



LAPAROSCOPIC APPENDICECTOMY: A PROSPECTIVE ASSESSMENT

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Kandalgaokar**ABSTRACT**

Laparoscopic appendicectomy has been criticized for longer operative time and higher hospital costs as compared to open surgery.

It was John Benjamin Murphy from Chicago who described that every few years important subjects in surgery should be revised and discussed again and again so that lessons connected to their line of management could be constantly kept before profession⁶.

Present study was undertaken for the same reason. In the present study, the techniques of appendicectomy were evaluated Traditional "Open" and Total Laparoscopic appendicectomy. Total 120 cases were studied in rural hospital to evaluate the efficacy of the two techniques in managing appendicitis.

MATERIAL AND METHODS: 120 patients were studied from duration 2008 to 2011 in Tertiary care centre

CONCLUSIONS: Laparoscopic appendectomy, over all, had following advantages over open surgery in term of Less post operative pain, Shorter convalescence, Less post operative wound infection, Better cosmesis, Shorter hospital stay, Early return to normal activity

KEYWORDS :**INTRODUCTION :**

for appendicectomy, the opinion about laparoscopic or open technique is divided. Since its initial description by Kurt Semm in 1982¹, Open appendicectomy has withstood the test of time for more than a century since its introduction by Charles Gastro-intestinal surgery has undergone a revolution in the recent years by the introduction of laparoscopic techniques. Now it's part of everyday surgical practice Need to be more cosmetic, least invasive had driven us to shift from open to laparoscopic method for appendicectomy. The procedure is standardized amongst the surgeons and unlike cholecystectomy, open appendicectomy is typically completed using small right lower quadrant incision and post operative recovery is usually uneventful².

Acute appendicitis is the most common intraabdominal surgical emergency, with a lifetime risk of 6%. The overall mortality of open appendicectomy is around 0.3% and morbidity around 11%³.

Numerous prospective randomized studies Meta analysis and systematic critical reviews have been published on the topic of laparoscopic appendicectomy⁴. However, the heterogeneity of the variables and other weakness in the methodology has not allowed drawing definitive conclusions and generalizations. The results of the various trials conducted have not conclusively proved the superiority of one procedure over the other. However, several studies have shown the benefits of laparoscopic appendicectomy over open in terms of less post operative morbidity, less pain, less rates of wound infection, less post operative hospital stay, early resumption of activity and work, better cosmetic and also as an investigational tool for diagnosis of other abdominal pathologies⁵.

On the other hand, laparoscopic appendicectomy has been criticized for longer operative time and higher hospital costs as compared to open surgery.

It was John Benjamin Murphy from Chicago who described that every few years important subjects in surgery should be revised and discussed again and again so that lessons connected to their line of management could be constantly kept before profession⁶.

Present study was undertaken for the same reason. In the

present study, the techniques of appendicectomy were evaluated –Traditional "Open" and Total Laparoscopic appendicectomy. Total 120 cases were studied in rural hospital to evaluate the efficacy of the two techniques in managing appendicitis.

MATERIALS AND METHODS:

Tertiary medical centre.

Duration

November 2008 to November 2010.

Design

Prospective, open labeled, comparative, two armed study.

Inclusion Criteria

All patients undergoing appendicectomies with

- a). History of acute appendicitis
- b). Recurrent appendicitis for interval appendicectomies.

Exclusion Criteria

Patients less than 12 years of age were not included in the study. When imaging techniques such as ultrasound, x ray abdomen or Computed Tomography scan in some cases revealed some non appendicular pathology, the patients were excluded.

Appendicular lump or perforation, appendicular malignancy and previous extensive pelvic surgery were excluded.

All patients unfit for pneumoperitoneum laparoscopy were excluded. This mainly included patients with cardiac diseases, bronchial asthma, chronic obstructive pulmonary diseases, renal diseases, hepatic diseases, bleeding disorders etc.

All screened patients were investigated with routine hematological test, Chest X ray, Ultrasound of the abdomen and pelvis. The patients who were eligible to be included in the study were randomly allocated to one of the two arms of study.

- a). Open appendicectomy by Mc Burney's / Lans incision
- b). Total laparoscopic appendicectomy using three ports.

