Original Research Article

COMPARISON OF OUTCOMES OF LAPAROSCOPIC AND OPEN APPENDECTOMY IN MANAGEMENT OF APPENDICITIS

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ABSTRACT

OBJECTIVE: To compare the outcomes in relations to postoperative pain and complications, and hospital stay of laparoscopic versus open appendectomy in management of appendicitis.

STUDY DESIGN: Cross sectional study.

PLACE AND DURATION OF STUDY: This study was conducted in department of surgery Unit III of PUMHS Nawabshah and Suleman Roshan Medical College Tando Adam, Sindh Pakistan, from January 2020 to December 2021.

METHODOLOGY: This study consisted of 136 consecutive casesof either gender, aged between 13 to 60 years, that were enrolled during study period and matching with the inclusion and exclusion criteria. After the permission of ethical committee, a detailed history was taken from all the patients with special regard to the pain in RIF, Pain starting around umbilicus, nausea, vomiting, fever and altered bowel habits. All the cases were randomly divided into Group A comprising of 68 cases which were operated by conventional open appendectomy (OA) and other group B also comprising of 68 cases which were operated by laparoscopically appendectomy (LA). All the clinical and demographic data was collected on a proforma designed for the study, and analyzed by using Statistical Package for Social Science (SPSS) software version 22. Effect modifier like age, gender was controlled by stratification and chi-square test was applied to see the effect of these on both open versus laparoscopic appendectomy outcome variable. P <0.05 was taken as significant.

RESULTS: In open appendectomy group male:female ratio of 1.2:1 and in laparoscopically appendectomy group male:female ratio of 1.5:1. The mean age was 31.28±4.30 years for OA group and 35.47±3.23 years for LA group (p 0.02).Alvarado score was showed <4 Score 0% in both groups, where as 4-7 Score in 9(13.23%) patients of OA group and 8(11.76%) patients of LA group, and > 7 Score was seen in 59(86.76%) patients of OA group and 60(83.23%) patients of LA group. The mean time in OA group was 45.21±12.1 minutes and LA group was

43.44±9.4 minutes (p 0.026).Mild pain was felt in 7(10.29%) patients of OA group and 39(57.35%) patients of LA group, Moderate pain was seen in 31(45.58%) patients of OA group and 26(38.23%) patients of LA group, severe pain was described by 30 (44.11%) patients in OA group and 3(4.41%) patients in LA group (p 0.005).The common complications seen in this study Ileus was 29(42.64%) patients in OA and 18(26.47%) patients in LA group) followed by wound infection 10(14.70%) patients in OA and 1(1.47%) patients in LA group. The duration of hospital stay was longer about 3-4 days in 58(85.29%) of OA patients as compared to LA cases where majority 65(95.58%) were discharged within 2 to 3 days.

CONCLUSION:- We conclude that laparoscopic appendectomy procedure has a low rate of complications, earlier mobilization, implies a shorter hospital stay and offers the patient a more comfortable postoperative period than open appendectomy procedure.

Key Words: Acute appendicitis, Laparoscopic appendectomy, Postoperative Complications, Hospital Stay.

INTRODUCTION:

Appendicitis is among one of the leading surgical emergencies demanding surgical intervention, the lifetime danger is about 6%[1]. It can occur mostly in male population in any age but commonly in their twenties and thirties[2].The disease is detected on clinical features as well as skills and experience of attending surgeon[3]. The features suggestive of appendicitis are pain in the right lower abdomen in iliac fossa, or pain in peri-umbilical region and then shifted towards right iliac fossa, the usual clinical presentation is temperature, queasiness and with frequent vomits, in about 70% of patient, the abdominal examination reveals stiffness, pain on palpation and reboundtenderness[4,5]. The classic patients are usually diagnosed on clinical examination, but some atypical presentations are quite difficult to diagnose. In majority about 70-80% of cases the judgement before surgery is quite clear and generally the negative appendix surgery rate is 15-

25%[7,8]. To avoid the serious complication of perforation, we accept a rising negative appendix surgery[9].

There are various lower abdominal conditions which comes in the differential diagnosis of acute appendicitis including pelvic inflammatory disease, gastroenteritis, abdominal pain of unknown cause, infections of urinary tract, ruptured ovarian follicle, and ectopicpregnancy[5]. The precise diagnosis of the disease before operation remains a challenge even to skilled persons. To reduce the negative surgery and to improve the accuracy in the diagnosis, so many tools are introduced comprising the imaging techniques, biochemical markers and scoring systems and earlysurgery[10,11], these all are helpful in a gross decrease in morbidity and also there is a decline in the serious complications like perforation, which documented a decline from 27%to 12.5%. In various gynaecological situations specially in ladies of child bearing age, due to intermixing of the symptoms there is a high negative appendectomy rate of35-45%[12].

