International Surgery Journal
Pinate AR et al. Int Surg J. 2017 May;4(5):1726-1730
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20171629

Original Research Article

Is the laparoscopic approach superior to open approach for treatment of acute appendicitis? A hospital based experience

Anil Reddy Pinate*, Mohammad Fazelul Rahman Shoeb, Shiva Kumar C. R.

Department General Surgery, Gulbarga institute of Medical Science, Gulbarga, Karnataka, India

Received: 21 February 2017
Accepted: 29 March 2017

***Correspondence:**
Dr. Anil Reddy Pinate,
E-mail: reddyanildr82@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Laparoscopic appendicetomy remains controversial in Indian perspective. The objective was to compare the clinical outcome of open with laparoscopic appendicectomy.
Methods: Prospectively collected data from 150 consecutive patients with acute appendicitis was studied. Patients undergoing surgery for acute appendicitis were alternately assigned into one of the two groups (Group-A patients underwent open appendicectomy and in Group B laparoscopic appendicectomy). The two groups were compared with respect to operative time, length of hospital stay, postoperative pain & wound complications.
Results: The mean operative time in the open group was 84.40 minutes; for laparoscopic group, 95.20 minutes (p-0.001). Duration of paralytic ileus, tolerance to oral feeds, resumption of daily routine activity and ambulation of patients were started earlier in laparoscopic group than open group. Group A (OA) patients had pain at the mean of 2.66 days as compared group B (LA), in which patients had pain at the mean of 1.66 days. Study also showed that the hospital stay for laparoscopic group was almost half of that for open group. Laparoscopic appendicectomy was safe as compared to open surgery in context to post-operative complications.
Conclusions: Provided surgical experience and equipment are available, Laparoscopic appendicectomy is as safe and efficient than open appendicectomy.

Keywords: Appendicitis, Appendicetomy, Laparoscopic, Surgery

INTRODUCTION

Appendicitis was first recognized as a disease entity in 16th century and was called as perityphlitis. Acute appendicitis is a common surgical condition and the diagnosis is made primarily on the basis of clinical history and examination, with additional assistance from laboratory and imaging investigations; Although most patients with Acute Appendicitis can easily be diagnosed, but in many of them the signs and symptoms are so variable that a firm diagnosis can be difficult.

Appendicectomy is the treatment of choice for acute appendicitis and is by far the most commonly performed emergency abdominal operation.[1,2]. Appendicectomy by McBurneys incision remained the procedure of choice for nearly a century until 1983 when Kurt Semm offered an alternative, "laparoscopic appendicectomy.[3,4] Although conventional appendicectomy is considered as a safe and effective, Variability in the degree of inflammatory process and the location of Appendix are the main causes of operative difficulties. Despite numerous attempts the diagnostic accuracy in acute appendicitis is unreliable in almost >15% of patients. The rate of negative exploration especially in young females for other causes of RIF pain mimicking acute appendicitis are still in the range of 25-30%.[5] So Laparoscopic appendicectomy has gained popularity in recent years and has become one of the most widely performed procedures using the laparoscope globally.[4] Still the method had not become the universal

gold standard for acute appendicitis may be due to the emergency nature of disease often operated by junior staff in odd hours when avilability of laparoscopic equipment due to its cost, especially in developing countries and trained staff is questionable. With improvements in the equipment and increasing clinical experience, it is now possible to perform almost any kind of procedure under laparoscopic visualization. Some studies have shown significant advantages of laparoscopic appendicectomy with respect to the length of hospital stay, postoperative pain and infectious complications.[6] However laparoscopic appendicectomy is time consuming which puts us in arguements that the advantages of laparoscopic appendicectomy are marginal compared to open appendicectomy performed by an experienced surgeon through a short, cosmetically acceptable incision with minimal complication and shorter hospital stay.[7,8]

Considering the fact it has not been found superior to open surgery for acute appendicitis, aim of our study was to compare the laparoscopic versus open appendicectomy to ascertain therapeutic benefits if any in diagnosis and management of acute appendicitis.

