Annals of International Medical and Dental Research
E-ISSN: 2395-2822 | P-ISSN: 2395-2814
Vol-10, Issue-2 | March-April 2024
https://doi.org/10.53339/aimdr.2024.10.2.2
Page no- 13-21 | Section- Research Article (Surgery)

Laparoscopic Appendicectomy the Gold Standard; Study of 200 Cases of both Open and Laparoscopic Appendicectomy at TMMCH

Abu Sayed Mollah[1*], Md. Abu Sayem[2], Makshoda Begum[3]

[*1]Associate Professor, Department of Surgery, Tairunnessa Memorial Medical College, Gazipur, Bangladesh.
Email: dramollah@yahoo.com,
Orcid ID: 0009-0008-7555-7432
[2]Assistant Professor, Department of Surgical Oncology, National Institute of Cancer Research & Hospital. Mohakhali, Dhaka, Bangladesh.
Email: sayem24@yahoo.com,
Orcid ID: 0009-0006-2289-3921
[3]Associate Professor, Department of Community Medicine, Sheikh Hasina Medical College, Tangail,
Bangladesh,
Email: makshodab722@gmail.com,
Orcid ID: 0009-0006-3617-264X

*Corresponding author

Received: 12 November 2023
Revised: 09 January 2024
Accepted: 27 January 2024
Published: 29 February 2024

Abstract

Background: Laparoscopic appendectomy (LA) is widely performed in many countries around the world. It is popular for mainly the complicated appendicitis, which includes perforated or gangrenous appendicitis with or without localized or disseminated peritonitis. Another option, Open appendectomy has been the treatment of choice for more than a century since its introduction by McBurney in 1894, and the procedure is standardized among surgeons. The purpose of this study is to evaluate LA compared with open appendectomy (OA) for complicated appendicitis. **Material & Methods:** This study has retrospectively analyzed the clinical records of 245 patients who had undergone appendectomy for complicated appendicitis within the time period of June 2021 to June2023. Among the 200 patients, 111 had undergone LA, 84 had conventional open appendectomy (OA), and 5 patients had conversion to the open procedure after laparoscopy. The total LA group was subdivided into ''early experience group consisting cases 1 to 200'' and ''late experience consisting LA: case 201 to 245.'' We defined the early LA group as the comparison group to minimize selection bias. **Results:** Patient demographics were found similar between the early LA and OA groups (P<0.05). Wound infection was significantly more frequent in the OA group (P< 0.05) than LA. Intra-abdominal infection was equally common in the two groups. The overall rate of postoperative complications was significantly higher in the OA group (32.1%) in comparision with the early LA group (18%; P< 0.05). This incidence was 12.8% in the total LA group. In terms of hospital stay, the early LA group (10.6 ± 3.9 days; P< 0.05) had significantly shorter stay than 8.9 ± 3.7 days in the total LA group. **Conclusions:** This study found that, LA is comparatively safe and successful even for the treatment of complicated appendicitis than OA if performed by an experienced surgeon.

Keywords:- LA, OA, appendicitis, laparoscopic appendectomy, open appendectomy

INTRODUCTION

In the sixteenth century appendicitis was first recognized as a disease entity and was called perityphlitis. McBurney had described the clinical findings in 1889. In management of perityphlitis, minimal access surgery has been proved to be useful surgical technique. New standards have been laid out for different

Copyright: ©The author(s), published in Annals of International Medical and Dental Research, Vol-10, Issue-2. This is an open access article under the Attribution-Non Commercial 2.0 Generic (CC BY-NC 2.0) license. (https://creativecommons.org/licenses/by-nc/2.0/)