Most of the patients were admitted one day prior to surgery. They were operated as per the allocated technique and the

relevant operative and post operative findings were noted. The operative findings included the appendicular findings such as ease of finding the appendix, the degree of adhesions to the surroundings, the associated blood loss the other findings included the presence of free fluid, pelvic pathology in females, tubercles, malignancy, bowel stricture.

The need for change of plan was recorded as FAILURE. Thus in the open appendicectomy, the need for muscle cutting incision was recorded as failure. All cases of laparoscopic appendicectomy which had to be converted to open were considered as failure.

The antibiotic protocol consisted of one dose of injection Cefotaxime 1 gm for adults along with 500mg of injection Metronidazole and Gentamycin as induction antibiotic. The same antibiotics were continued for three doses in the post operative period.

The analgesic used was injection Diclofenac Sodium 50 mg 8 hourly and the degree of pain was recorded as per the visual analog scale at 6 hours, 12 hours and 24 hours. The need for any rescue analgesia was also noted. Visual Analogue Scale (VAS) is a measurement instrument that tries to measure a characteristic or attitude that is believed to range across a continuum of values and cannot easily be directly measured.

Operationally a VAS is usually a horizontal line 100 mm in length anchored by word descriptors at each end, from none to an extreme amount of pain. The patients mark on the line the point that they feel represents their perception of their current state of pain. The VAS score is determined by measuring in millimeters or centimeters from the left hand end of the line to the point that the patient marks.

The patients were encouraged to mobilize and oral liquids were started on the next day morning of surgery. The tolerance of the patient to oral feeds was noted and accordingly the oral intake was increased.

The patients were discharged once they were ambulatory and could tolerate full oral diet.

The wounds were checked after 48 hours for the presence of any infection and necessary measures taken such as drainage of subcutaneous abscess or stitch removal for stitch abscess. They were advised regarding dressing of the wound accordingly. Suture removal was done after one week in all patients who had no wound infection.

The patients were followed up at the end of 1 week, 2 weeks and 1 month. The scars were checked and the post operative cosmeses of the scar were assessed as per the perception of the patients.

The patients were finally assessed regarding the relief of symptoms with which he /she presented. The data was recorded on the proforma.

RESULTS :

The study was carried out at Tertiary medical centre. A total of 120 patients were included. Out of which 60 patients underwent open appendicectomy and 60 patients laparoscopic appendicectomy.

There was no mortality in any of the patients.

Statistical Analysis:

1. Demographic Data:

Demographic characters like age and sex are mentioned. Age is expressed in mean and standard deviation (SD).

2. Descriptive Statistics Of All Characters:

Descriptive statistics of demographic characters like (age,

sex) and other parameters like chief complaints, post operative pain, operating time, resumption of daily activities, work, hospital stay, blood loss, post operative cosmeses and relief of symptoms are considered.

Data are expressed as mean, standard deviation and percentages. Unpaired t-test and chi-square test is use to analyze the date.

3. For statistical analysis statistical software SPSS (Statistical packages for social sciences) 6th version is used.

4. For all statistical comparison, p value <0.05 is considered statistically significant.

The observations were recorded as follows:

Table 1: Comparing mean age of patients

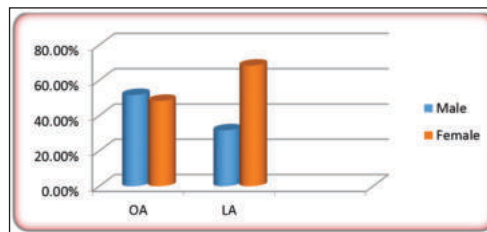
Parameter	Operating	Modalities
	OA	LA
Number	60	60
Mean age ± SD (Yrs)	31.2 ± 10.78	24.26 ± 7.94

Mean age of subject is higher in open appendicectomy group as compared to laparoscopic appendicectomy group. However, there is no significant difference in the mean age of patients in either study group.

Table – 2: Sex distribution of patients in the two groups.

Sex	Operating	Modalities	Total	P Value
	OA	LA		
Male	31(51.67%)	19 (31.67%)	50	0.0262
Female	29 (48.33%)	41(68.33%)	70	
Total	60	60	120	

Chi square test use, *value significant if <0.05.



