 45) were excluded. Exclusion criteria was strictly followed to control confounders and bias in the study.

DATA COLLECTION PROCEDURE

After approval from the Medical Ethics Committee, all the patients with acute appendicitis were admitted in surgical ward through OPD and emergency. To diagnose acute appendicitis, history (right iliac fossa [RIF] or peri-umbilical pain shifting to RIF, nausea/vomiting), physical examination (rebound tenderness or guarding in RIF) and investigations such as U/S abdomen + pelvis and TLC (white blood cell (WBC) count > 10,000/dl) were performed. Investigations for fitness for anesthesia like FBC, BUS Electrolytes, Hepatitis B and C screening, CXR and ECG were also performed and the patients prepared for surgery.

A written informed consent was taken from the patients fulfilling the selection criteria and their profiles entered in the Performa. The patients were equally divided into group "A" and group "B" randomly using the lottery method. Group A patients were subjected to clipping while group B patients underwent Ligature of appendiceal stump through laparoscopic appendicectomy on elective list the next morning. A prophylactic dose of 3rd generation cephalosporin and metronidazole were given to all the patients at the time of induction and 2 doses were repeated postoperatively. All the operative details including operating time were recorded. Skin incision was closed with Prolene 2/0, sub-cuticular stitches in both groups. The patients were operated by consultant surgeons sufficiently capable of performing both kinds of procedures. Exclusion criteria were strictly followed to control confounders and bias in the study. Drain was removed on 1stpostoperative day if it contained less than 50 ml of fluid per 24 hours. Patients were discharged once they were able to take orally and can be mobilized.

The patient's were examined on 1st postoperative day and skin stitches were removed on 1st follow up visit in the OPD after 1 week. Patients were educated to report any day if they develop features of stump leakage. Any patient who misses follow up was telephoned and asked about features suggestive of stump leakage. Any patient who develops stump leakage was managed accordingly.

The demographic and clinical data of all the patients such as name, age, gender, clinical findings, investigations, diagnosis, procedures and stump leakage status was recorded in a Performa developed after consultation with a statistician.

DATA ANALYSIS

The data was entered and analyzed by SPSS version 16 and above. Frequency and percentages were calculated for categorical data like gender, stump leakage in both groups A and B. Mean ± standard deviation was calculated for numerical variables like age, hospital stay. Chi square test was applied to compare stump leakage in both groups A and B. Keeping P- value less than or equal to 0.05 ($P \leq 0.05$) was considered as significant. Stump leakage was stratified among age and gender to see effect modifications. All the data was presented in the form of tables and charts/graphs. Post-stratification chi-square test was applied.

RESULTS

This study was conducted at Department of Surgery, Hayatabad Medical Complex, Peshawar in which 620 (310 each group) patients were observed to compare ligature with clipping of appendiceal stump in laparoscopic appendectomy in terms of leakage.

Age distribution among two groups was analyzed as in group A (Clipping) 158(51%) patients were in age range 18-30 years, 102(33%) patients were in age range 31-40 years, 38(12%) patients were in age range 41-50 years and 12(4%) patients were in above 51-60 years of age. Mean age was 27 years with SD ± 2.31. Where as in Group B (Ligature) 171(55%) patients were in age range 18-30 years, 99(32%) patients were in age range 31-40 years, 31(10%) patients were in age range 41-50 years and 9(3%) patients were in above 51-60 years of age. Mean age was 30 years with SD ± 3.36 (Table 1).

Gender distribution among two groups was analyzed as in group A (Clipping) 174(56%) patients were male and 136(44%) patients were female. Where as in Group B (Ligature) 186 (60%) patients were male and 124 (40%) patients were female (Table 2).

Status of stump leakage among two groups was analyzed as in group A (Clipping) 6(2%) patients had stump leakage while in Group B (Ligature) 12(4%) patients had stump leakage (Table 3). Stratification of stump leakage among two groups with age and gender is given in (Table 4,5).