Annals of International Medical and Dental Research
E-ISSN: 2395-2822 | P-ISSN: 2395-2814
Vol-10, Issue-2 | March-April 2024
https://doi.org/10.53339/aimdr.2024.10.2.2
Page no- 13-21 | Section- Research Article (Surgery)

indications. Laparoscopic appendectomy is being done when laparoscopic cholecystectomy has shown unequivocal advantages over the open method. In the young female the cause of lower abdominal pain is often assumed as gynecological. Gynecologists perform diagnostic laparoscopy frequently. A German gynecologist, Semm, performed the first laparoscopic appendectomy in 1983.[1] Since then, the use of laparoscopy method to treat acute appendicitis has been controversial; however, laparoscopic surgery is gradually being considered as the ''gold standard'' for uncomplicated appendicitis.[2,3] In this regard, all prospective, randomized trial meta-analyses have come to the conclusion that laparoscopic appendectomy (LA) is better than,[4,5,6,7,8] or as good as [9] open appendectomy (OA) in terms of postoperative wound infections, the requirements for analgesia, the length of stay in the hospital, the time period before returning to work, and overall recovery. The role of laparoscopy in complicated appendicitis remains contentious, and OA is advocated.[9] Perforated appendicitis happens in 20-30% of patients with intense an infected appendix.[10] Postoperative complications like wound infection and intra-abdominal abscess are strongly linked to this condition.[11] A couple of reports have shown an increment of irresistible difficulties after LA for a ruptured appendix.[12,13] The Cochrane Database Review came to the conclusion in 2002 that the effects of LA on perforated appendicitis required additional research and that the clinical effects were "small and of limited clinical relevance." Many authors still believe that LA may not be beneficial for patients with perforated appendicitis,[3,14] due to the high rate of intra-abdominal abscesses observed in the early years. The purpose of this study was to assess LA compared with open appendectomy (OA) for complicated appendicitis, with emphasis on operative results and complications.

Objective of the study

- General objective: The primary purpose of this research is to compare the efficacy of LA with open appendectomy (OA) for complicated appendicitis.
- Specific objective: The current study aims to emphasis on operative results and complications of LA and OA.

MATERIAL AND METHODS

This retrospective study was designed to compare the outcomes and efficacy of LA with open appendectomy (OA) for complicated appendicitis among adult patients with complicated appendicitis who were aged more than 18 years. This study was conducted in the Department of ……., Tairunnessa Memorial Medical College, Gazipur, Bangladesh during June 2021 to June 2023. In this 24 months period, 200 patients of different age group and different gender came in this hospital with complicated appendicitis.

200 patients who had undergone appendectomy for complicated appendicitis among which 111 underwent LA, 84 underwent conventional OA, and five underwent CA

Inclusive criteria

Patients who had complicated appendicitis were included in this study. Previous history

Copyright: ©The author(s), published in Annals of International Medical and Dental Research, Vol-10, Issue-2. This is an open access article under the Attribution-Non Commercial 2.0 Generic (CC BY-NC 2.0) license. (https://creativecommons.org/licenses/by-nc/2.0/)

Annals of International Medical and Dental Research
E-ISSN: 2395-2822 | P-ISSN: 2395-2814
Vol-10, Issue-2 | March-April 2024
https://doi.org/10.53339/aimdr.2024.10.2.2
Page no- 13-21 | Section- Research Article (Surgery)

of laparotomy was not a contraindication for LA.

Exclusion criteria

Any participants with pregnancy were excluded of this study.

LA was performed by means of three ports. A 10-mm subumbilical port was introduced by utilizing the open strategy to make a pneumoperitoneum. Two 5-mm ports were embedded in the right lateral and suprapubic region, or in the left lower quadrant and suprapubic region. The operation was done in the standard way observed by essential conclusion of the abdominal wound. The two groups of patients went through careful peritoneal lavage utilizing large volumes of warmed saline. Drains were utilized as needs be. Until the sepsis subsided, all patients received 1,000 mg of cefmetazole sodium intravenously prior to surgery. Analgesics with intramuscular pethidine and an oral pain reliever (loxoprofen sodium) were given on request. Statistical analyses were performed by utilizing one-way analysis of variance (ANOVA) and post-hoc tests with Bonferroni adjustment, v2 test for correlation of the factors among the three groups, and Mann-Whitney U test and v2 test between the two groups. Statistical significance was set at P< 0.05. Ethical clearance was taken from the hospital ethics committees as required. Informed written consent paper was signed by the patients.

