

Original Research Article

Outcome comparison study between laparoscopic appendisectomy and conventional open appendisectomy

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ABSTRACT

Background: Open appendisectomy (OA) had been the procedure of choice for acute appendisectomy for a century since Mc Burney introduced in 1884. Laparoscopic appendisectomy (LA) didn't gain popularity and many studies had been conducted to see the superiority of one over the other. Recent meta-analysis studies, found overall benefits in favour of LA. So, we have done comparative study with the aim to compare the benefits of LA over OA.

Methods: Total of 90 appendisectomies was done, 45 each in OA and LA group and compared over a period of 1-year from October 2016 to October 2017 in Indira Gandhi Medical College and RI, Pondicherry. Outcome parameters were compared between the 2-groups in relation to operative time, analgesia used, length of post-operative hospital stay, return to work, resumption of a regular diet, post-operative scar and post-operative complications.

Results: Mean age of LA was 35 years, OA was 30 years. Male preponderance observed in OA (67%), female in LA (60%). Post-operative short hospital stay was 3-days in LA, 5-days in OA. Early return to work was 9-days in LA, 15-days in OA. Operative time was significantly shorter in LA which was 30-minutes and 40-minutes in OA. In laparoscopic group, no complications was observed, in open group we had two post-operative infections.

Conclusions: LA is an effective and safe option and the procedure of choice for most patients regardless of age, sex and BMI, with a statistically significant finding in regards to operation time in LA compared to conventional OA group.

Keywords: Open appendisectomy, Laparoscopic appendisectomy, Acute appendicitis

INTRODUCTION

Acute appendicitis is one of the commonest abdominal surgical emergencies requiring appendisectomy in the world population. Only 7% of the population develops acute appendicitis in their lifetime with the peak incidence from 10-30 years of age.^{1,2} It was in 1889, Charles Mc Burney popularised appendisectomy through Mc Burney's grid iron incision which remained the procedure of choice for nearly a century until 1983 when Semm Kurt a German Gynaecologist offered

alternative, namely laparoscopic appendisectomy (LA).^{3,4} However, unlike laparoscopic cholecystectomy, LA has not yet gained popularity. LA is now a gold standard operation and replaced the old method throughout the world in a short span of time, while laparoscopic appendicitis has not yet achieved such popularity.

Since then, LA as compared to OA had been a matter of great debate. More and more questions were being raised as to this benefit of LA and meta-analysis had confirmed

that LA was safe and resulted in faster return to the normal activities with fewer wound complications.⁵⁻⁸

Hence, this study was aimed to compare operative time, postoperative complications, post-operative pain, resumption of oral foods, better cosmetic effects of scar, return to normal activities and post-operative length of hospital stay between LA and conventional open appendicectomy.

METHODS

The qualifying patients were informed of the risk and benefits of each operation and ask to sign a detailed informed consent in their respective native language. This study was an observational case-control study. The study was conducted in the department of General Surgery at Indira Gandhi Medical College and RI, Pondicherry in a period of 12-months from October 2016 to October 2017. The Surgeons who were included had minimum 3-years' experience in conducting laparoscopic appendicectomy.

Inclusion criteria

Inclusion criteria were patients with clinical diagnosis of acute appendicitis with the age group above 14 years.

Exclusion criteria

Exclusion criteria were patients with history of cirrhosis and coagulation disorders, generalized peritonitis, shock on admission, pregnancy, appendicular mass, history of contraindication to laparoscopic surgery and general anaesthesia like severe cardiac or pulmonary diseases.

After a detailed and complete workup, patients were given choice for either laparoscopic or open appendicectomy (OA). Then patients with acute appendicitis were proceeded for appendicectomy by video-laparoscopy or by traditional open method with 45 patients in each group.

For the laparoscopic approach, a 10-mm trocar was placed at the umbilicus and 2-additional 5mm and a 10 mm trocars were inserted in the left iliac fossa and suprapubic port respectively. The meso-appendix was transected after applying monopolar cautery. The bases of the appendix were ligated with an endoloop constructed with a Roeder's knot on a no.1 vicryl thread. Usually three endoloops were used. Two on the proximal and one on the distal appendix. The specimens were removed via the suprapubic port. In case of peritoneal collection only suction was used.

In open approach, we used traditional grid-iron incision or Lanz incision over the Mc-Burney's point. The appendix bases were transfixed with a no.1/0 vicryl suture. Appendix base was not invaginated.

Post operative (PO) intravenous fluids were continued till normal bowel function returned (return of bowel sounds and passage of flatus). A 3rd generation cephalosporins were given postoperatively and metronidazole were added in complicated cases. Analgesics in the form of diclofenac sodium injection were given for 24-hours. Further analgesics were given based on the patient's perception of pain. The operating time, PO wound infection, status of PO pain, return to normal activity, assessment of scar and length of post-operative hospital stay were recorded. Patients in both the study groups were discharged as soon as possible i.e. when fully mobilized without the need for assistance from attendants.