METHODS

Aim of the study is to compare Laparoscopic versus Open approach for appendicectomy and to ascertain therapeutic benefits if any in diagnosis and management of acute appendicitis. This is a hospital based prospective study carried out in the Department of surgery, between October 2011 and April 2012 among the patients admitted in the surgical unit of NKP Salve Institute Of Medical Sciences and RC., presented with right lower quadrant pain and who had given consent for enrollment in the study. The patients **w**ere alternatively assigned to group A or B. Group A comprised of patients that underwent open appendicectomy while Group B included laparoscopic appendicectomy. All patients were informed about the nature of the study and the possibility of conversion to open in case of laparoscopic group. Unwilling participants and patients with bleeding disorder, diabetic mellitus, ascites patient with previous history of lower abdomen surgery, Appendicular mass and generalized peritonitis were excluded from study. Pre-operative antibiotics in the form of Ceftrixone + salbactum in combination 1gm + 500mg respectively half an hour before induction of anesthesia were given to all the patients. Surgeries were performed in all these patient's by equally qualified surgeon. Post-operative assessment was done for pain using Visual analogue scale, start of oral Feed (hrs), post-operative ambulation (hrs), incisional-pain(days)analgesia (days), post operative stay (days), resumption of daily routine activity (days)etc. Patients were assessed for early complications in the postoperative period like pain, fever, vomiting, urinary retention,wound infection, fecal fistula, Intra abdominal collection and any mortality. Comparison between the groups was done by using Student T test, Chi Square test, mean and SD. Statistical package for social sciences (SPSS-17) was used to analyze data.

RESULTS

A total of One hundred and fifty patients with clinical diagnosis of acute appendicitis were admitted to the hospital which were randomized into groups A(OA) and B (LA), with 75 patients in each group. Group-A patients underwent open appendicectomy and group –b patients underwent laparoscopic appendicectomy. As explained in table no 1, patients in the two groups were comparable with regard to their age with mean age of 24.92±12.71 years for group A (OA) and 24.46±11.07ears for group B (LA). Total number of male patients were 83, out of which 43 (57.33%) were included in Group A (OA) however 40 (53.33%) patients were in Group B (LA). Out of 67 females, 32 (42.67%) were in Group A (OA) and 35 (46.67%) were in Group B (LA). The groups were also comparable with regard to symptoms and signs presented. The most common symptom was pain in right iliac fossa. Nausea, vomiting and anorexia were next common symptom.in the clinical signs tenderness at McBurneys point was the most common sign followed by rebound tenderness and local rigidity in both the groups. Table 1 also depicts that values of laboratory investigation like TLC counts, serum bilirubin and CRP levels are also comparable in both the groups.There were no significant differences with respect to gender, age, lab investigations (CRP, TSB, TLC), pattern of presentation (signs and symptoms).

The actual operating time was more in group B (LA) as compared to group A(OA) i.e. 84.40 minutes in the open group *vs* 95.20 min in the laparoscopic group; P = 005, Table 2). In the post-operative course, Median duration of paralytic ileus was more for open appendectomy as compared to laparoscopic group. For group A (OA) it was mean of 30.64 hrs and for group B (LA) mean of 11.61hrs. Difference of duration of paralytic ileus in group A (OA) and B were statistically significant ($p<0.05$). Patients who had undergone open appendicetomy, tolerated oral feeds at the mean of 60.20 hrs and Group B (LA) patients were able to tolerate oral feed at the mean of 34.24 hrs.(p-0.000).

In Group A (OA), ambulation of patients was started after mean time of 44.48 hrs. As compared Group B (LA), for which mean time for ambulation was 21.76 hrs with a statistically significant difference. Pain was assessed using 'Visual analogue scale 'and recorded at 8, 12 and 36 hrs after surgery. In group A (OA) patients had pain accordingly at the mean of 2.66 days as compared to group B (LA), in which patients had a pain at the mean of 1.66 days for which rescue analgesics were given. There was a significant difference between open and laparoscopic groups with respect to number of days of pain level (P=0.03) Eventually, the need for analgesic medication usage for the control of postoperative pain was similar in the two groups. After comparing other

covariates LA remained associated with shorter duration of parenteral analgesia, a shorter postoperative hospital stays and earlier return to full activity which helps in early discharge from the hospital, thus reduces hospital stay that shows cost effectiveness of laparoscopy over open appendectomy.

