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Original Article

A Comparative Study of Laparoscopic Appendectomy with Open Appendectomy at a Tertiary Care Hospital

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Abstract

Background

Appendectomy is most common surgical procedure done for treatment of acute appendicitis. Both laparoscopic and open techniques are used for its removal. The aim of this study is to compare the outcome of laparoscopic appendectomy with open appendectomy.

Materials and Methods

A retrospective study was conducted in Nobel Medical College And Teaching Hospital, Biratnagar, Nepal from April 2019 to February 2021.Total 90 patients were enrolled in the study of which 44 in laparoscopic appendectomy group and 46 in open appendectomy group. These two groups were compared for demographic profiles, operative time, postoperative pain, length of hospital stay and surgical site infections.

Results

Ninety patients underwent appendectomy of which 44 were in Laparoscopic group and 46 in Open group with similar demographic profiles. The mean operative time in Laparoscopic group was 42.95±2.46 minutes where as in Open group it was 35.25±1.87 minutes [p<0.001].The mean postoperative pain at 8 hours in Laparoscopic group was 7.77±1.03 and in Open group 8.45±1.16 [p=0.002], at day one Laparoscopic group 5.01±0.88 and in Open group 5.80±0.99[p<0.001],at day two Laparoscopic group 3.54 ±1.19 and in Open group 4.26±0.89[p<0.001]. Mean duration of hospital stay in Laparoscopic group was 2.02±0.26 and Open group was 2.52 ±0.54[p<0.001]. Surgical site infections was noted 1(2.27%) in Laparoscopic group and 6(13.04%) in Open group[p=0.029].

Conclusion

Laparoscopic appendectomy offers less postoperative pain, shorter hospital stay, less surgical site infections but prolonged operative time compared to open appendectomy.

Keywords: *Appendectomy, Hospital stay, Operative time, Wound infection*

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Introduction

Acute appendicitis is the most common cause of surgical abdomen which affects (6-8%) of populations [1]. Incidence of acute appendicitis is maximal in the second and third decades of life [2]. In 1894 Mc Burney described open surgical technique for removal of inflamed appendix which remained treatment of choice for more than a century [3]. In 1983, KurtSemm from Germany did first laparoscopic appendectomy, since then it got acceptance [4].

However, there is much debate about superiority, efficacy between laparoscopic techniques with open technique [2, 5]. In our hospital laparoscopic appendectomy as well as open appendectomy is done for removal of inflamed appendix.

Therefore, the aim of this study is to compare the advantage and disadvantage among these two techniques of appendix removal.

Materials and Methods

A retrospective observational study was conducted in the department of general and laparoscopic surgery, Nobel Medical College and Teaching Hospital from April 2019 to February 2021. All patients diagnosed as a case of acute appendicitis who underwent emergency appendectomy as well as laparoscopic appendectomy were enrolled in the study. The ethical clearance was taken from Institutional Review Committee. Informed written consent was taken from all patients. The diagnosis of acute appendicitis was made on basis of history, clinical examinations, Alvarado scoring systems, laboratory investigations and ultrasonography of abdomen and pelvis.

Patients with cirrhosis and coagulation disorder, Psychiatric illness, pregnant women, generalized peritonitis with shock at the time of admission, ascites with abdominal distension, severe pulmonary and cardiac diseases were excluded from the study. Ninety patients were enrolled in the study and were divided into two groups: Laparoscopic appendectomy and Open appendectomy. Each group of the patients received injection ceftriaxone (1gm) and metronidazole (500mg) prior to induction of anesthesia. Laparoscopic appendectomy was performed by using standard 3 ports technique. Pneumoperitoneum was achieved by using verres needle technique positioned at supraumbilical site and a pressure of 12-15 mm of Hg of carbon dioxide was maintained. The patients were placed in Trendelenburg position with slight tilt to the left. The abdominal cavity was thoroughly inspected to rule out any other pathology. The mesoappendix was divided with ligature and base of the appendix was tied with chromic endoloops. The appendix was kept in endobag made up of gloves and extracted through umbilical port. Open appendectomy was performed by Grid iron or Lanz incision. Appendix was delivered after opening the peritoneum and the base of the appendix was transfixed with absorbable sutures after taking care of mesoappendix. All the specimens were sent for Histopathological examinations. Patients were orally allowed after 4 hours of surgery, started with liquids to soft diet. For pain relief we used injection ketorolac 30mg 8 hourly for 24 hours followed by flexon(Paracetamol 500mg+ Ibuprofen 400mg). Patients were discharged once vitals were stable, tolerated normal diet with good pain control.