Statistical analysis

Statistical analysis was performed using Student's t-test for paired samples using SPSS v. 21.0. Values were expressed as a mean±standard deviation or as percentages. $P<0.05$ was considered statistically significant.

RESULTS

A total number of 90 patients had undergone appendicectomy during the study period. Out of the 90 patients 45 had undergone LA and another 45 patients had undergone conventional OA. The ages of the patients ranged from 14-years to 60-years. The age difference between open and LA patients is shown in (Table 1) with a mean difference of 15 ± 15.13 and 15 ± 9.85 in OA and LA respectively. Majority of the patients were in the age group of 14-30 years (71%) in OA, 31-45 years (27%) in LA and 46-60 years (15%) in LA (Table 1). In both the cases, maximum age group are below 35-years of age. The oldest one was 60-years of age and the youngest one 14 years old. The sex difference is shown in (Table 2), in which males were more in number in OA (67%) group and females were more in LA (60%) group (Table 2), with a mean difference of 22.5 ± 10.60 and 22.5 ± 6.36 respectively. The clinical outcome parameters are shown in (Table 3), which were recorded in proforma like operating time in minutes, no of parenteral analgesics given, visual analogue score (VAS) for pain and cosmetic effect of scar of which 0 is the lowest score and 10 is the highest score. There was statistically significant difference in regards to the operation time taken by the surgeon, when compared to OA and LA ($p<0.01$). There was also significantly less need for analgesia in LA (6.7%) compared to OA (11.1%). Resumption of oral foods in hours and hospital stay in days were also recorded. We observed that resumption of oral foods was earlier in LA (25-hours) as compared to OA (48-hours) and the length of hospital stay was less in LA, when compared to OA. We observed two cases of post-operative wound infection in PA and none in laparoscopic appendicectomy. Return to normal routine activity in case of OA is 15 days while in LA it was only 9 days.

Table 1: Age difference between OA and LA patients.

Age (in years)	OA (n=45)	LA (n=45)	P value
14-30	32	26	0.18
3-45	10	12	0.62
46-60	03	07	0.18
Mean±SD	15±15.13	15±9.849	
95% CI	-28.94 to 28.94		

CI= confidence interval.

Table 2: Sex difference between OA and LA patients.

Sex	OA (n=45)	LA (n=45)	P value
Male	30	18	0.011
Female	15	27	0.011
Mean±SD	22.5±10.60	22.5±6.36	
95% CI	-37.64 to 37.64		

CI= confidence interval.

Table 3: Outcome comparison between OA and LA patients.

Outcome	OA	LA	P value
Operating time in minutes	40	30	0.01
No. of parenteral analgesic	04	02	0.39
VAS for pain	05	03	0.45
Resumption of oral food in hours	48	25	0.0
VAS for cosmetic effect of scar	05	02	0.23
Length of hospital stay	05	03	0.45
Post-operative wound infection	02	0	0.15
Return to normal routine activity in days	15	09	0.15
Mean±SD	15.5±18.13	9.25±11.63	
95% CI	-10.09 to 22.59		

CI= confidence interval.

DISCUSSION

Since the introduction of minimally invasive surgery, there was always a comparison of LA vs. OA to see the supremacy of one over the other and also to see the therapeutic and diagnostic advantage of LA over OA.

In surgical field of modern world, laparoscopic operations were being replaced in every conventional type of operations wherever feasible. LA also was slowly gaining acceptance after the development of laparoscopic cholecystectomy which had become a gold standard and replaced the traditional method of open

cholecystectomy.⁹ After Semm Kurt a German Gynaecologist introduced LA in 1983, many studies were being conducted to clarify the advantages of LA over OA.⁴ But OA had been a gold standard for a century. So, we had to critically analyse whether the new method LA could replace OA which had been an accepted procedure for a long time.

In our studies which were mentioned above there was a significant difference in sex ratio between male and female patients. There were 30 male patients in OA against 15 female patients whereas in LA there were 27 female patients against 18 male patients. Age did not show much difference and 30 years of age were at peak which were similar to the study conducted by Sheikh et al.⁹

Operation time taken by a surgeon in LA was in average 30 minutes whereas in conventional OA group it was 40 minutes, which was statistically significant. This study was similar to the study done by Islam et al where LA time is less than OA time.¹⁰ This might be due to the learning curve the surgeon had experienced that operation time in LA was being lesser when compared to the time we started doing LA. There were average of 10-minutes difference between LA and OA. Atwood et al in their study found that operation time in OA was shorter than LA.¹¹ This might be due to various factors like anaesthetic time in preparation for surgery and surgeon competence.

