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COMPARATIVE STUDY ON OPEN APPENDICECTOMY VERSUS LAPAROSCOPIC APPENDICECTOMY

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Abstract:

Background: Appendectomy is done by two methods one is open appendectomy, and the other is with the help of laparoscopic appendectomy. Open Appendectomy is a technique in which small right lower quadrant incision is done and in which the postoperative recovery takes a long time. Laparoscopic appendectomy is termed as the procedure which has gained popularity and is a frequently used technique nowadays that is preferred for patients who are highly sensitive and experience difficulty in surgical recovery.

Aim: To compare the laparoscopic approach and the conventional technique in the treatment of acute appendicitis

Materials and methods: It was a prospective study conducted between March 2017 and February 2018. It involved 60 cases (30 cases opened and 30 cases laparoscopic) which were consecutively selected at the Department of Surgery, Banas Medical College and Research Institute, Palanpur, Gujarat.

Results: The mean age of the patients in the two groups was 23.9 and 22.1years, respectively. History of vomiting was present in 18 (60%) in open and 16 (54%) in the laparoscopic group. The other complaints were fever 14 (46%) in the open group and 12 (40%) in the laparoscopic group. In the present study, abnormal pathology was noted in 26 (86%) and 22 (73%) in the open and laparoscopic group respectively. Ultrasound was normal in 4 (14%) of open group and 8 (27%) in the laparoscopic group. Both pain and analgesics used were significantly reduced in laparoscopic compared to open appendicectomy.

Conclusion: Through the findings of this study, it was evident that variation in outcomes between laparoscopic and open appendicectomy can be differentiated based on different parameters such as VAS value, Post-operative recovery and complications faced as well. Use of analgesics in laparoscopic appendicectomy is less as compared to open appendicectomy. The length of hospital stay is more in open appendicectomy as compared to laparoscopic appendicectomy.

Introduction

A blockage, when experienced in the lining of the appendix results in infection, causes appendicitis. In few cases the bacteria multiply in a rapid manner proving as a major cause for the appendix to turn swollen, inflamed or noticed to be filled with pus irritating the abdominal wall (peritoneum)[1]. If care is not taken it can take the form of appendix rupture complicating the case. Appendicitis is termed as the commonest acute surgical disease. In most of the cases of appendicitis, appendectomy is prescribed for treating the patients[2].

Appendectomy is done by two methods one is open appendectomy, and the other is with the help of laparoscopic appendectomy. Open Appendectomy is a technique in which small right lower quadrant incision is done and in which the postoperative recovery takes a long time. It is termed as an intra-abdominal surgical emergency with a lifetime risk of 6%[3]. In some cases of appendicitis, pain is severe and unbearable which results in early morbidity. Thus, for treating acute appendicitis open appendectomy resulting in low morbidity[4].

Laparoscopic appendectomy is termed as the procedure which has gained popularity and is a frequently used technique nowadays that is preferred for patients who are highly sensitive and experience difficulty in surgical recovery. It is recommended by most of the doctors because of three major factors they are less time required for the hospital stay, early and easy recovery as well as less operative time required to accomplish the surgical process[5]. Likewise both the procedures have its pros and cons to be considered as per different situational demands. Analgesic requirements differ in both the treatment depending upon the severity of pain the patient experiences. Time taken for oral intake after post-operation period and resuming to normal activities in life also depends and varies from patients to patients

and the line of treatment chosen to treat the patient[6].

With regards to Open Appendectomy the time taken for surgery is quite more as the incision done is of 8 to 10 inch in-depth than it is taken in Laparoscopic surgery which requires just a small and narrow incision to insert a tube called cannula using a fibre-optic tube that is connected to the video camera so that the doctor can see the exact condition of the ailment to treat Appendicitis[7]. The quality of life after laparoscopic surgery is observed to be better than that of open appendectomy surgery. The duration of hospital stay is 1 to 2 days after surgery is done with the aid of laparoscopic method whereas duration of stay is 2 to 3 days and can last 4 to 5 days after surgery in sensitive cases when it comes to open appendectomy surgery[8].