RESULTS

[Table 1] presents patients' demographic and clinical data. There were 200 patients diagnosed with complicated appendicitis in the early group: 84 underwent conventional OA, 111 had LA, and five had CA. No significant differences in age, sex, white blood cell counts, C-reactive protein score, and abscess formation were found among the groups. The operating time for early LA ranged from 45 to 300 (120.4 ± 41) min, significantly longer than that in OA, ranged from 28–240 (mean, 95.8 ± 46.7); P< 0.05. The operating time for total LA ranged from 36 to 300 (mean, 116.7 ± 45) min. The volume of intraoperative blood loss for OA ranged from 2 to 300 (mean, 90.4 ± 108) ml, significantly greater than that in early LA ranged from 1 to155 (mean, 32.6 ± 36) ml; P< 0.05). The bleeding volume for total LA ranged from 1 to 155 (mean, 26.2 ± 33) ml. Patients in the early LA group, 4.1 ± 3.2 times, required oral administration of analgesics less frequently than OA, 6.4 ± 4 times (P<0.05). The time to adequate oral intake was significantly shorter for the early LA group (P<0.05). The mean hospital stay was 8.9 ± 3.7 days for the total LA group, 10.6 ± 3.9 days for the early LA, and 16.6 ± 11.8 days for the OA group. The hospital stay was significantly shorter for the early LA group than the OA group (P<0.05) [Table 2]. The rate of postoperative complications was higher in the OA group than LA (P<0.05) [Table 3]. Wound infection was found higher in 23.8% of patients in the OA group (P<0.05), in the early LA12.5%, and in the total LA 6.4%. The frequency of intra-abdominal infections was quite similar between early LA and OA group. In the early LA group, four patients developed intra-abdominal abscess: two in the pelvic region, and two in the retrocecal region. In terms of intra-abdominal abscess, the OA group showed the same outcome. Surgical drainage of the retrocecal abscess was necessary in one

Copyright: ©The author(s), published in Annals of International Medical and Dental Research, Vol-10, Issue-2. This is an open access article under the Attribution-Non Commercial 2.0 Generic (CC BY-NC 2.0) license. (https://creativecommons.org/licenses/by-nc/2.0/)

Annals of International Medical and Dental Research
E-ISSN: 2395-2822 | P-ISSN: 2395-2814
Vol-10, Issue-2 | March-April 2024
https://doi.org/10.53339/aimdr.2024.10.2.2
Page no- 13-21 | Section- Research Article (Surgery)

patient each in both groups. The other patients with an intra-abdominal abscess were treated with antibiotics and obtained successful result. The occurrence of small-bowel obstruction also was similar between the early LA and OA groups. In two patients of the OA group, adhesive intestinal obstruction occurred shortly after surgery and they were treated conservatively. Other postoperative complications included enteritis in one patient and pneumonia in two patients of the OA group. Five patients were converted to the open procedure after laparoscopy (CA) which included three patients with difficult dissection and two patients with extensive cecal adhesions. In five converted cases, the operating time ranged from 139 to 200 with mean, 167.6 ± 22 min. The amount of intraoperative bleeding ranged from 30 to 100 with mean, 73.1 ± 29 ml. The time to adequate oral intake was 5.2 ± 2.8 days, and the mean hospital stay was 14.8 ± 8.4 days. The hospital stay was prolonged in the CA group which was not significant. There were two cases of wound infection, but none of intra-abdominal infection [Table 2 and 3]. All converted cases were included in the early experience group.

