International Surgery Journal
Agrawal SN et al. Int Surg J. 2017 Mar;4(3):993-997
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20170849

Original Research Article

Study of laparoscopic appendectomy: advantages, disadvantages and reasons for conversion of laparoscopic to open appendectomy

Sujan Narayan Agrawal*, Sunita Meshram, Kamlesh Dhruv

Department of General Surgery, LTBRKM Government Medical College, Jagdalpur, Chhattisgarh, India

Received: 07 January 2017
Accepted: 04 February 2017

***Correspondence:**
Dr. Sujan Narayan Agrawal,
E-mail: drsujanagrawal@gmail.com

ABSTRACT

Background: Good outcome has been reported with the laparoscopic approach in uncomplicated appendicitis, but a higher incidence of postoperative intraabdominal abscesses has been reported after laparoscopic appendectomy in complicated appendicitis. Objective was to study the efficacy of laparoscopic appendectomy.
Methods: A Hospital based cross sectional study was carried out among of 302 patients. The study duration was from June 2004 to December 2006. Institutional Ethics Committee permission was obtained. Informed individual consent was taken. Out of 302 subjects, 236 underwent open appendectomy and 66 underwent laparoscopic appendectomy.
Results: It was observed that in both the groups majority patients had retrocecal position of the appendix. The amount of blood loss, adjacent organ injury and duration of surgery were similar in both the groups. The difference in the incidence of wound infection in both groups was not found to be statistically significant. But the antibiotic use was significantly less in the LA group compared to OA group. It was found that time to resumptions of oral fees, duration of hospital stay and time to return to normal duties were significantly lesser in LA group compared to OA group. ($p < 0.001$). As per the cosmetic end result, majorities were satisfied in LA group and rated the surgery as excellent as compared to patients in OA group.
Conclusions: Laparoscopic appendectomy was better than open appendectomy with respect to wound infection, tackling co-existing pathology, duration of hospital stay, earlier return to normal activity, excellent cosmetic end result, lesser use of antibiotics and earlier resumption of oral feeds.

Keywords: Duration of hospital stay, Laparoscopy, Wound infection

INTRODUCTION

For diagnosis and treatment purpose the Laparoscopic appendicectomy is gaining wide acceptance. The estimated incidence of Appendicitis is about 7% in industrialized countries. USA shows around 300,000 cases/year. 2nd and 3rd decades of life shows maximum incidence. The male to female ratio at puberty is 3-4:1. Diagnosis of appendicitis is difficult. During the reproductive years of women, it is estimated that about 40% are not diagnosed properly. Moreover in 20-30% of patients may not show inflammation of the appendix but present with signs and symptoms.[1]

Many advantages of Laparoscopic surgery have been documented over to open appendectomy. It requires small incisions and its gives good visualization, it also gives better access to reach the organs in abdomen, as well as fast recovery in the post-operative period. Even Meta-analyses of randomized, controlled trials proved that this approach in better as compared to open appendectomy. It also showed that the incidence of intra-abdominal abscess is thrice more in LA than OA.[2]

The incidence of intra-abdominal abscess is found to be more common especially in complicated cases of appendicitis.[3]

Hence laparoscopic appendectomy is considered a suitable surgical technique for uncomplicated appendicitis. As mentioned above, it has several advantages. But it has certain and some disadvantages also. Hence it is the choice of surgeons to decide whether to go for laparoscopic appendectomy or open appendectomy.[4]

Use of Laparoscopic appendectomy technique in cases of complicated appendicitis remains doubtful.[5] Considering pros and cons discussed above, laparoscopic appendicectomy is suggested as the method of choice for surgical treatment for acute appendicitis.[6]

Considering these issues, we have undertaken to study the efficacy of laparoscopic appendectomy its advantages, disadvantages and reasons for conversion of laparoscopic to open appendectomy.

METHODS

Hospital based cross sectional study was done. A total of 302 patients were included in the present study who have undergone appendicectomy. The study duration was from June 2004 to December 2006.