Usually, the recovery time required for an open appendectomy is more than it is for the laparoscopic method been used. In laparoscopic surgery, there is a risk of abscess formation internally which can lead to further complications and a need for a second surgery if not taken proper care. Laparoscopic surgery is quite expensive than open appendectomy because of high-end apparatus and instruments used in the entire procedure. The severity of pain in both the cases (open and laparoscopic) can be denoted with the help of VAS value which in laparoscopic surgery is less than an open appendectomy. In case of a ruptured appendix, the patient has to undergo a drain incision which takes more operative time as well as recovery time too. The total cost of laparoscopic surgery fits well in the budget due to shorter hospital stay which is totally opposite in the case of open appendectomy[10].

Undergoing a laparoscopic procedure for appendicectomy in comparison to open surgical technique can be contrasted well on the above-mentioned factors they are the duration of the surgery, duration of analgesic, post-operative pain, post-operative complications faced such as vomiting, nausea, ileus, abscess in intraabdominal region, infected wounds, the length of hospital stay and the time taken to return to normal routine work and life. Visual Analogue pain scale helps better in determining the pain experienced by the patient in both of the treatments.

Aim

To compare the clinical terms such as (hospital stay, operating time, postoperative complications, analgesia requirement, time to oral intake and to resume normal activity) and the hospital expenses between open appendectomy and laparoscopic appendectomy in the treatment of acute appendicitis.

Materials and Methods

It was a prospective study from March 2017 to August 2018. It involved 60 cases (30 cases opened and 30 cases lap) which were consecutively selected at the Department of Surgery, Banas Medical College and Research Institute, Palanpur, Gujarat.

Inclusion criteria

- Patients with a clinical diagnosis of acute or recurrent appendicitis with necessary investigations

Exclusion criteria

- Those not willing for the study, children <10yrs, pregnant women and those with complications

Treatment

Patients who presented with abdominal pain, vomiting, fever, and on examination with tenderness in right iliac fossa with guarding or rigidity or some findings of them, were investigated with the necessary investigation and were diagnosed of acute/ recurrent appendicitis were posted for surgery.

Open appendicectomy was performed through a muscle splitting incision in the right iliac fossa. The base of the appendix was crushed ligated, and the stump of the appendix was not invigilated. Laparoscopic appendicectomy was done using a standardized approach involving a closed technique for trocar insertion and by 3 port technique. The appendix was divided after ligature of the base. Appendix extraction was performed using the trocar sleeve to protect the wound from contamination during removal. Duration of surgery taken for a lap is from the time of port site incision to closure of the port by suturing and for open its from skin incision to skin closure.

All the cases were followed every day in the postoperative period until they were discharged and then later followed for a period of 4 weeks in the outpatient department. The following parameters were observed during follow up in comparison between two procedures, post-operative pain using a visual analogue pain scale and duration of analgesic used in the number of days. Postoperative complications like vomiting, ileus, abdominal abscess and wound infection. Patients in both study groups

were discharged as soon as possible, and duration of stay after surgery and duration of analgesics used after surgery in the number of days is noted.

Wound infection was defined as the discharge of pus that required surgical drainage. An intrabdominal abscess was defined as a fluid collection diagnosed at Ultrasonography or computed tomography which contained pus at ultrasonographically guided aspiration. The data was collected in MS-Excel and was analysed using SPSS-20 by applying chi-square test and student t-test.

Results

- Twenty (66%) patients of open appendicectomy and 10 (34%) patients of laparoscopic appendicectomy were males. Eighteen (60%) patients of open appendicectomy and 12 (40%) laparoscopic appendicectomy were females.
- The mean age of the patients in the two groups was 23.9 and 22.1 years, respectively.
- Thirty (100%) in the open group and 30 (100%) in the laparoscopic group complained of abdominal pain.
- History of vomiting was present in 18 (60%) in open and 16 (54%) in the laparoscopic group.
- The other complaints were fever 14 (46%) in the open group and 12 (40%) in the laparoscopic group.

