Brief Report

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Laparoscopic Appendicectomy: A Safe Option for Basic Laparoscopic Training

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Abstract

Background: Laparoscopic appendicectomy has advantages over open surgery in terms of complications, postoperative pain and the length of hospital stay. It is considered as a preferred basic laparoscopic procedure for surgical trainees based on the studies performed at teaching hospitals.

Objective: The aim of this study was to determine whether laparoscopic appendicectomy can safely be carried out by surgical trainees in peripheral hospitals.

Methods: A retrospective analysis was conducted at a base hospital in Uva province of Sri Lanka including all laparoscopic appendicectomies performed from July 2018 to December 2018. Duration of procedure, complications, postoperative pain, and duration of hospital stay were compared between the surgeries performed by surgeon (group A) and by a supervised trainee (group B).

Results: 53 laparoscopic appendicectomies, 15 (28.3%) were included in group A and 38 (71.7%) were included in group B. Demographics including age, intraoperative findings and histology were comparable between two groups. There were no significant differences observed between group A and B for the duration of procedure (34.67 min vs. 41.18 min, $p = 0.30$), deep surgical site infections (0 vs. 2.6%, $p = 1.0$), median postoperative pain score (1 vs 1, $p = 0.23$) and duration of hospital stay (2.27 days vs. 2.58 days, $p = 0.11$). However, group B had a higher conversion rate to open surgery compared to group A (5% vs. 0).

Conclusion: Laparoscopic appendicectomy is a safe procedure for supervised trainees to perform in peripheral hospital setting.

Keywords: *laparoscopic training, appendicectomy, surgical trainee, Sri Lanka*

INTRODUCTION

Surgical fraternity is gradually moving towards minimally invasive approach in respect of both routine and urgent surgeries. Because of the wide acceptance of minimally invasive surgical approach, the laparoscopic training is now recognized as an essential part of surgical training [1]. Laparoscopic surgeries are considered to have a steep learning curve owing to lack of tactile sensation, two-dimensional view, poor depth perception and fulcrum effect of instrument handling [2]. Therefore, learning basic principles of laparoscopy, training on simulators and assisting laparoscopic surgeries are essential in the early period of the surgical training. Thereafter, the skills of performing laparoscopic surgery on actual patients need to be acquired.

As patient safety is the utmost priority even in the process of training, concerns are there about the complications including inadvertent injury to surrounding structures, increased risk of infections; longer operating time; and delayed recovery when the surgery is performed by surgical trainees [3].

Laparoscopic appendicectomy (LA) was first performed by Kurt Semm in 1983. Metanalyses have proven the superiority of it over open surgery in terms of complications other than deep surgical site infections, postoperative pain and the length of hospital stay [4, 5]. In addition, concerns have been raised about LA as a preferred procedure for basic laparoscopic training based on a few retrospective studies conducted at teaching hospitals [6-9]. Jaffer et al concluded that the learning curve stabilizes after performing 20 LAs [8].

Since this is a frequently performed procedure and less complex compared to other laparoscopic surgeries (e.g., laparoscopic cholecystectomy), we too consider the suitability of this for surgical trainees to achieve basic laparoscopic skills. Additionally, LA is a commonly performed surgery even at peripheral hospitals and considerable duration of general surgical training is taken place at peripheral hospitals, the safety of the procedure in the hands of surgical trainees at peripheral surgical units needs to be evaluated.

The aim of this study was to determine whether LA can safely be carried out by supervised surgical trainees in peripheral surgical settings.

MATERIALS AND METHODS

A retrospective analysis was conducted at a base hospital, Mahiyangana, Sri Lanka. We included all LAs performed from July 2018 to December 2018. Surgeries were performed by two surgeons who trained in laparoscopic surgeries (Group A) or by surgical trainee who was in the second year of surgical training (Group B). The trainee had attended a basic laparoscopic workshop, assisted a variety of laparoscopic surgeries, and performed few LAs under supervision during the first year of training.