Institutional ethics committee permission was obtained. Informed individual consent was taken.

Inclusion criteria

- Confirmed cases of acute appendicitis
- Patients scheduled for interval appendectomy

Exclusion criteria

- Patients presenting with appendicular mass and/or features of generalized peritonitis

Out of 302 subjects, 236 underwent open appendectomy and 66 underwent laparoscopic appendectomy. Data was collected on a program basis; clinical examination, pre-operative findings as well as postoperative recovery and follow up were all done by the surgeons.

Patients age, sex, race and other details ASA class (American Society of Anesthesiologists risk classification) were recorded. Pre-operative fever, leukocytes, right lower quadrant pain, right lower quadrant tenderness, nausea, vomiting and anorexia were recorded. Each patient's hospital bill was examined to obtain data on his doctor total expenditure. Time until return to work or normal activities was determined by examination of the post-operative out-patient medical records and by a one month post-operative follow up interview. In the one month post-operative interview, patients were also asked to grade their perception to the cosmetic result on a scale of one to five (one being worst and five being the best).

The various criteria which were taken into account for the study were patient selection for each type, 302 patients who had either minimal symptoms or were scheduled for interval appendectomies, duration of surgery, amount of blood loss in each type of procedure, number of days of use of Parenteral and oral antibiotics in each case, number of days of Parenteral and oral analgesics in each case, total number of days the patient spent in the hospital following surgery, time taken by the patient to resume routine work and patient perception and satisfaction regarding cosmetic end results.

Qualitative data was summarized in terms of percentage and the mean and standard deviation was used for quantitative data. The two groups were compared using needed statistical technique. The difference in percentage was statistically assessed using chi square test/Fisher's exact test. Student's t-test was used to compare means. A p value of less than 0.05 was considered as statistically significant result.

RESULTS

Table 1: Distribution of study subjects as per the position of appendix.

Position	Open appendectomy (OA)		Laparoscopic appendectomy (LA)		P-value
	Number	Percentage	Number	Percentage	
Retrocecal	202	85	64	96.9	0.1
Ileal	18	7.8	00	00	
Pelvic	12	05	02	3.04	
Sub hepatic	02	0.6	00	00	
Other	02	0.6	00	00	

It was observed that in both the groups majority patients had retrocecal position of the appendix. The next major presentation in LA group was pelvic position of the appendix. In this group patients presented only with two types of presentations, i.e. retrocecal and pelvic. In OA group all positions of the appendix were found; ileal, pelvic, sub hepatic and other in decreasing order.

Table 2: Distribution of study subjects as per the results of appendectomy.

Details		Open appendectomy (OA)		Laparoscopic appendectomy (LA)		P value
		Number	Percentage	Number	Percentage	
Blood loss	< 50 ml	224	95	65	98	0.2
	50-100 ml	12	05	01	02	
No adjacent organ injury		236	100	65	98	0.2
Duration of surgery		34±25*		45±26*		0.07

*These are mean+standard deviation

Table 3: Distribution of study subjects as per the post operative parameters.

Parameters		Open appendectomy (OA)		Laparoscopic appendectomy (LA)		P value
		Number	Percentage	Number	Percentage	
Wound infection		01	03	00	00	0.02
Antibiotic use (days)	Parenteral	2±0.8*		1.5±0.5*		0.001
	Oral	2±0.6*		3±0*		-
Analgesic use	Parenteral	2±0.7*		2±0*		-
	Oral	3±0.7*		3±0*		-

*These are mean+standard deviation

Above table shows the comparison between some parameters of two types of surgical techniques. Thus it can be observed that the two procedures were found similar with no statistical difference in these aspects studied. The amount of blood loss, adjacent organ injury and duration of surgery were similar in both the groups. The patients in both the groups were assessed post operatively for incidence of wound infection, use of antibiotics and use of analgesic. The difference in the incidence of wound infection in both groups was not found to be statistically significant. But the antibiotic use was significantly less in the LA group compared to OA group.