Table 1: Age distribution (n = 620)

Age	Group A	Group B
18-30 years	158(51%)	171(55%)
31-40 years	102(33%)	99(32%)
41-50 years	38(12%)	31(10%)
51-60 years	12(4%)	9(3%)
Total	310(100%)	310(100%)
Mean and SD	27 years ± 2.31	30 years ± 3.36

Group A: Clipping, Group B: Ligature

Table 2: Gender distribution (n = 620)

Gender	Group A	Group B
Male	174(56%)	186(60%)
Female	136(44%)	124(40%)

Table 3: Stump leakage (n = 620)

Stump Leakage	Group A	Group B
Yes	6(2%)	12(4%)
No	304(98%)	298(96%)
Total	310(100%)	310(100%)

Table 4: Stratification of stump leakage among two groups with age (n = 620)

	Leakage	Clipping	Ligature	P value
18-30 years	Yes	2	4	0.003
	No	156	167	
Total		158	171	
31-40 years	Yes	2	4	0.003
	No	100	95	
Total		102	99	
41-50 years	Yes	1	2	0.002
	No	37	29	
		38	31	
51-60 years	Yes	1	2	0.002
	No	11	7	
Total		6	12	

Table 5: Stratification of stump leakage among two groups with gender (n = 620)

	Leakage	Clipping	Ligature	
Male	Yes	4	8	0.002
	No	170	178	
		174	186	
Female	Yes	2	4	0.002
	No	134	120	
Total		136	124	

DISCUSSION

Appendicectomy is the treatment of choice for acute appendicitis. The modern era of minimal invasive techniques has led to the use of laparoscopic surgery to perform appendicectomy. The advantages of laparoscopic appendicectomy are reduced wound infection, less post operative pain, faster recovery and shorter hospital stay. During laparoscopic procedure appendiceal stump closure is a challenging step because its inappropriate management can lead to stump leakage with all its consequent complications. Endoloop, endostapler, metal clips, bipolar endo-coagulation, polymeric clips and invaginating intracorporeal sutures are some of the techniques used for appendiceal stump closure.

Our study shows that mean age in group A (Clipping) was 27 years with SD ± 2.31 while mean age in Group B (Ligature) was 30 years with SD ± 3.36. In group A (Clipping) 56% patients were male and 44% patients were female, where as in Group B (Ligature) 60% patients were male and 40% patients were female. In group A (Clipping) 2% patients had stump leakage while in Group B (Ligature) 4% patients had stump leakage.

A review of clinical studies reveals stump leakage in 1.47% patients with clipping while 0% patients in ligature group[2]. Yet another study revealed stump leakage in 0% of patients in both clipping and ligature groups[6]. A prospective non-randomized study showed stump leakage in 3.6% of patients in ligature group and 5% of patients in intracorporeal knotting with invaginating suture group5. In a prospective study the rate of stump leakage was 1% with clipping of appendiceal stump4, as compared to 2% in our study.

Safavi A, et al[7] observed 242 patients undergoing Laparoscopic Appendicectomy (LA), 57 (23.6%) had perforated appendicitis (PA). In the PA group the appendiceal stump was closed with endoloop (EL) in 47 (82.5%) patients, while in the non perforated appendicitis (NPA) group EL was used in 161 (87%) patients. Among PA patients, intr-abdominal abscess (IAA) was more common in the endostapler (ES) than the EL group (5 of 10) (50%) v. 6 of 47 [12.7%]. There was no significant difference in rates of surgical site infection (SSI). Among NPA patients, there were no differences in rates of IAA or SSI. There were no stump leaks in either group. Logistic regression analysis confirmed the predictive effect of ES use on IAA formation in PA (adjusted odds ratio 7.09; 95% confidence interval 1.08-46.13; p = 0.042).

In another study conducted by Elif Colak et al[8] in which a total of 53 patients were evaluated in this study (n=26 and 27 for hem-o-lok (nonabsorbable polymer clips) and endoloop groups, respectively). The mean operation time was shorter in hem-o-lok group than endoloop group (64.7±19.2 vs. 75.4±23, respectively); however, the difference was not significant. Other

surgical findings were similar. There was no statistically significant difference in overall nonsurgically or surgically related complications. The mean postoperative hospitalization time was also similar in both groups. Although it is not possible to make general conclusions on basis of such a limited study, in our opinion, closure of the appendix stump with polymeric nonabsorbable clips in laparoscopic appendectomy may be a cheaper and simpler alternative to other widely used methods.

We agreed with some authors' study results[9,10] that using a titanium endoclip for appendiceal stump closure is safe and associated with a shorter operation time in LA. It also simplifies the procedure and provides a useful alternative to intracorporeal knotting (ICK) for appendiceal stump closure. The use of clips for appendicular stump closure was described more than 20 years ago[11]. So more research with comparison of different methods for laparoscopic appendicular stump closure is needed in future to overcome this problem.

CONCLUSION

Our study concludes that there is no difference between ligature and clipping of appendiceal stump in laparoscopic appendicectomy in term of leakage as the incidence of leakage in ligature was 4% while in clipping it was 2%.

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