In the year 1894, the first open appendectomy(OA) was executed by using incision in the right lower quadrant of abdomen[12], and it remains a typical standard for treating the acute appendicitis more than 100 years, due reliability and safety of the procedure. In 1983, Semm was the first person who introduce the Laparoscopic appendectomy (LA)[13], till than the procedure is gaining popularity. However it remains a topic of debate in the literature that which procedure suitable for the appendectomy.

The rational of our research is to compare the effectiveness, safety, outcome hospital stay, pain and its complication between the laparoscopic and conventional open appendectomy in the treatment of acute appendicitis reported at tertiary care hospital.

MATERIAL & METHODS

This study was conducted in the department of surgery Unit III of PUMHS Nawabshah and Suleman Roshan Medical College Tando Adam, Sindh Pakistan, from January 2020 to December 2021, on 135 consecutive cases. After the permission of ethical committee, a detailed History was taken from all the patients with special regard to the pain in RIF, Pain starting around umbilicus, nausea, vomiting, fever and altered bowel habits. All the patients of either gender, age between 13 to 60 years that are suspected case of acute appendicitis on clinical and radiological grounds were included in this study. Patients age <13 and >60 years, features of generalized peritonitis, patients with palpable mass in right iliac fossa and history of previous operation on lower abdomen were excluded from this study.

All the cases were randomly divided into two equal groups, Group A comprising of 68 cases which were operated by conventional open appendectomy (OA) and other group B also comprising of 68 cases which were operated by laparoscopic appendectomy (LA).

Randomization is not clear. Does it means patient were randomly selected to undergo either OA or LA. If so what was the methods used to avoid selection bias.

All the clinical and demographic data was collected on a proforma designed for the study, and analyzed by using Statistical Package for Social Science (SPSS) software version 22. Effect modifier like age, gender was controlled by stratification and chi-square test was applied to see the effect of these on both open versus laparoscopic appendectomy outcome variable. P <0.05 was taken as significant.

RESULTS

The results of the analysis of data on 68 patients who underwent open appendicectomy and another group of 68 patients, who were operated laparoscopical appendicectomy. In open appendicectomy group 38(55.88%) were male and 30(44.11%) female. Ratio male:female ratio of 1.2:1. In laparoscopically appendicectomy group 41(60.29%) were male and 27(39.70%) female with male:female ratio of 1.5:1 (Char No.1). There was wide variation of age ranging from a minimum of 13 years to 60 years in both group. The mean age was 31.28±4.30 years for OA group and 35.47±3.23 years for LA group (p 0.02). Symptoms of patients in both groups were almost same. Pain in RIF was found 54(79.41%) in OA group and 60(88.23%) LA group, Pain starting around umbilicus was seen 14(20.58%) in OA group and 8(11.76%) in LA group, Nausea was seen 39(57.35%) in OA group and 45(66.17%) in LA group, Vomiting was 13(19.11%) in O.A group and 15(22.05%) in L.A group and Fever was 8(11.76%) in O.A group and 13(19.11%) in L.A group (Table No:1).

Examination findings revealed was Tenderness at Mc Burney's in 55(80.88%) patients of OA group and 58(85.29%) patients of LA group where as Guarding in 60(88.23%) patients of OA group and 62(91.17%) patients of LA group, Rebound tenderness was found in 28(41.17%) patients of OA group and 26(38.23%) patients of LA group and Fever was seen in 8(11.76%) patients of OA group and 13(19.11%) patients of LA group (Table No: 1). Alvarado score was showed <4 Score 0% in both groups, where as 4-7 Score in 9(13.23%) patients of OA group and 8(11.76%) patients of LA group, and > 7 Score was seen in 59(86.76%) patients of OA group and 60(83.23%) patients of LA group (Table No:1).