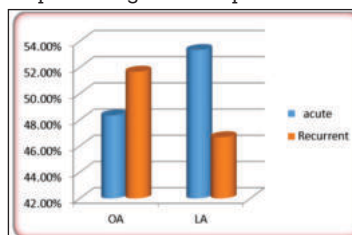
Graph 1: Sex distribution of patients in the two groups

Thus, there is statistically significant difference in the sex distribution of the two groups. There are 50 males as compared to 70 females in the study, which shows that there is female preponderance in the study.

Table3: Percentage of patients presenting with each chief complaint in both groups.

Chief Complaints	Operating	Modalities	Total	P value
	OA	LA		
h/o of acute Appendicitis	29 (48.33%)	32 (53.33%)	61	0.524
Recurrent appendicitis	31(51.67%)	28 (46.67%)	42	
Total	60	60	120	

Chi square test p value significant if p<0.05



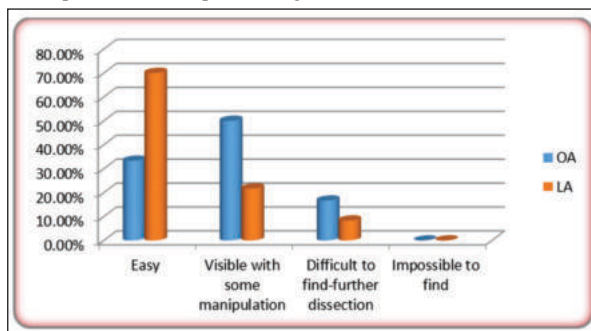
Graph 2: Percentage of patients presenting with each chief complaint in both group

H/o of acute appendicitis is chief complaint of presentation in both the group (48.33%) in open appendectomy group and (53.33%) in laparoscopic appendectomy group. Thus, maximum patients in both the groups had h/o acute appendicitis. Recurrent appendicitis is another chief complaint on presentation (51.67%) in open appendectomy group and (46.67%) in the laparoscopic appendectomy group. But the difference is not statistically significant.

Table 4: comparing both groups for ease of surgery.

Ease of finding appendix	Operating	Modalities	Total	P Value
	OA	LA		
Easy	20 (33.33%)	42 (70%)	62	<0.001
Visible with some manipulation	30 (50%)	13 (21.67%)	43	
Difficult to find-further dissection	10 (16.67%)	5 (8.33%)	15	
Impossible to find	0 (0%)	0 (0%)	0	
Total	60	60	120	

Chi square test use, p value significant if <0.05.



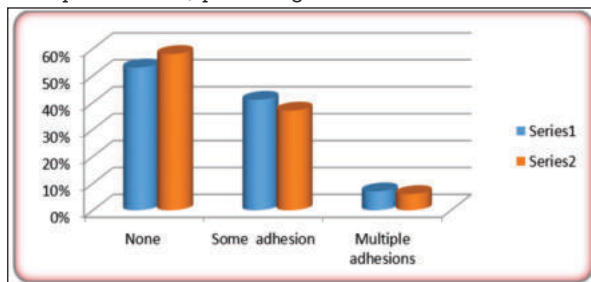
Graph 3: comparing both groups for ease of surgery

Ease of finding appendix was more in laparoscopic appendectomy group as compared to open appendectomy group and the difference is statistically significant (p<0.001). In about 70% of patients of patients of the laparoscopic appendectomy group, appendix could be found easily. In 21.67%patients, appendix was found after some manipulation or further dissection.

Table – 5: comparison of degree of adhesion in both groups.

Degree of adhesion	Operating	Modalities	Total	P Value
	OA	LA		
None	32 (53.33%)	35 (58.34%)	67	0.850
Some adhesion	25 (41.67%)	22 (36.67%)	47	
Multiple adhesions	3(5%)	3(5%)	6	
Total	60	60	120	

Chi square test use, p value significant if <0.05.