Table 1: Demographic characteristics of the study patients

	OA	**Early LA**	**CA**	**Total LA**
No. of patients	84	111	5	200
Male/female ratio*	44/40	65/46	3/2	112/88
Age (yr)*	34.3 ± 18	37.8 ± 11	33.2 ± 16	35.2 ± 18
WBC (mm3)*	13700 ± 1530	13880 ± 3772	14720 ± 1470	13900 ± 3740
CRP (mg/dl)*	13.4 ± 9.5	14.5 ± 9.2	10.1 ± 2.23	14.8 ± 9.8
Abscess formation*	49	32	2	88
Gangrenous appendicitis*	34	23	1	57
Local peritonitis*	32	21	2	50
Diffuse peritonitis*	18	12	2	34

OA open appendectomy, LA laparoscopic appendectomy, CA converted to the open procedure after laparoscopy, WBC white blood cell count, CRP C-reactive protein score
* P>0.05 (not significant) between all group

Table 2: Operative outcomes

	OA (n = 84)	**Early LA (n = 111)**	**CA (n = 5)**	**Total LA (n = 200)**
Operative time (min)*, **, ***	95.8 ± 46.7	120.4 ± 41	167.6 ± 22	116.7 ± 45
Bleeding volume(ml)*	90.4 ± 108	32.6 ± 36	73.1 ± 29	26.2 ± 33
Analgesic use (times)				
Pentazosine****	1.2 ± 1.6	1.1 ± 0.9	1.3 ± 1.1	0.8 ± 1.2
Loxoprofen sodium*, **	6.4 ± 4	4.1 ± 3.2	6.7 ± 3.9	4.2 ± 2.9
Oral intake (days)*	3.6 ± 2.5	2.9 ± 2.2	5.2 ± 2.8	2.7 ± 2.1
Hospital stay (days)*	16.6 ± 11.8	10.6 ± 3.9	14.8 ± 8.4	8.9 ± 3.7

Copyright: ©The author(s), published in Annals of International Medical and Dental Research, Vol-10, Issue-2. This is an open access article under the Attribution-Non Commercial 2.0 Generic (CC BY-NC 2.0) license. (https://creativecommons.org/licenses/by-nc/2.0/)

Annals of International Medical and Dental Research
E-ISSN: 2395-2822 | P-ISSN: 2395-2814
Vol-10, Issue-2 | March-April 2024
https://doi.org/10.53339/aimdr.2024.10.2.2
Page no- 13-21 | Section- Research Article (Surgery)

OA open appendectomy, LA laparoscopic appendectomy, CA converted to the open procedure after laparoscopy * P \0.05 early LA vs. OA
** P<0.05 early LA vs. CA
*** P<0.05 OA vs. CA
**** P> 0.05 (not significant) between all groups

Table 3: Postoperative complications

	OA (n = 84)	Early LA (n = 111)	CA (n = 5)	Total LA (n = 200)
Overall complications*	27 (32.1%)	20 (18%)	2 (40%)	25 (12.5%)
Wound infection*	20 (23.8%)	14(12.5%)	2 (40%)	13 (6.4%)
Intra-abdominal abscess**	4 (4.8%)	4 (7.1%)	0	9 (4.5%)
Small-bowel obstruction**	4 (4.8%)	2(1.8%)	0	6 (2.5%)
Enteritis**	1 (1.2%)	0	0	0
Pneumonia**	2 (2.4%)	0	0	0

OA open appendectomy, LA laparoscopic appendectomy, CA converted to the open procedure after laparoscopy
* P <0.05 early LA vs. OA
** P>0.05 (not significant) between all groups

DISCUSSION

This research studied more than 200 patients with complicated appendicitis during a 2-years period and compared with conventional open appendectomy (OA), the early LA group had less analgesic use, shorter hospital stay, and lower presence of overall complications and wound infection. Similar occurrence of intra-abdominal infections, and lower amount of intraoperative blood loss was found in LA compared to OA, though the operating time was longer. Moreover, the operative results and complication rates indicates a tendency to improve in the total LA group.