Table 3 depicts that, incidence of postoperative complications is found to be more in patients undergone open technique i.e. wound infection in 17 (22.67%), seroma in 14 (18.67%), respiratory tract infection in 13 (17.33%) patients as compared to patients undergone laparoscopic approach, in which incidence of post-operative complication like wound infection found in 2 (2.67%), seroma in 2 (2.67%) and respiratory tract infection 16(21.33%) patients. Statistical analysis for wound infection and seroma collection between the groups was found to be significant.

Table 1: Variables in OA (open appendicectomy) and LA (laparoscopic appendicectomy) groups.

Variable		Group A	Group B	P value
Age group in years	0-10	2(2.67%)	6(8%)	0.678
	11-20	33(44%)	26(34.67%)	
	21-30	21(28%)	29(38.67%)	
	31-40	13(17.33%)	8(10.67%)	
	41-50	3(4%)	4(5.33%)	
	>50	3(4%)	2(2.67%)	
	Mean±SD	24.92±12.71	24.46±11.07	
Sex	Male	43(57.33%)	40(53.33%)	0.622
	Female	32(42.67%)	35(46.67%)	
Symptoms	RIF pain	75(100%)	75(100%)	1.00
	Nausea	40(53.33%)	53(70.67%)	0.249
	Vomiting	48(64%)	34(45.33%)	0.908
	Anorexia	50(66.67%)	39(52%)	0.101
	Fever	31(41.33%)	15(20%)	0.624
Signs	Mc Burney's Tenderness	75(100%)	75(100%)	1.00
	Psoas Test	18(24%)	19(25.33%)	0.826
	Obturator Test	13(17.33%)	11(10.67%)	0.104
	Rovsing Sign	32(42.67%)	26(34.67%)	0.246
	Cough Sign	19(25.33%)	20(26.67%)	0.856
	Rebound Tenderness	50(66.67%)	41(30.77%)	0.132
	Local Rigidity	39(52%)	29(38.67%)	0.100
TLC	≤10000	42(56%)	44(58.67%)	0.742
	>10000	33(44%)	31(41.33%)	
TSB	Upto 1.2	64(85.33%)	70(93.33%)	0.112
	>1.2	11(14.64%)	5(6.67%)	
CRP	UP TO 10 mg/dl	44(58.67%)	36(48%)	0.193
	>10 mg/dl	31(41.33%)	39(52%)	

Table 2: Postoperative course among the study participants.

Postoperative course	OA group	LA group	z-value	p-value
Paralytic ileus(hrs)	30.64±14.24	11.61±4	11.13	<0.05
Oral Feed(hrs)	60.20±17.72	34.24±11.10	10.74	<0.05
Ambulation (hrs)	44.48±18.37	21.76±7.30	9.95	<0.05
Incisional-Pain(days)	2.66±0.66	1.66±0.55	10.01	<0.05
Analgesics (days)	2.34±0.47	1.65±0.47	8.86	<0.05
Post Op Stay (days)	5.69±2.22	3.01±0.76	9.84	<0.05
Resumption of daily routine activity (days)	7.34±2.75	3.96±0.72	10.28	<0.05

Table 3: Post-operative complications in the study patients.

Variable	OA group	LA group	ꭓ2-value	p-value
Wound Infection	17 (22.67%)	2 (2.67%)	17.68	<0.05
Seroma	14 (18.67%)	2 (2.67%)	10.07	<0.05
RTI	13 (17.33%)	16 (21.33%)	0.38	<0.05
Intraabdominal collection	9 (12%)	0 (0%)	12.77	<0.05