Graph 4: comparison of degree of adhesion in both groups

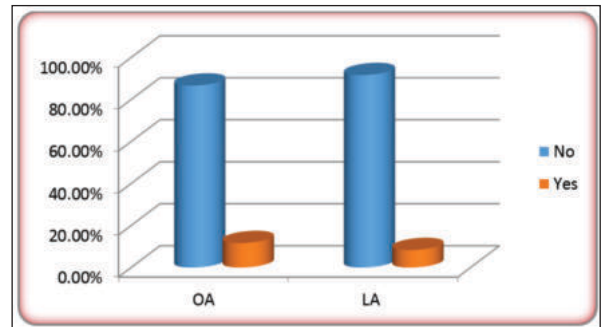
Most of the patients in the laparoscopic appendectomy group had no adhesion (58.34%) as compared to those in the open appendectomy (53.33%) group but the difference is not statistically significant (p=0.850). Also equal number of patients has some adhesion and multiple adhesions in both the group.

Thus, the two study groups were well matched as far as age, sex distribution, indication for surgery and difficulty level. Hence, further analysis can be assumed to be free of any bias.

Table – 6: comparison of need for change of plan in both groups.

Need for Change of plan	Operating	Modalities	Total	P Value
	OA	LA		
No(success)	52(86.67%)	55(91.67%)	103	0.523
Yes(failure)	7(11.67%)	5(8.33%)	17	
Total	60	60	120	

Chi square test use, p value significant if <0.05.



Graph 5: comparison of need for change of plan in both groups

Operative plan was carried out successfully in 91.67% of laparoscopic appendectomy group as compare to 86.67% in the open appendectomy group but the difference is not statistically significant.

The need for change of plan was felt in 5 cases of laparoscopic appendectomy. 2 cases were converted to open because hemostasis could not be achieved.

In rest of the 3 cases the procedure had to be converted to open due to excessive adhesions. Whereas in 7 cases of open appendectomy, the incision was inadequate and the incision had to be changed from muscle splitting to muscle cutting for adequate access.

Table – 7: comparison of postoperative pain (VAS score) in both groups.

Post operative Pain (VAS score)	Operating	Modalities	P Value
	OA	LA	
6 hrs	5.38 ± 1.53	4.23 ± 1.17	0.001**
12 hrs	4.26 ± 1.33	2.81 ± 1.13	0.001**
24 hrs	3.50 ± 1.07	1.46 ± 1.03	0.001**

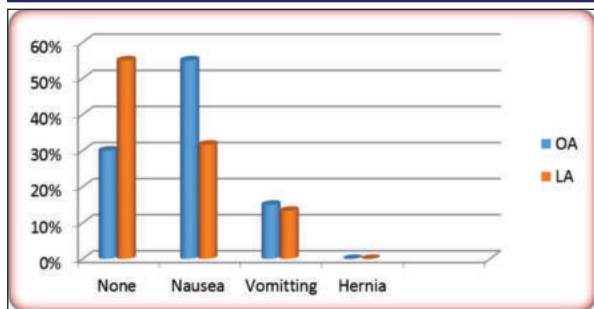
**Highly significant if p<0.001.

Thus, there was a declining pattern of pain on the VAS scale in both the groups. But the VAS scores of the patients undergoing open appendectomy were higher than that of the patients undergoing laparoscopic appendectomy at all the times. And the difference was statistically highly significant.

Table – 8: comparison of postoperative morbidity in both groups.

Post operative morbidity	Operating	Modalities	Total	P Value
	OA	LA		
None	18 (30%)	33 (55%)	51	0.017
Nausea	33 (55%)	19(31.67%)	52	
Vomiting	9(15%)	8(13.33)	17	
Hernia	0	0	0	
Total	60	60	120	

Chi square test use, p value significant if < 0.05. Highly sig. if <0.001.



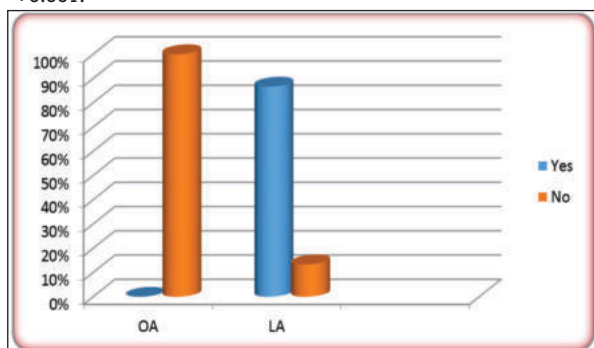
Graph 6: comparison of postoperative morbidity in both groups

Thus, the post operative morbidity was significantly high in patients undergoing open appendectomy. The incidence of nausea and vomiting was higher in the open group than in the laparoscopic group.