A study demonstrates the controversy regarding the usefulness of LA for patients with complicated appendicitis persists. For instance, information related to postoperative confusions are inconsistent. It was accounted for that the gamble of intra-abdominal abscesses in patients with convoluted a appendicitis expanded after laparoscopic appendectomy.[15,16] In the meantime, different researches noticed no critical expansion in complexities among those patients and reasoned that laparoscopy was an option in contrast to the open system even in patients with punctured appendicitis.[17,18,19] One study found that laparoscopic appendectomy was not contraindicated for such patients because standardized LA surgical techniques reduced the rate of complications.[14] In 2001, Wullstein et al,[20] first detailed a review concentrate on that showed that the goal benefits of a negligibly intrusive procedure for muddled an infected appendix were laid out. Until 2005, the reports on LA for convoluted a ruptured appendix comprised exclusively of little review investigations and incorporated no huge imminent, randomized preliminaries. In 2006, Towfigh et al,[21] revealed an enormous series in light of tentatively gathered information for convoluted an appendicitis, showing that LA ought to be considered as the first-line approach for all patients with a appendicitis.

The present laparoscopic results are comparable to the majority of the series revealed in the writing, and backing the

Copyright: ©The author(s), published in Annals of International Medical and Dental Research, Vol-10, Issue-2. This is an open access article under the Attribution-Non Commercial 2.0 Generic (CC BY-NC 2.0) license. (https://creativecommons.org/licenses/by-nc/2.0/)

Annals of International Medical and Dental Research
E-ISSN: 2395-2822 | P-ISSN: 2395-2814
Vol-10, Issue-2 | March-April 2024
https://doi.org/10.53339/aimdr.2024.10.2.2
Page no- 13-21 | Section- Research Article (Surgery)

finishes of Wullstein et al,[20] Ball et al,[22] Cueto and others,[19] Towfigh and others,[21] and others, who found that LA enjoys unique benefits for patients with confounded an infected appendix. In this current review, LA extraordinarily further developed the postoperative generally complexities rate and wound infection rate. The lower wound contamination rate might be on the grounds that an endoscopic pack was constantly used to eliminate the example, subsequently staying away from direct contact with the trocar wounds. The event of postoperative intra-stomach ulcer was comparative between the early LA and OA gatherings, albeit somewhat higher than that recently portrayed (2.8%).[19] However, the incidence of intra-abdominal infection decreased to 4.3% in the entire LA group. This was perhaps on the grounds that our laparoscopic strategy turned out to be more modern. It was accounted for that CT or US-directed boil seepage with anti-infection agents for the treatment of complicated appendicitis is protected and successful.[23] This strategy isn't generally in fact achievable, may open the patient to extra grimness, and has not been basically assessed for its sign.

Brandt et al,[24] revealed a case-controlled study to look at the consequences of percutaneous drainage versus anti-microbial treatment alone in patients with Hinchey II diverticulitis, which showed that anti-infection treatment alone is by all accounts a protected option at whatever point percutaneous waste is in fact troublesome or dangerous. In case an activity couldn't be performed under serious general circumstances, like septic shock, and CT or US-directed sore seepage could be performed effectively, this system would be viewed as a best option as a scaffold use for a medical procedure. In this review, the LA change rate was lower contrasted and those in the event of punctured a ruptured appendix detailed in the writing,[25,26] and there was no massive distinction between our muddled and simple cases (information not shown). This was logical in light of the fact that our essential specialist or directed specialist had broad involvement with laparoscopic medical procedure. The specialist's experience has been displayed to correspond with the pace of transformation to open methodology.[26] Ortega et al,[27] announced that the event of gut obstacle was higher in laparoscopic appendectomy for punctured a ruptured appendix than with the open methodology. The event of postoperative gut block in patients with muddled a ruptured appendix in this study didn't contrast between the early LA and OA gatherings. As a result of gaining experience with more advanced laparoscopic techniques, the rate of postoperative complications would also decrease if the operating time could be reduced, according to the current study.