Table 4: Distribution of study subjects as per the post-operative course.

Details	Open appendectomy (OA)	Laparoscopic appendectomy (LA)	P value
Time to resumptions of oral feeds (days)	1.6±0.8	1.1±0.3	0.001
Duration of hospital stay	4±1.4	2±0.6	0.001
Time to return to normal duties	12±2.8	9±2.1	0.001

Table 5: Distribution of study subjects as per the cosmetic end result.

Details	Open appendectomy (OA)		Laparoscopic appendectomy (LA)		P value
	Number	Percentage	Number	Percentage	
Unacceptable	3	1.7	00	00	0.001
OK	4	1.69	00	00	
Acceptable	174	73.72	00	00	
Good	50	21.18	02	04	
Excellent	6	2.54	64	96	

Post-operative course was studied in both the groups in terms of time to resumptions of oral fees, duration of hospital stay and time to return to normal duties. It was found that time to resumptions of oral fees, duration of hospital stay and time to return to normal duties were significantly lesser in LA group compared to OA group. ($p < 0.001$). Thus LA surgical technique was found to be better in this aspect as compared to OA surgical technique. As per the cosmetic end result, majorities were satisfied in LA group and rated the surgery as excellent as compared to patients in OA group. OA technique was reported as unacceptable by 1.7% in OA group and no one in LA group. 1.69% rated OA as OK compared to no

one in LA group. Because 96% rated excellent and 4% as good in LA technique, we could not find anyone in the lower rating categories.

DISCUSSION

It was observed that in both the groups majority patients had retrocecal position of the appendix. The amount of blood loss, adjacent organ injury and duration of surgery were similar in both the groups. The difference in the incidence of wound infection in both groups was not found to be statistically significant. But the antibiotic use was significantly less in the LA group compared to OA group. It was found that time to resumptions of oral fees, duration of hospital stay and time to return to normal duties were significantly lesser in LA group compared to OA group. ($p < 0.001$). As per the cosmetic end result, majorities were satisfied in LA group and rated the surgery as excellent as compared to patients in OA group.

Azaro EM et al concluded that for treatment of acute appendicitis, laparoscopic appendicectomy is a safe alternative. But he also pointed out that there are many disadvantages too.[1] These disadvantages should be overcome by the concerned surgeons.

Abe T et al observed that when compared among the two groups, there was a significant difference in terms of average patient age, preoperative C-reactive protein (CRP) level, and diffuse peritonitis.[2] Laparoscopic group has shown less incidence of complicated appendicitis. Dense adhesions and diffuse peritonitis were the reasons for converting the patient into open appendectomy. But overall, the LA group has shown significantly lower complication after surgery. The incidence of intra operative abscess was similar in both the groups.

Pokala N et al concluded that LA is comparable to OA except for high rates of intra abdominal abscess in LA. But he reported the lower rates of wound infection in LA.[3]

Yau KK et al in their study of 1,133 patients found that 224 (21.5%) of patients were identified as having complicated appendicitis by laparoscopic method. Out of these 224 patients, they operated 175 patients by LA methods and remaining 69 patients using OA.[4] In demographics, there was no significant difference among the two groups. The mean operation time was significantly less for LA group compared to OA group. Similarly the LA group had significantly lesser hospital stay. The conversion rate was only 0.6% in LA group who had wound infection compared to 10% in OA group and this was statistically significant. The author reported that no patient died in their study.

Garg CP et al observed that the reason of conversion in two cases was friable appendix.[5] They reported that laparoscopic appendectomy had taken a longer time which is in contrast to Yau KK et al.[4] But the LA group patients used less analgesics. They found the intra abdominal abscess was more in OA group. Prolonged ileus was more common in OA group but the statistically not significant.