Table No.1

Demographic Variable

Variable	O.A Group		L.A Group	
	No: of Patients	Percentage	No: of Patients	Percentage
GENDER				
• Male	38	55.88%	41	60.29%
• Female	30	44.11%	27	39.70%
AGE (YEARS)				
• 13 – 20 years	7	10.29%	5	7.35%
• 21 – 30 years	31	45.58%	28	41.17%
• 31 – 40 years	15	22.05%	19	27.94%
• 41 – 50 years	10	14.70%	7	10.29%
• 51 – 60 years	5	7.35%	9	13.23%
PRESENTATION/SYMPTOMS OF PATIENTS				
• Pain in RIF	54	79.41%	60	88.23%
• Pain starting around umbilicus	14	20.58%	8	11.76%
• Nausea	39	57.35%	45	66.17%
• Vomiting	13	19.11%	15	22.05%
• Fever	8	11.76%	13	19.11%
• Anorexia	25	36.76%	16	23.52%
• Altered bowel habits	3	4.41%	5	7.35%
EXAMINATION FINDINGS				
• Tenderness at Mc Burney's	55	80.88%	58	85.29%
• Guarding	60	88.23%	62	91.17%
• Rebound tenderness	28	41.17%	26	38.23%
• Fever	8	11.76%	13	19.11%
ALVARADO SCORE				
• <4 Score	0	0%	0	0%
• 4-7 Score	9	13.23%	8	11.76%
• > 7 Score	59	86.76%	60	83.23%

A.O: Open Appendicectomy Group, L.A: Laparoscopic Appendicectomy Group

If you can add another column to show the p value of each of the categories, to show there is no difference, it will emphasize your randomization is good.

Operative time in both groups was recorded. Operative time range 30 minutes to 90 minutes in both groups.

Should know who operated the patients. Are they with similar level of competence. The operator knowing that patients are undergoing study can affect the randomization and bias cannot be excluded.

The mean time in OA group was 45.21±12.1 minutes and LA group was 43.44±9.4 minutes (p 0.026). (Table No:2). Severity of post-operative pain in both groups was recorded. Mild pain was felt in 7(10.29%) patients of OA group and 39(57.35%) patients of LA group, Moderate pain was seen in 31(45.58%) patients of OA group and 26(38.23%) patients of LA group, severe pain was described by 30 (44.11%) patients in OA group and 3(4.41%) patients in LA group (p 0.005) (Table No.2).

It is not clear how mild, moderate and severe pain is identified. Please use an objective method like numerical scale of 0 to 10

The common complications seen in this study Ileus was 29(42.64%) patients in OA and 18(26.47%) patients in LA group) followed by wound infection 10(14.70%) patients in OA and 1(1.47%) patients in LA group. Abdominal collection, Residual abcess and Incisional hernia Right inguinal hernia were found in each case (Table No.2). The duration of hospital stay varied from 1 to 5 days. It was longer about 3-4 days in 58(85.29%) of OA patients as compared to LA cases where majority 65(95.58%) were discharged within 2 to 3 days. The mean hospital stay in OA group was 4.21±2.1 days and LA group was 2.14±1.1 (p <0.001) days (Table No.2).

Table No.2

Operative and postoperative variable

Variable	O.A Group		L.A Group	
	No: of Patients	Percentage	No: of Patients	Percentage
OPERATIVE TIME (P value 0.026)				
• 30 Minutes	10	14.70%	1	1.47
• 45 Minutes	21	30.88%	16	23.52%
• 60 Minutes	27	39.70%	35	51.47%
• 75 Minutes	8	11.76%	12	17.64%
• 90 Minutes	2	2.94%	4	5.88%
Mean Operative Time	45.21±12.1 minutes		43.44±9.4 minutes	
SEVERITY OF POSTOPERATIVE PAIN (P value 0.005)				
• Mild	7	10.29%	39	57.35%
• Moderate	31	45.58%	26	38.23%
• Severe	30	44.11%	3	4.41%
POST OPERATIVE COMPLICATIONS (P value <0.001)				
• Wound infections	10	20 %	1	1.47%
• Abdominal collection	1	1.47%	0	0%
• Ileus	29	42.64%	18	26.47%
• Residual abcess	1	1.47%	0	0%
• Intestional obstruction from adhesion	0	0%	0	0%
• Incisional hernia Right inguinal hernia	1	1.47%	0	0%
HOSPITAL STAY (p value <0.001)				
• 1 day	0	0 %	0	0%
• 2 day	0	0 %	26	38.23%
• 3 day	27	39.70%	39	57.35%
• 4 day	31	45.58%	3	4.41%
• 5 day	10	14.70%	0	0%
Mean (days)	4.21±2.1		2.14±1.1	

A.O: Open Appendicectomy Group, L.A: Laparoscopic Appendicectomy Group

DISCUSSION

The pendulum of the surgical opinion continuous to swing with gradual decreasing sweep as the appropriate application of the laparoscopy for the suspected case of the acute and recurrent appendicitis is popularizing[14].

Critics of laparoscopic appendicectomy often point to the increase cost of the surgical equipment as a major disadvantages of the laparoscopic procedure despite these concerns, it has become safe popular procedure. However the cost effectiveness for laparoscopic appendicectomy is easily realized once the decreased hospital stay and entire patient convalescence period are accounted for laparoscopy as a major surgical advantage has enable the general surgeon to stretch his hands in the Superspeciality area. The controversy that currently exits over the potential benefit of laparoscopic appendicectomy motivated us to analyze our experience with this procedure[15,16].