Concerning closure of the appendiceal stump, a few reports have shown clinical proof that inclines toward the standard utilization of endoscopic staplers.[28,29] The routine use of staplers in laparoscopic appendectomy probably would become a better option if they were as inexpensive as loops. In any case, impressive contrasts in costs actually exist between the two strategies. Furthermore, laparoscopic straight staplers require a 12-mm port for their presentation, and leaving metal staples on the stump or potentially in the stomach hole can cause bonds related short-gut block or development of pseudopolyps in the

Copyright: ©The author(s), published in Annals of International Medical and Dental Research, Vol-10, Issue-2. This is an open access article under the Attribution-Non Commercial 2.0 Generic (CC BY-NC 2.0) license. (https://creativecommons.org/licenses/by-nc/2.0/)

Annals of International Medical and Dental Research
E-ISSN: 2395-2822 | P-ISSN: 2395-2814
Vol-10, Issue-2 | March-April 2024
https://doi.org/10.53339/aimdr.2024.10.2.2
Page no- 13-21 | Section- Research Article (Surgery)

cecum.[30,31,32] In the review place laparoscopic preknotted circles are regularly utilized, and staplers are applied in LA, especially for troublesome cases, for example, those with puncture or serious irritation at the appendiceal base. We involved staplers in three patients of the complete LA gathering to separate the supplement since analyzation was troublesome or there was serious irritation. Less wound contamination during surgery, direct visualization, and sufficient saline irrigation of the contaminated peritoneal cavity are some of the technical advantages of LA. It can be referred that, LA may be recommended for patients with generalized peritonitis brought on by complicated appendicitis due to its usefulness.

Limitations of the study: One limitation of the current study was being a single centered study which may not reflect the overall scenario of the whole country. A long duration of study also causes less accuracy as the treatment choice has probability to differ with time.

CONCLUSIONS

This research has studied different cases of LA and its outcome. The evidences has demonstrated that LA is comparatively acceptable procedure even for the treatment of complicated appendicitis if performed by an experienced surgeon.

REFERENCES

1. Nazir A, Farooqi SA, Chaudhary NA, Bhatti HW, Waqar M, Sadiq A. Comparison of Open Appendectomy and Laparoscopic Appendectomy in Perforated Appendicitis. Cureus. 2019;11(7):e5105. doi: 10.7759/cureus.5105.
2. Heinzelmann M, Simmen HP, Cummins AS, Largiadèr F. Is laparoscopic appendectomy the new 'gold standard'? Arch Surg. 1995;130(7):782-5. doi: 10.1001/archsurg.1995.01430070104022.
3. Sauerland S, Jaschinski T, Neugebauer EA. Laparoscopic versus open surgery for suspected appendicitis. Cochrane Database Syst Rev. 2010;(10):CD001546. doi: 10.1002/14651858.CD001546.pub3.
4. 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(3):250-6. doi: 10.1016/s0002-9610(99)00017-3.
5. 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(1):17-26.
6. Golub R, Siddiqui F, Pohl D. Laparoscopic versus open appendectomy: a metaanalysis. J Am Coll Surg. 1998;186(5):545-53. doi: 10.1016/s1072-7515(98)00080-5.
7. Sauerland S, Lefering R, Holthausen U, Neugebauer EA. Laparoscopic vs conventional appendectomy--a meta-analysis of randomised controlled trials. Langenbecks Arch Surg. 1998;383(3-4):289-95. doi: 10.1007/s004230050135.
8. 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.
9. Slim K, Pezet D, Chipponi J. Laparoscopic or open appendectomy? Critical review of randomized, controlled trials. Dis Colon Rectum. 1998;41(3):398-403. doi: 10.1007/BF02237500.
10. Andersson RE, Hugander A, Thulin AJ. Diagnostic accuracy and perforation rate in appendicitis: association with age and sex of the patient and with appendicectomy rate. Eur J Surg. 1992;158(1):37-41.
11. Krukowski ZH, Irwin ST, Denholm S, Matheson NA. Preventing wound infection after appendicectomy: a