The patients who underwent diagnostic laparoscopy for suspected acute appendicitis, but the appendectomy was not proceeded due to non-inflamed appendix, or situations where appendix could not be visualized due to mass or abscess formation were excluded from the study.

All patients were given intravenous co-amoxiclav and metronidazole as prophylactic antibiotics. Surgery was performed using standard 3 port technique in which ports were placed subumbilical, suprapubic and left iliac fossa regions. The pneumoperitoneum was created with modified Hassan's technique. The appendix was skeletonized from mesoappendix with monopolar diathermy hook and the base of appendix was ligated with loop ligatures. Trainee performed the procedure while a colleague assisting and in the presence of an unscrubbed supervising surgeon in the theatre premises.

The data were collected from medical records, operative notes, and histopathology reports. Statistical analysis was performed using IBM SPSS statistics version 26. The demographics, intraoperative findings and histology were compared between two groups using Pearson Chi-square test.

Statistical analysis of outcome variables including duration of procedure, duration of hospital stays, rate of conversion to open surgery, complications,

and pain score (according to numeric pain scale) on first postoperative day were done using t-test, Fisher's exact test and independent samples

median test respectively. A p value of <0.05 was considered statistically significant.

RESULTS

Table 1: Comparison of outcome variables

Outcome variable	Group A	Group B	P value
Mean duration of procedure (min)	34.67	41.18	0.30
Median post-operative pain score	1	1	0.23
Mean duration of hospital stays	2.27	2.58	0.11
Complication rate	0	2.6%	0.53
Conversion to open surgery	0	5%	

A total of 61 diagnostic laparoscopies were performed for suspected appendicitis during the study period. After the exclusions, 53 LAs were included for the analysis. Out of them 15 (28.3%) were included in group A and 38 (71.7%) were included in group B. Mean age of the patients was

26.8 (range 9 – 64) years and 41.5% were females. Both groups were comparable in terms of demographics including age ($p = 0.18$), intraoperative findings ($p = 0.65$) and histology ($p = 1.0$).

Figure 1: Comparison of intraoperative findings

Figure 2: Comparison of histology

Intraoperative findings were variable ranging from mild inflammation to perforated appendix and abscess formation (Figure 1). Grossly inflamed appendix was the commonest intraoperative finding in group A (53.3%) as well as in B (44.7%). One appendicular mass in group A and 4 appendicular masses in group B were proceeded to LA. One appendicular abscess was proceeded to appendicectomy in group A, but all appendicular abscesses were managed with tube drainage without proceeding to appendicectomy in group B. The most frequent appendiceal pathology was mild acute appendicitis in both group A (60%) and B (55.3%). Two (5.3%) appendiceal specimens in group B were free of inflammation (Figure 2).

Outcome variables were compared between two groups (Table 1). Mean duration of procedure for group A was 34.67 (range 25 – 60) min and for group B was 41.18 (range 30-90) min ($p = 0.3$). Deep surgical site infection rates were 2.6% in group B and none observed in group A ($p = 1.00$). We did not observe any superficial surgical site infections in either group. Both groups had median pain score of 1 on first post-operative day ($p = 0.23$). The duration of hospital stay was shorter in group A (2.27 days vs. 2.58 days, $p = 0.11$). Conversion rate to open surgery was higher in group B compared to group A (5% vs. 0).

DISCUSSION

The mean operating time for the surgical trainee (group B) was 41.18 minutes. The wide range of operating time in this group (30 – 90 min) can be explained by the variable complexity of intraoperative findings. We did not observe a statistical difference of operating time between trainee group and surgeon group ($p = 0.3$) similar to previous studies. However, the mean operating time described in them was longer compared to our study and ranged between 60 – 75 minutes [6, 9].

Evidence from meta-analyses show a reduction in superficial surgical site infections but increase in intra-abdominal abscesses following LA [4]. Similarly, we observed 2.6% of pelvic abscess rates in surgical trainee group without any superficial surgical site infection. However, we did not

encounter other complications including paralytic ileus, bowel injury or mortality which were described in previous studies [6-9].