The advantages and disadvantages of laparoscopic and open appendectomy were mainly measured during the operation, postoperative pain score and days of analgesic use, and postoperative complications such as ileus, fever, vomiting, postoperative wound infection and other hospital stays were evaluated.

The male to female ratio seen in OA group was 1.2:1 as compared to LA group where it was 1.5:1. While in the study of Mitsugi Shimoda[17] reported male to female ratio are 1:1.6 in OA group and 1:1.4 in LA group. Whike in an other study D Zosimas [18] conducted in 2018 and reported male to female ratio is 1:1.06 which is almost same as in present study.

The mean age was 31.28±4.30 years (13 to 60 years) for OA group and 35.47±3.23 years (13 to 60 years) for LA group. The peak age group for presentation of appendicitis in our study is 21 to 30 years. However the study of Jan H was reported incidence found in 3rd decade of Life[19]. However B. A. Kolhar[20] showed the age of patients ranged from 13 years (youngest) to 53 years (oldest) with a mean age of 25.08 years in open and 23.36 years in laproscopic group.

In our study the pain in in right iliac fossa and around umbilicus was the commonest presentation (99%) followed by nausea (OA=57.35% vs LA= 66.17%) and vomiting (OA=19.11% vs LA= 22.05%). However in study of Arshad Hussain Abro[21] is reported symptoms of patients in both groups were pain in RIF in 59 (98.33%), nausea in 50 (83.33%), fever in 22(36.66%), pain around umbilicus in 45 (75%), vomiting 35(58.33%), anorexia in 25(41.66%), and altered bowel habits in 20(33.33%).

The operative time in our series was significantly longer in OA group (p 0.02). The mean operative time for open appendectomy group was 45.21±12.1 minutes and for laparoscopic appendectomy were 43.44±9.4 minutes with range 30 to 90 minutes in both groups. The mean operative time given by Sandeep Thakre[22] is 60.8 for LA and 45.7 minutes for OA group. An other study by Atia Khatoon[23] is reported are 33.84±13.20 minutes in OA and 37.67±11.07 minutes in LA group. This contrasts with other studies showing longer operative time in LA group patients.

In our study majorty of cases 89.70 % of OA group felt moderate to severe pain and late recovery as compare to LA group where 95.58 % felt mild to moderate pain (p 0.005) with quick recovery arly mobilization and therefore was less need of postoperative analgesia

in LA group. In other studies laparoscopic appendectomy have minimum surgical stress , less postoperative pain , fast recovery and early gut motility and feeding. However study of Rawalpindi[24] conducted in 2015 is reported moderate to severe post operative pain in 40.81% in OA, where as mild to moderate postoperative pain in 48.97% in LA group.

In our study majority of postoperative complication was found higher in OA as compared to LA group ($p < 0.001$). The wound infection observed in (OA=20% VS LA=1.47%), which is higher than LA group.However, Arshad Hussain Abro[21] study observed wound infection frequency was reported to be almost twice as high in the open appendectomy group (10%) as in the laparoscopic appendectomy group (6.66%). While in the study Marzouk M[24], infection was found more frequently in the open appendectomy group (7.6%) than in the laparoscopic appendectomy group (0.00%).

The Ileus (OA=42.64% VS LA=26.47%) and Abdominal collection (OA=1.47% VS LA=0%) were the complications responsible for re-exploration of the patient. However in the study of Moheb S. Eskandaros[25] is reported prolonged paralytic ileus was observed open appendectomy in 3(5.4%) as compared to laparoscopic appendectomy 1(3%).

The hospital stay in this study ranged from 1 to 5 days in both groups with mean length of hospitalization as 4.21±2.1 days in OA and 2.14±1.1 days in LA group ($p < 0.001$).It is comparable to other studies given by different authors like 1.70 ± 1.06 days in OA VS 1.52 ± 0.76 days in LA [26], 7.68±2.38 days in OA VS 2.84±0.9 days in LA[4], 3.87 days for OA and 2.75 days for LA [27].

CONCLUSIONS

Laparoscopic appendectomy is a safe and effective method for the treatment of acute appendicitis. Compared with open appendectomy, laparoscopic appendectomy has a lower complication rate, earlier mobilization, and means a shorter hospital stay and a more comfortable postoperative period. Laparoscopic appendectomy has significant advantages over open appendectomy and a faster recovery to the normal life.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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