Copyright: ©The author(s), published in Annals of International Medical and Dental Research, Vol-10, Issue-2. This is an open access article under the Attribution-Non Commercial 2.0 Generic (CC BY-NC 2.0) license. (https://creativecommons.org/licenses/by-nc/2.0/)

Annals of International Medical and Dental Research
E-ISSN: 2395-2822 | P-ISSN: 2395-2814
Vol-10, Issue-2 | March-April 2024
https://doi.org/10.53339/aimdr.2024.10.2.2
Page no- 13-21 | Section- Research Article (Surgery)

review. Br J Surg. 1988;75(10):1023-33. doi: 10.1002/bjs.1800751023.
12. Paik PS, Towson JA, Anthone GJ, Ortega AE, Simons AJ, Beart RW Jr. Intra-abdominal abscesses following laparoscopic and open appendectomies. J Gastrointest Surg. 1997;1(2):188-92. doi: 10.1016/s1091-255x(97)80108-4.
13. Frazee RC, Bohannon WT. Laparoscopic appendectomy for complicated appendicitis. Arch Surg. 1996;131(5):509-11. doi: 10.1001/archsurg.1996.01430170055010.
14. Katkhouda N, Friedlander MH, Grant SW, Achanta KK, Essani R, Paik P, et al. Intraabdominal abscess rate after laparoscopic appendectomy. Am J Surg. 2000;180(6):456-9. doi: 10.1016/s0002-9610(00)00504-3.
15. Horwitz JR, Custer MD, May BH, Mehall JR, Lally KP. Should laparoscopic appendectomy be avoided for complicated appendicitis in children? J Pediatr Surg. 1997;32(11):1601-3. doi: 10.1016/s0022-3468(97)90462-0.
16. Krisher SL, Browne A, Dibbins A, Tkacz N, Curci M. Intra-abdominal abscess after laparoscopic appendectomy for perforated appendicitis. Arch Surg. 2001;136(4):438-41. doi: 10.1001/archsurg.136.4.438.
17. Canty TG Sr, Collins D, Losasso B, Lynch F, Brown C. Laparoscopic appendectomy for simple and perforated appendicitis in children: the procedure of choice? J Pediatr Surg. 2000;35(11):1582-5. doi: 10.1053/jpsu.2000.18319.
18. Lintula H, Kokki H, Vanamo K, Antila P, Eskelinen M. Laparoscopy in children with complicated appendicitis. J Pediatr Surg. 2002;37(9):1317-20. doi: 10.1053/jpsu.2002.34998.
19. Cueto J, D'Allemagne B, Vázquez-Frias JA, Gomez S, Delgado F, Trullenque L, et al. Morbidity of laparoscopic surgery for complicated appendicitis: an international study. Surg Endosc. 2006;20(5):717-20. doi: 10.1007/s00464-005-0402-4.
20. Wullstein C, Barkhausen S, Gross E. Results of laparoscopic vs. conventional appendectomy in complicated appendicitis. Dis Colon Rectum. 2001;44(11):1700-5. doi: 10.1007/BF02234393.
21. Towfigh S, Chen F, Mason R, Katkhouda N, Chan L, Berne T. Laparoscopic appendectomy significantly reduces length of stay for perforated appendicitis. Surg Endosc. 2006;20(3):495-9. doi: 10.1007/s00464-005-0249-8.
22. Ball CG, Kortbeek JB, Kirkpatrick AW, Mitchell P. Laparoscopic appendectomy for complicated appendicitis: an evaluation of postoperative factors. Surg Endosc. 2004;18(6):969-73. doi: 10.1007/s00464-003-8262-2.
23. Zerem E, Salkic N, Imamovic G, Terzić I. Comparison of therapeutic effectiveness of percutaneous drainage with antibiotics versus antibiotics alone in the treatment of periappendiceal abscess: is appendectomy always necessary after perforation of appendix? Surg Endosc. 2007;21(3):461-6. doi: 10.1007/s00464-006-9005-y.
24. Brandt D, Gervaz P, Durmishi Y, Platon A, Morel P, Poletti PA. Percutaneous CT scan-guided drainage vs. antibiotherapy alone for Hinchey II diverticulitis: a case-control study. Dis Colon Rectum. 2006;49(10):1533-8. doi: 10.1007/s10350-006-0613-3.
25. Hellberg A, Rudberg C, Kullman E, Enochsson L, Fenyö G, Graffner H, et al. Prospective randomized multicentre study of laparoscopic versus open appendicectomy. Br J Surg. 1999;86(1):48-53. doi: 10.1046/j.1365-2168.1999.00971.x.
26. Liu SI, Siewert B, Raptopoulos V, Hodin RA. Factors associated with conversion to laparotomy in patients undergoing laparoscopic appendectomy. J Am Coll Surg. 2002;194(3):298-305. doi: 10.1016/s1072-7515(01)01164-4.
27. Ortega AE, Hunter JG, Peters JH, Swanstrom LL, Schirmer B. A prospective, randomized comparison of laparoscopic appendectomy with open appendectomy. Laparoscopic Appendectomy Study Group. Am J Surg. 1995;169(2):208-12. doi: 10.1016/s0002-9610(99)80138-x.
28. Schäfer M, Krähenbühl L, Frei E, Büchler MW. Laparoscopic appendectomy in Switzerland: a prospective audit of 2, 179 cases. Dig Surg. 2000;17(5):497-502. doi: 10.1159/000051947.
29. Kazemier G, in't Hof KH, Saad S, Bonjer HJ, Sauerland S. Securing the appendiceal stump in laparoscopic appendectomy: evidence for routine stapling? Surg Endosc. 2006;20(9):1473-6. doi: 10.1007/s00464-005-0525-7.
30. Eickhoff RM, Kroh A, Eickhoff S, Heise D, Helmedag MJ, Tolba RH, et al. A peritoneal defect covered by intraperitoneal mesh prosthesis effects an increased and distinctive foreign body reaction in a minipig