Table 1:

	Appendicectomy			
	Open		**Laparoscopy**	
	No.	**%**	**No.**	**%**
Patients analysed	30	100	30	100
Sex				
Male	20	66	10	34
Female	18	60	12	40
Age (years)				
10-20	21	43	23	47
21-30	19	39	21	43
31-40	3	7	1	1
41-50	3	7	3	7
Mean age ±SD	23.9±7.8		22.1±6.5	
Symptoms Presenting Complaints				
Abdominal Pain	30	100	30	100
Nausea/ Vomiting	16	54	18	60
Fever	14	46	12	40
History of				
Episode of Pain	14	46	16	54
Findings Local Examination				
Tenderness				
Present	30	100	30	100
Absent	0	0	0	0
Guarding/Rigidity				
Present	16	54	24	80
Absent	14	46	6	20
Total Counts Parameters				
Mean	90810		90400	
SD	±2270		±2410	
Differential count with shift to left				
Present	24	80	18	60
Absent	6	20	12	40
Ultrasound Findings Report				
Normal	4	14	8	27
Abnormal pathology noted	26	86	22	73
Duration of Surgery				

<30 min	2		2	
31-60 min	38		17	
61-90 min	3		13	
91-120 min	1		5	
121-180 min	0		1	
Mean	32.12±10.2		28.5±20.1	
Details Post- operative pain score and medication			**Significance**	
	Open	**Laparoscopic**	**T value**	**P value**
Pain Score (0-4)	2.6 score (±) 0.5	1.2 score (±) 0.5	5.90	<0.05 sig*
Duration of analgesics used	5.90 days	2.1 days	8.03	<0.05 sig*
Parental and oral (days)	(±) 2.1	(±) 1.1		
Complications Post-Operative	**Open**	**Laparoscopic**	**T value**	**P value**
Vomiting	6 (20)	3 (10)	-	<0.05, Sig*
Abdominal abscess	2 (7)	0 (0)	-	0.21, NS*
Wound infection	4 (14)	2 (7)	-	<0.05, Sig*
Ileus (hrs)	28.8±8.2	18.2±6.9	5.08	<0.05, Sig*
Duration of hospital stay after surgery (days)	**Open**		**Laparoscopic**	
1	0		5	
2	0		22	
3	5		12	
4	22		4	
5-9	4		0	
10-15	5		0	
Mean	3± 1.84		2.6± 0.8	
P value	<0.05		<0.05	
Days for recovery: Post – Operative time taken to return to normal work				
6-8	4		26	
9-12	9		15	
13-16	20		6	
17-20	8		1	
Mean	12.7±3.12		12.7±2.95	

- 46% and 54% of the patient of the open and laparoscopic group respectively had a history of episodes of abdominal pain in the past.
- All patient in both groups had right iliac fossa tenderness and 16 (54%) in the open group and 24 (80%) laparoscopic group had guarding / rigidity.
- The laboratory parameters of patients in the open and laparoscopic group were comparable. 24 (80%) and 18 (60%) of the open and laparoscopic group respectively were showing differential count with a shift to the left.
- Abnormal pathology was noted in 26 (86%) and 22 (73%) in the open and laparoscopic group respectively. Ultrasound was normal in 4 (14%) of open group and 8 (27%) in the laparoscopic group.
- In open appendicectomy, the mean surgery duration was 32.12±10.2 min, whereas, for lap appendicectomy, the mean duration of surgery was 28.5±20.1 (P<0.05)
- The average pain score was 2.6 (±0.5) in the open group as compared to 1.2 (±0.5) in the laparoscopic group with p <0.05 which was significant.
- Duration of analgesics used parental and oral in days were on an average 5.90 (±2.4) and 2.1 (±1.0) for the open and laparoscopic group respectively. Again, this difference was significant (p <0.05).
- The incidence of vomiting was higher following open appendicectomy (20%) than laparoscopic (10%), which is significant with P<0.05. Average postoperative ileus was 28.8 (±8.2) hrs for open, and 18.2 (±6.9) hrs for the laparoscopic group was noted, with P<0.05, which is significant.
- Wound infection was more common after open 4 (14%) than laparoscopic 2(7%) and the difference was significant (P<0.05).
- Intra-abdominal abscesses developed in 2 (7%) of the open group and case in the laparoscopic group. However, this difference was not significant (P=0.21).
- In laparoscopic appendicectomy, mean postoperative stay in the hospital was 3±1.84 days