Pain assessment was done by VAS (Visual Analogue Score) in which 0 was the lowest and 10 was the highest pain threshold, and it was not statistically significant. VAS for pain in LA was 03 and in OA it was 05 which was almost similar to the study done by Thakre et al in which he got 3.2 in LA and 4.8 in OA in VAS.¹² The need for parenteral analgesic was also assessed and no statistically significant differences emerged. For LA we gave only two doses in 24 hrs while in OA we gave 4 doses in 48-hours. This explained that pain after post appendisectomy was much better in LA than in OA.

In this study oral intake of food was done within 25-hrs in LA whereas in OA it took around 48 hrs to start oral diet. This study was similar to the finding of Lin et al.¹³ There was not statistically significant difference regarding the return to the normal activity which was found in LA as 9 days and OA 15 days. Peterson AG et al had also found that the minimum time to normal activity between LA and OA as 10 vs. 16 days respectively.¹⁴ No statistically significant difference emerged in regards to the average length of stay in hospital which was 3 days in LA and 5 days in OA in this study. Similar result was found in the work of Azora et al.¹⁵ There was no post-operative wound infection in LA and in OA two persons had superficial wound infection which were later treated with antibiotics and dressing, which was not statistically significant in our study. Azaro et al found statistically

significant reduction in the number of complications when comparing the two groups.¹⁵

VAS for cosmetic effect of scar was 2 in LA and 5 in OA in our study, which was not statistically significant in this study. We have to analyse very critically whether we need a procedure which gives us a small scar which is acceptable cosmetically with minimum hospital stay and off work but serious post-operative complications or should we stick to the previous gold standard and well-established method of OA with lesser chances of intra-abdominal abscess/perforation of bowel.

CONCLUSION

LA is an effective and safe option and the procedure of choice for most patients regardless of age, sex and BMI. It requires less operative time, less hospital stay, early mobilisation, and early resumption of oral intake, less postoperative narcotics requirements, early return to work, less complication, cosmetic and advantage of diagnosing and managing concomitant pathologies.

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Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

- Guller U, Hervey S, Purves H, Muhlbaier LH, Peterson ED, Eubanks S, et al. Laparoscopic versus open appendectomy: outcomes comparison based on a large administrative database. *Ann Surg.* 2004;239:43–52.
- Kumar B, Samad A, Khanzada TW, Laghari MH, Sheikh AR. Superiority of laproscopic appendicectomy over open appendicectomy. *Rawal Med J.* 2008;33:165-8.
- Mc Burney C. The incision made in the abdominal wall in case of appendicitis with a description of a new method of operating. *Ann Surg.* 1894;20(1):38–43.
- Semm K. Endoscopic appendectomy. *Endoscopy.* 1983;15:59-64.
- Chung RS, Rowland DY, Li P, Diaz J. A meta-analysis of randomized controlled trials of laparoscopic versus conventional appendectomy. *Am J Surg.* 1999;177:250-6.
- Garbutt JM, Soper NJ, Shannon WD, Botero A, Littenberg B. Meta-analysis of randomized controlled trials comparing laparoscopic and open appendectomy. *Surg Laparosc Endosc.* 1999;9:17-26.
- Golub R, Siddiqui F, Pohl D. Laparoscopic versus open appendectomy: a meta-analysis. *J Am Coll Surg.* 1998;186:545-53.
- Sauerland S, Lefering R, Holthausen, Neugebauer EAM. Laparoscopic versus conventional appendectomy—a meta-analysis of randomized controlled trials. *Langenbecks Arch Surg.* 1998;383:289-95.
- Shaikh AR, Sangrasi AK, Shaikh GA. Clinical Outcomes of Laparoscopic Versus Open Appendectomy. *JLS.* 2009;13:574–80.
- Islam SR, Pasha K, Pasha K, Rahman S, Nasir E. Hanif E, et al. Laparoscopic VS Open Appendicectomy: A Comparative Study. *Bangladesh J Endosurg.* 2014;2:1-4.
- Attwood SE, Hill AD, Murphy PG, Thornton J, Stephens RB. A prospective randomized trial of laparoscopic versus open appendectomy. *Surgery.* 1992;112:497-501.
- Thakre S, Mujalde VS, Mudgal MM, Kushwah N, Gupta A. A Comparative Study between Laparoscopic Appendectomy and Conventional Open Appendectomy. *Sch. J. App. Med. Sci.* 2014; 2(5F):1909-12
- Lin HF, Wu JM, Tseng LM, Chen KH, Huang SH, Lai IR. Laparoscopic vs open appendicectomy for perforated appendicitis. *J Gastro Surg.* 2006;10(6):906-10.
- Pederson AG, Peterson OB, Wara P, Rowning H, Qvist N, Laurberg S. Randomised clinical trial of laparoscopic versus open appendicectomy. *Br J Surg.* 2001;88:200-5.
- Azaro EM, Amaral PCG, Ettinger JETM, Souza ELQ, Fortes MF, Alcantara RSM, et al. Laparoscopic versus Open appendicectomy: a comparative study. *J Soc Lap Surg.* 1999;3:279-83.

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