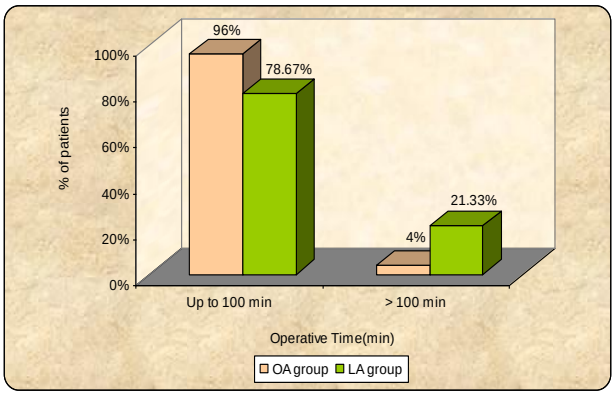

Figure 1: Distribution of patients according to operative time in OA and LA group.

DISCUSSION

At present, although there is no consensus regarding the superiority of the laparoscopic approach over the conventional technique, there is trend towards greater utilization of laparoscopic appendectomy.[9] Despite the advantages described, it is still a matter of debate because of concerns about possible longer operative time, higher rate of postoperative intra-abdominal abscesses, and higher costs in laparoscopic approach. And hence, the open approach is still widely used in clinical practice. With the aim to compare the two approaches (although patients were not truly randomized) the various patient characteristics and measurements of disease severity were equally distributed between the two groups.

All procedures in this study were performed by same consultant team to limit technique bias. Mean operative time for OA was 84.40 as compared to 95.20 min for laparoscopic appendicectomy (p-<0.0001HS). The longer total times in the laparoscopic group were not surprising. Setting up laparoscopy equipment generally took longer than setting up traditional surgical equipment. One more reason behind may be the learning curve, level of surgical experience. and increased conversion rate in the earlier stages accounted for increased operative time.[4,10] A study done by BushraShirizi showed the similar findings like our study.[11] This time can be further shortened with technical expertise in the field of laparoscopy. A worldwide spread of training in laparoscopic techniques lead to a significant reduction in difference of operative time compared to open procedures after 2000, as evidenced by one of the meta-analyses.[12] In our study, the difference between the duration of postoperative ileus for two different approaches was statistically significant. Recovery of the bowel function was faster in the LA group (30.64±14.24) vs 11.61±4, p Value 0.00). Reduced manipulation in the intraoperative course, minor abdominal trauma leading to less pain and early postoperative mobilization of the patient may be the factors responsible for the same. Similar results were also reported by Demirbas S et al.[13] On contrary to findings of a prospective study byHansen JB et al.[14]

In present study, for Group A patients (OA), maximum patients tolerated oral feeds on Day 2 (24-48 hrs) of surgery. In Group B (LA), oral feeds started to maximum patients on Day 0-1 i.e. < 24hrs of surgery and difference is statistically significant (P-0.000). This finding was consistent with that ofLong KH et al.[15] On contrary study conducted by Katkhouda N et al shows no significant difference in acceptance of diet for both techniques.[16] In addition to this, our study reveals that laparoscopic appendicectomy confers advantages in terms less pain, faster recovery and earlier return to work which is consistent with findings of study done by Nowzardan Y.[17] In our experience, the length of the hospital stay was about 2.5 day shorter in the LA group than in the OA group (p value 0.011). This result is comparable to the metanalysis by Wei et al.[18] However, in a study conducted by Merhoff AM et al recorded average hospital stay was almost similar in both the groups i.e. 2(1-6) days for open and 2(1-6) days for laparoscopy.[19] Length of hospital has a direct impact on costs. Although laparoscopic approach may be costlier because of the use of disposable instruments and ports; as compared to open approach, this gap in total costs between the two procedures is decreased by the shorter length of stay experienced by patients who underwent LA. Our study reveals that incidence of postoperative complications are more in patients undergone open technique. Our study findings are in accordance with other study done by Long KH, in which there were significantly fewer wound infections in the laparoscopy group.[20] A reduction in wound infection can be attributed to extraction of the specimen through a port or with the use of an endobag, or leaving a non-inflamed appendix in place.