Andersson RE et al observed mixed findings for outcomes in LA and OA group.[6] Hence he stated that the choice of surgical technique to be adopted by the surgeon in cases of acute appendicitis should be left to them.

Wang X et al found that there was zero conversion in the LA group. For LA the operative time was significantly more compared to OA.[7] The patients in LA group had shorter stay in the hospital, started feeding earlier as well as the incidence of wound infection was lower when they compared to the patients in the OA group.

Khiria LS et al studied the morbidity rates and compared them in two groups. They concluded that the overall morbidity rates were lesser in LA group. They also noted that the mean time required for surgery and the patient stay in the hospital did not differ much.[8]

Cueto J et al observed that 2.7% of the patients needed conversion.[9] Horwitz JR et al in their study had Fifty-six cases and reported a conversion rate in seven children. Contrary to above findings discussed, here the author found that complication rate was more in LA group patients than OA group patients.[10]

Aziz O et al credited laparoscopic appendectomy for less number of complication in children. But they want that the findings must be confirmed by better quality studies.[11] Temple LK et al conducted the meta analysis. Their findings are in favour of laparoscopic appendectomy.[12]

CONCLUSION

Laparoscopic appendectomy was better than open appendectomy with respect to wound infection, tackling co-existing pathology, duration of hospital stay, earlier return to normal activity, excellent cosmetic end result, lesser use of antibiotics and earlier resumption of oral feeds.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Azaro EM, Paulo CG, Ettinger ETM. Laparoscopic versus open appendicectomy: a comparative study. J Society Laparoendoscopic Surgeons. 1999;3(4):279-83.
2. Abe T, Nagaie T, Miyazaki M. Risk factors of converting to laparotomy in laparoscopic appendectomy for acute appendicitis. Clin Exp Gastroenterol. 2013;6:109-14.

3. Pokala N, Sadhasivam S, Kiran RP. Complicated appendicitisis the laparoscopic approach appropriate? a comparative study with the open approach: outcome in a community hospital setting. Am Surg. 2007;73(8):737-41.
4. Yau KK, Siu WT, Tang CN. Laparoscopic versus open appendectomy for complicated appendicitis. J Am Coll Surg. 2007;205(1):60-5.
5. Garg CP, Vaidya BB, Chengalath MM. Efficacy of laparoscopy in complicated appendicitis. Int J Surg. 2009;7(3):250-2.
6. Andersson RE. Short-term complications and long-term morbidity of laparoscopic and open appendicectomy in a national cohort. Br J Surg. 2014;101(9):1135-42.
7. Wang X, Zhang W, Yang X. Complicated appendicitis in children: is laparoscopic appendectomy appropriate? A comparative study with the open appendectomy our experience. J Pediatr Surg. 2009;44(10):1924-7.
8. Khiria LA, Ardhnari R, Mohan N. Laparoscopic appendicectomy for complicated appendicitis: is it safe and justified? a retrospective analysis. Surg Laparosc Endosc Percutan Tech. 2011;21(3):142-5.
9. Cueto J, Alemagne B, Vazquez JA. Morbidity of laparoscopic surgery for complicated appendicitis: an international study. Surg Endosc. 2006;20(5):717-20.
10. Horwitz JR, Custer MD, May BH. Should laparoscopic appendectomy be avoided for complicated appendicitis in children? J Pediatr Surg. 1997;32(11):1601-3.
11. Azia O, Athanasiou T, Tekkis PP. Laparoscopic versus open appendectomy in children: a meta-analysis. Ann Surg. 2006;243(1):17-27.
12. Temple LK, Litwin DE, Mcleod RS. A meta-analysis of laparoscopic versus open appendectomy in patients suspected of having acute appendicitis. Can J Surg. 1999;42(5):377-83.

Cite this article as: Agrawal SN, Meshram S, Dhruv K. Study of laparoscopic appendectomy: advantages, disadvantages and reasons for conversion of laparoscopic to open appendectomy. Int Surg J 2017;4:993-7.