Table 9: comparing both groups for tolerance of oral feeds at the end of 24 hrs.

Tolerance of oral feeds	Operating Modalities		Total	P Value
	OA	LA		
Yes	0 (0%)	52(86.67%)	52	0.001*
No	60 (100%)	8 (13.33%)	68	
Total	60	60	120	

Chi square test use, *p value significant if < 0.05. Highly sig. if < 0.001.



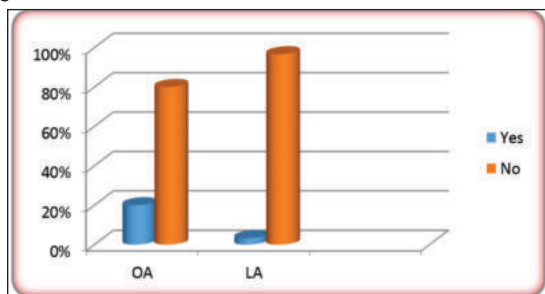
Graph 7: comparing both groups for tolerance of oral feeds at end of 24 hrs

Thus, there was a significant difference in the tolerance of oral feeds at the end of 24 hours after surgery. The tolerance was far superior in the laparoscopic group than open group.

Table - 10: comparison of wound infection in both groups.

Wound infection	Operating Modalities		Total	P Value
	OA	LA		
Yes	12 (20%)	2 (3.33%)	14	0.005
No	48 (80%)	58 (96.67%)	106	
Total	60	60	120	

Chi square test use, *p value significant if <0.05, highly significant if <0.01.



Graph 8: comparison of wound infection in both groups

Comparison of wound infection in both groups shows that only 3.33% of patients in laparoscopic appendectomy group have wound infection as compared to 20% in the open appendectomy group and the difference is highly significant (p=0.005). Thus, the incidence of wound infection was higher in open appendectomy as compared to laparoscopic group. The difference is statistically highly significant (p=0.005). The umbilical port site infection was seen in 2 patients of laparoscopy group

Table -11: comparison of post operative stay, resumption to daily activity & work and operative time in both groups.

Parameters	Operating Modalities		P Value
	OA	LA	
Post operative stay (days)	3.21 ± 0.97	2.41 ± 0.86	0.05*
Resumption of daily activities (days)	7.70 ± 2.50	6.28 ± 1.70	0.001*
Resumption of work (days)	14.51 ± 3.13	11.68 ± 2.69	0.001*
Operative time (min)	60.16 ± 13.14	48.83 ± 10.26	0.001*

Unpaired t- test use, * p value significant if < 0.05. Highly sig. If <0.001

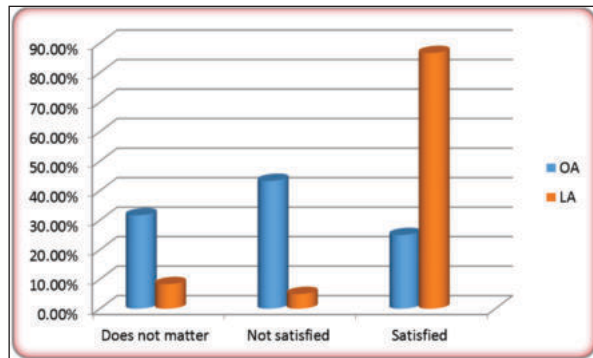
Although the operative time is significantly more in laparoscopic appendectomy group but the post operative stay is significantly less in laparoscopic appendectomy group (p<0.05). The average time taken by patients undergoing open appendectomy to resume their daily activities was 8-10 days, whereas those undergoing laparoscopic appendectomy was 6-7 days. Thus there was a significant difference between the two groups (p-0.001).

The average time for resumption of work in the open group was 14-17 days, whereas in the laparoscopic group was 11-13 days. Thus there was a highly significant difference between the two groups (p<0.001).