CONCLUSION

Study concludes that laparoscopic appendicectomy is one of the alternative and safe procedure with lesser postoperative analgesia requirement, hospital stay and

wound infections to overcome the above disadvantages of open appendicectomy. Laparoscopy has definite role in evaluation of pain in right lower abdomen mimicking acute appendicitis with uncertain diagnosis and in female patients to diagnosis of pelvic disease and rule out other pathology, ultimately reducing the number of negative appendectomies.

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

REFERENCES

1. Amir M, Raja MH. Timings for surgery of acute appendicitis. J Coll Physicians Surg Pak. 2000;10:295-7.
2. Fingerhut A, Millat B, Borrie F. Laparoscopic versus open appendectomy: time to decide. World J Surg. 1999;23:835-9.
3. Semm K. Endoscopic appendicectomy. Endoscopy. 1983;15:59-64.
4. Sweeney KJ, Keane FB. Moving from open to laparoscopic appendicectomy. BJS. 2003;20:257-8
5. Shakhtrech HS. The accuracy of C-Reactive Protein in the diagnosis of acute appendicitis compared with that of clinical diagnosis. Med Arh. 2000;71(5):265-72.
6. Towfigh S, Chen F, Mason R, Katkhouda N, Chan L, Berne T. Laparoscopic appendectomy significantly reduces length of stay for perforated appendicitis. SurgEndosc. 2006;20:495-9.
7. De U. Laparoscopic versus open appendicectomy: An Indian perspective. J Min Access Surg. 2005;1:15-20.
8. Katkhouda N, Mason RJ, Towfigh S, Gevorgyan A, Essani R. Laparoscopic versus open appendectomy: a prospective randomized double-blind study. Ann Surg. 2005;242(3):439-48.
9. Sauerland S, Lefering R, Neugebauer EA. Laparoscopic versus open surgery for suspected appendicitis. Cochrane Database Syst Rev. 2004; CD001546.
10. Klingler A, Henle KP, Beller S, Rechner J, Zerz A, Wetscher GJ, et al. Laparoscopic appendicectomy does not change the incidence of postoperativeinfectious complications. Am J Surg. 1998;175:232-5.
11. Shirazi B, Naureen Ali, Muhammad MS. Laproscopic versus open appendectomy: A comparative study. Karachi J Pak Med Assoc. 2010;60(11):901-5.
12. Li X, Zhang J, Sang L, Zhang W, Chu Z, Li X, Liu Y. Laparoscopic versus conventional appendectomy - a meta-analysis of randomized controlled trials. BMC Gastroenterol. 2010;10:129.
13. Demirbas SAV. Laparoscopic appendectomy enables military personnel return to work early. The internet J surgery 2007;9(2).
14. Hansen JB, Smithers BM. Laparoscopic versus open appendicectomy: prospective randomized trial. World J Surg. 1996;20:17-21.
15. Long KH, Bannon MP. Laparoscopic versus open appendicectomy:Is there a difference? Surgery. 2001;129:390-400.
16. Katkhouda N, Mason RJ. A prospective randomized double blinded study of laparoscopic versus open appendicectomy. Ann Surg. 2005;242(3):439-50.
17. Nowzardan Y, Westmoreland J, McCarver CT, Harris RJ. Laparoscopic appendectomy for acute appendicitis: indications and current use. J Laparoendosc Surg. 1991;1:247-57.
18. Wei B, Qi CL, Chen TF, Zheng ZH, Huang JL, Hu BG, Wei HB. Laparoscopic versus open appendectomy for acute appendicitis: a metaanalysis. Surg Endosc. 2011;25:1199-208.
19. Merhoff AM, Merhoff GC. Laparoscopic versus open appendicectomy. Am J Surg. 2000;179:375-8.
20. Long KH, Bannon MP, Zietlow SP, Helgeson ER, Harmsen WS, Smith CD, et al. A prospective randomized comparison of laparoscopic appendicectomy with open appendicectomy: Clinical and economic analyses. Surgery. 2001;129:390-400.

Cite this article as: Pinate AR, Shoeb MFR, Shiva Kumar CR. Is the laparoscopic approach superior to open approach for treatment of acute appendicitis? A hospital based experience. Int Surg J 2017;4:1726-30.