Post-operative pain and duration of hospital stay are the other parameters used to indicate the effectiveness of LA over open appendicectomy. We did not observe statistical differences of these two parameters between surgical trainee and surgeon groups.

Surgical trainee showed a higher conversion rate (5% vs. 0) in our study. It is comparable to conversion rates demonstrated by surgical trainees in previous studies ranges from 5 – 11% [7-9]. Possible reasons for the higher conversion rate would be the lack of experience in recognizing altered anatomical structures in the presence of local complications of appendicitis and lack of hands on experience of laparoscopic dissection. Considering the forementioned comparison, we conclude that the laparoscopic appendicectomy is safe and effective in the hands of supervised trainees in peripheral hospital setting. To establish LA as a preferred procedure for basic laparoscopic training, we suggest studies to evaluate its effects on the learning curve of laparoscopic skills compared to other common laparoscopic surgeries.

Limitations

The study is based on the perspective of a single surgical trainee. Involvement of more trainees in multicenter basis would have given a more representative analysis.

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Author Contributions

GDS and RSR were involved in the initial conceptualization of the study. GDS conducted the data collection, analysis and drafted the manuscript. MEK provided support in statistical analysis and drafting manuscript. RSR and MEK revised the final manuscript.

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There is no involvement of any financial benefits for the investigators or participants.

Availability of data and materials

Confidentiality and the anonymity of participants have been strictly maintained. The data sheets have been kept in a safe container and only the investigators had the accessibility to the collected data. Collected data will be stored in a password protected computer and will be deleted 5 years from publishing of the study.

Ethics approval and consent to participate

We obtained ethical approval from the Ethics Review Committee of Clinical Society of Mahiyangana. We obtained written informed consent from all the patients.

Competing interests

None

REFERENCES

1. Emken JL, McDougall EM, Clayman RV. Training and assessment of laparoscopic skills. *JSLs*. 2004 Apr-Jun;8(2):195-9. PMID: 15119670; PMCID: PMC3015539.
2. Levy B, Mobasher M, Principles of safe laparoscopic surgery, *Surgery* (2017), <http://dx.doi.org/10.1016/j.jmpsurg.2017.01.010>
3. Advani V, Ahad S, Gonczy C, Markwell S, Hassan I. Does resident involvement effect surgical times and complication rates during laparoscopic appendectomy for uncomplicated appendicitis? An analysis of 16,849 cases from the ACS-NSQIP. *Am J Surg*. 2012 Mar;203(3):347-51; discussion 351-2. doi: 10.1016/j.amjsurg.2011.08.015. PMID: 22364902.
4. Jaschinski T, Mosch CG, Eikermann M, Neugebauer EA, Sauerland S. Laparoscopic versus open surgery for suspected appendicitis. *Cochrane Database Syst Rev*. 2018 Nov 28;11(11):CD001546. doi: 10.1002/14651858.CD001546.pub4. PMID: 30484855; PMCID: PMC6517145.
5. 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 Apr;25(4):1199-208. doi: 10.1007/s00464-010-1344-z. Epub 2010 Sep 17. PMID: 20848140.
6. Sweeney KJ, Dillon M, Johnston SM, Keane FB, Conlon KC. Training in laparoscopic appendectomy. *World J Surg*. 2006 Mar;30(3):358-63. doi: 10.1007/s00268-005-0311-7. PMID: 16479344.
7. Tata MD, Singh R, Bakar AA, Selvindoss P, P K, Gurunathan R. Laparoscopic appendicectomy: the ideal procedure for laparoscopic skill training for surgical registrars. *Asian J Surg*. 2008 Apr;31(2):55-8. doi: 10.1016/s1015-9584(08)60058-5. PMID: 18490215.
8. Jaffer U, Cameron AE. Laparoscopic appendectomy: a junior trainee's learning curve. *JSLs*. 2008;12(3):288-291.
9. Wong K, Duncan T, Pearson A. Unsupervised laparoscopic appendicectomy by surgical trainees is safe and time-effective. *Asian J Surg*. 2007 Jul;30(3):161-6. doi: 10.1016/S1015-9584(08)60016-0. PMID: 17638633.