Table - 12: Comparing post operative cosmeses in both groups.

Post operative	Operating Modalities		Total	P Value
	OA	LA		
Does not matter	19 (31.67%)	5 (8.33%)	24	0.001*
Not satisfied	26 (43.33%)	3 (5%)	29	
Satisfied	15 (25%)	52(86.67%)	67	
Total	60	60	120	

Chi square test use, *p value significant if <0.05. Highly sig. If <0.001.



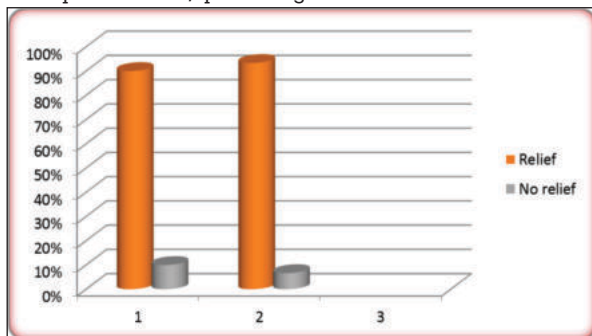
Graph 9: Comparing post operative cosmeses in both groups

Around 43.33% of patients were not satisfied with the scar they got after open appendectomy. In contrast, maximum patients of the laparoscopic group were satisfied with their post operative scar. There was a statistically highly significant difference between the two groups in this aspect.

Table – 13: comparing relief of symptoms in both groups.

Relief from symptoms	Operating Modalities		Total	P Value
	OA	LA		
Relief	54 (90%)	56 (93.33%)	110	0.509
No relief	6 (10%)	4(6.67%)	10	
Total	60	60	120	

Chi square test use, *p value significant if < 0.05.

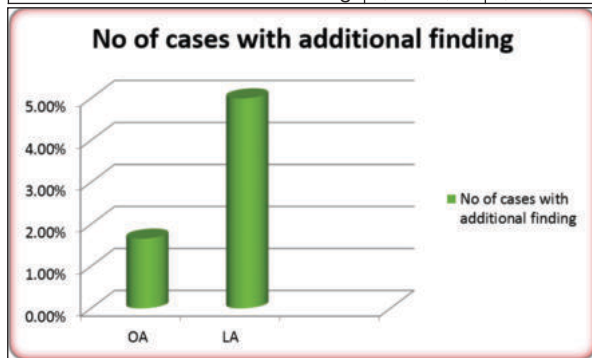


Graph 10: comparing relief of symptoms in both groups

Out of the 120 patients, around 93.33% patients showed relief of symptoms post operatively, whereas 10% patients still complained of symptoms. Thus, almost patients in each study group had relief of symptoms. The difference is not statistically significant (P=0.762).

Table – 14: percentage of additional pathologies in both groups.

Diagnosis of additional pathologies	Operating Modalities	
	OA	LA
No of cases with additional finding	1(1.66%)	3(5%)



Graph 11: percentage of additional pathologies in both groups

Additional finding of Mechel's diverticulum was found in 1 case of open appendicectomy where wedge resection anastomosis was done. There was evidence of left sided ovarian cyst in 1 patient. Right sided ovarian cyst was found in 2 patients for which gynecologist opinion taken.

CONCLUSIONS:

At the dawn of surgery excellence was associated with big incisions. "big scar-big surgeon". But today it is the era of minimal access surgery.

Laparoscopic appendectomy, over all, had following advantages over open surgery.

- Less post operative pain
- Shorter convalescence
- Less post operative wound infection
- Better cosmeses
- Shorter hospital stay
- Early return to normal activity

In the hands of an experienced laparoscopic surgeon, the LA

technique not only provides a panoramic but also proved to be a useful diagnostic tool.

Laparoscopic appendectomy is safe and was successfully completed in 91.67% of patients in our study.

We believe these are the major benefits a laparoscopic approach.

On balance, the decision between a laparoscopic or open operation has to be determined by the individual preferences of patients and surgeon, depending on the resources available.

Thus, laparoscopic appendectomy is a key procedure in the development of laparoscopic surgery.

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