Copyright: ©The author(s), published in Annals of International Medical and Dental Research, Vol-10, Issue-2. This is an open access article under the Attribution-Non Commercial 2.0 Generic (CC BY-NC 2.0) license. (https://creativecommons.org/licenses/by-nc/2.0/)

Annals of International Medical and Dental Research
E-ISSN: 2395-2822 | P-ISSN: 2395-2814
Vol-10, Issue-2 | March-April 2024
https://doi.org/10.53339/aimdr.2024.10.2.2
Page no- 13-21 | Section- Research Article (Surgery)

model. J Biomater Appl. 2021;35(6):732-739. doi: 10.1177/0885328220963918
31. Nottingham JM. Mechanical small bowel obstruction from a loose linear cutter staple after laparoscopic appendectomy. Surg Laparosc Endosc Percutan Tech. 2002;12(4):289-90. doi: 10.1097/00129689-200208000-00019.
32. Petrocelli P, Corsale I, Giannessi S, Cerone M, Colugnat D, Matocci GC. Complications due to mechanical sutures in laparoscopic surgery: bowel obstruction caused by staple. Case report and literature review. Minerva Chir. 2003;58(4):591-4.

Source of Support: Nil, Conflict of Interest: None declared

Copyright: ©The author(s), published in Annals of International Medical and Dental Research, Vol-10, Issue-2. This is an open access article under the Attribution-Non Commercial 2.0 Generic (CC BY-NC 2.0) license. (https://creativecommons.org/licenses/by-nc/2.0/)