The parameters examined in the study were demographic data of the patients (age, sex), operations time (from skin incisions to closure), post-operative pain (as rated based on Numeric Pain Rating Scale (NPRS) of 0 to 10 with higher score indicating more severe pain. Intensity of pain was collected at 8 hours after surgery, and on day 1 and day 2, Length of hospital stay (counted as in which postoperative day patient was discharged) and surgical site infections (defined as redness, purulent or seropurulent discharge from wound site).

All data were collected and statistical analysis was done using SPSS version25.0.The numerical data were expressed as mean and standard deviation. Independent sample t tests for parametric continuous variables and chi-square analysis for categorical variables were used.P-value of <0.05 was considered statistically significant.

Results

90 patients underwent appendectomy, 44 with laparoscopic technique (LA group) and 46 with open technique (OA group).Out of 90 patients 45 were male (50%) and 45 were female (50%) with ratio of 1:1 as shown in Table 1.

Table 1: Patients according to gender

Sex	LA group	OA group	Total	P value
Male	22	23	45(50%)	
Female	22	23	45(50%)	0.5
Total	44	46		

Incidence of acute appendicitis was highest in the age group between11-20 years (33.33%) followed by 21-30 years (25.55%) as shown in Table 2.

Table 2: Distributions of patients according to age \ groups

Age group(year)	LA group	OA group	Total
1-10	1	6	7(7.77%)
11-20	14	16	30(33.33%)
21-30	15	8	23(25.55%)
31-40	7	7	14(15.55%)
41-50	4	4	8(8.88%)
51-60	1	3	4(4.44%)
61-70	2	2	4(4.44%)
Total	44	46	90(100%)
Mean +/- S.D.	27.41 ±13.07 Age(years)	27.02 ±15.48 Age(years)	Highest number53 (58.88%)

The mean duration of operative time in laparoscopic appendectomy (LA) was 42.95±2.46 where as in open appendectomy (OA), it was 35.25±1.87 which was statistically significant (p<0.001) as shown in Table 3.

Table 3: Comparison of operative time between LA with OA group

Operation time (minutes)	LA group	OA group	P value
	42.95±2.46	35.25±1.87	<0.001

Patients were analyzed for pain using Numeric Pain Rating Scale (NPRS) which showed less postoperative pain in LA group compared to OA group which was taken at 8 hours, at day 1, and at day 2 following surgery as shown in Table 4.

Table 4: Comparison of postoperative pain between LA with OA group

Postoperative Numeric Pain Rating Scale (NPRS)	LA group	OA group	P-value
8 hours	7.77±1.03	8.45±1.16	0.002
Day 1	5.01±0.88	5.80±0.99	<0.001
Day 2	3.54±1.19	4.26±0.89	<0.001

Mean duration of hospital stay in LA group was2.02±0.26 where was in OA group it was 2.52±0.54 which was statistically significant (p<0.001) as shown in Table 5.

Table 5: Comparison of hospital stay between LA with OA group

Duration of hospital stay (Days)	LA group	OA group	P- value
1	1	1	
2	41	20	
3	2	25	P<0.001
Total	44	46	
Mean±SD	2.02±0.26	2.52±0.54	

During follow up in OPD, 1(2.27%) patient developed surgical site infections in LA group whereas 6(13.04%) patients in OA group as shown in Table 6.