whereas, in open appendicectomy, it was 2.6±0.8 days (P<0.05).

Discussion

In this study comparison with regards to the mean duration of surgery, laparoscopic appendicectomy took 28.5±20.1 min, and open appendicectomy took 32.12±10.2 min (p<0.05). Familiar observations have been observed in other related studies conducted by Mishra et al. (2008) and Marzouk (2003) based on similar findings as well[11,12]. The mean (operate-time) was 18 minutes longer in the case of laparoscopic appendicectomy. However, McAnena et al. (1992) reported that despite longer operating time, the advantages of making it a worthwhile alternative for patients with acute appendicitis[13].

In the present study, pain score was 2.6±0.5 for the open group as compared to 1.2±0.5 in the laparoscopic group (P<0.05) because of longer incision stretching of muscles and wound infection subjected. Similar observations are reported by Chung et al. (1999) and Minne et al. (1997)[14,15].

In a study conducted by Ortega et al.; linear analogue pain scores were recorded in 134 patients blinded to the procedure of operation by special dressing and pain score was observed to be very less in the laparoscopic group when compared to open group[16].

Postoperative complications like vomiting were lower in the laparoscopic group with 10% as compared with 20% in the open group (P<0.05) and ileus was lower in the laparoscopic group with 28.8±8.2 and for the open group with P<0.05 which were significant. The similar studies done showed that the incidence of emesis was lesser and postoperative ileus lesser in laparoscopic group[16].

In the present study, there is a significant reduction in the incidence of postoperative wound infection in the laparoscopic group 14% as compared to open group 7% (P<0.05). Similar findings were observed in other studies also[17-18]. Pedersen et al. (2001)[19] showed that laparoscopic appendicectomy significantly improved the postoperative wound infection rate. In this study, there was 2% (7) wound infection in the laparoscopic group, whereas in the open group, the infection rate was 14% (n=4).

Duration of postoperative hospital stay was significantly low for laparoscopic group 3±1.84 as compared to open group 2.6±0.8. The longer hospital stays in open group compared to the laparoscopic group also has been reported by others. In Tate JJT (1993); Mehoff et al. (2000), studies state that stay was shorter for the laparoscopic group (P<0.04)[17,18].

Return to normal activity was early for laparoscopic group 12.7±3.12 days as compared to open group 12.7±2.95 days. The study conducted by Moberg (2005) showed similar findings[20].

Conclusion

Through the findings of this study, it was evident that variation in outcomes between laparoscopic and open appendicectomy can be differentiated based on different parameters such as VAS value, Post-operative recovery and complications faced as well. Use of analgesics in laparoscopic appendicectomy is less as compared to open appendicectomy. The length of hospital stay is more in open appendicectomy as compared to laparoscopic appendicectomy. In every manner, open appendicectomy lacks in today's time in comparison to laparoscopic appendicectomy, excluding the only parameter taken into consideration that is the time required to perform the surgery is more in laparoscopic appendicectomy. There are fewer chances of abscess formation as the incisions are not that deep in laparoscopic appendicectomy surgery. Therefore, it can be stated on overall evaluation that open appendicectomy is not that effective nowadays except treating rare cases whereas laparoscopic appendicectomy is used worldwide to treat a large number of patients with budget-friendly, short hospital stay and early recovery as major plus points.

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