Table 6: Comparison of wound infection between LA with OA group

Type of Surgery	Wound infection (%)	No wound infection (%)	P-value
Laparoscopic appendectomy	1(2.27%)	43(97.72%)	0.029
Open appendectomy	6(13.04%)	40(86.95%)	

Discussion

In general surgical practice Laparoscopic appendectomy is very common surgical procedure where expertise, equipment's and facilities available. Moreover, it facilitates the complete visualzations of peritoneal cavity thus it has got diagnostic value, helps to find out the cause of pain abdomen and avoids unnecessary negative appendectomy. In our hospital both laparoscopic appendectomy and open appendectomy is performed for removal of acutely inflamed appendix. This study was conducted to know the surgical outcomes between Laparoscopic and Open appendectomy. In the present study, equal number of male (45) and female (45) patients were operated with ratio of 1:1, which does not show any statistical significant difference (P=0.5).However, the study conducted earlier in our hospital showed female predominance [6] but the study conducted by Williams et al showed male predominance [7]. Therefore, it is variable in different series. Incidence of acute appendicitis was highest between age groups 11 to 30 years; altogether 53 (58.88%) as shown in Table 2. This was comparable with the study conducted by Jawad Khalil et al [8]. The study conducted by Kurtz RJ et. al. mentioned the highest incidence of acute appendicitis in second and third decades of life [2].

The mean duration of operative time in laparoscopic appendectomy (LA)was 42.95±2.46 where as in open appendectomy (OA)was 35.25±1.87 (P<0.001).The study conducted by Biondi et al too showed longer operative time in laparoscopic appendectomy [9].It mainly depends on experience of surgeons with competent operating team [10]. In our case it was longer because of early learning curve with technical difficulties. However, the study conducted by Minutolo, Vincenzo et al showed no difference in operative time as less as two minutes [11]. Patients were analyzed for pain in postoperative period at 8 hours, at day 1 and at day 2 using Numeric Pain Rating Scale (NPRS) as shown in

Table 4.The patient on laparoscopic appendectomy group experienced less postoperative pain compared with open appendectomy group. This may be due to more tissues trauma at single incision site in open appendectomy. Less postoperative pain in laparoscopic appendectomy was mentioned in different series [9, 12, 13] which was comparable with our study. A meta-analysis conducted by Ioannis Kehagias etall showed significantly less pain after laparoscopic appendicectomy [14]. Mean duration of hospital stay in laparoscopic appendectomy group was less compared with open appendectomy group as shown in Table 5. Similar findings were mentioned in the study conducted by Biondi et al, Merhoff et al [9, 15]. In our study reason behind long hospital stay in open appendectomy group was due to the complaints of pain by patients.

Surgical site infections was seen only in 1 patient (2.27%) in laparoscopic appendectomy group whereas 6 patients (13.04%) in open appendectomy group which was statistically significant (p=0.029). Similar type of finding was observed in the study conducted earlier in our institute [16]. Retrieval bag was used in laparoscopic appendectomy in the present study, so that inflamed appendix doesn't come in contact with wound, as acutely inflamed organs have adverse impact on surgical site infections [17]. Different studies mentioned that surgical site infection too depends on intraoperative findings of nature of appendix, more common in complicated appendicitis like gangrenous appendix, appendicular abscess and appendicular perforation peritonitis [11]. We found a lot of advantages of laparoscopic appendectomy compared with open appendectomy. However, a systematic meta-analysis of randomized controlled trials comparing laparoscopic versus open appendectomy concluded that both procedures are safe and equally effective for the treatment of acute appendicitis [18].

There were few limitations of our study that it was conducted in single center with small sample size. Our follow-up was limited to 4 weeks postoperatively and long term complications were not evaluated. We also could not analyze hospital cost for laparoscopic and open appendectomy.

Conclusion

Laparoscopic appendectomy showed a lot of advantages compared to open appendectomy in terms of less postoperative pain, shorter hospital stay, less surgical site infections although operative time was prolonged.

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Conflict of interest: None

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