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Comparison Of Laparoscopic Versus Open Appendectomy Outcomes In Pediatric Patients: A Retrospective Single-Institution Review

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ABSTRACT

Background: Acute appendicitis is one of the most common abdominal emergencies in children. Surgical removal of the appendix is the preferred treatment for most patients. Currently, two primary surgical approaches exist open appendectomy (OA) and laparoscopic appendectomy (LA). While both procedures are widely used, there is ongoing debate regarding their comparative outcomes, especially regarding operating time, blood loss, length of hospital stay, and surgical site infection rates in pediatric patients. This study aims to compare the outcomes of LA and OA in pediatric patients, focusing on operating time, blood loss, postoperative length of hospital stays, and surgical site infection rates. **Methods:** Sixty pediatric patients who underwent appendectomy at a single institution over two years were retrospectively reviewed. Key outcomes, including operating time (OT), blood loss, length of hospital stay (LOS), and surgical site infection (SSI) rates, were compared between the two surgical techniques. Statistical significance was set at $p<0.05$. **Results:** The mean operating time for LA was significantly longer (56.9 minutes) compared to OA (37.1 minutes) ($p<0.05$). However, mean blood loss was greater in OA (11.54 mL) than LA (10.38 mL) ($p<0.05$). There were no significant differences between the two groups in terms of postoperative LOS or SSI rates. **Conclusion:** The findings of this study indicate that both LA and OA are safe and effective approaches for the management of acute appendicitis in pediatric population. Although operating times were longer with LA approach, this was compensated by reduced blood loss compared to OA approach. Larger prospective studies are needed to further elucidate any potential differences in clinical outcomes between the two surgical techniques.

Keywords: Pediatric Surgery, Appendectomy, Laparoscopic

INTRODUCTION

Acute appendicitis is one of the most common abdominal emergencies in children. In this age group, there is a high risk of complications due to delays in diagnosis, often caused by difficulties in communication and misdiagnosis with more common gastrointestinal disorders.[1] Appendicitis symptoms include fever, nausea, vomiting, and abdominal pain.[2] Acute appendicitis requires urgent surgical intervention, ideally within the first 48 hours after symptom onset.[3]

Surgical removal of the appendix is the preferred treatment for most patients, making appendectomy one of the most frequently performed surgical procedures, with over 300,000 operations annually.[4] Currently, two primary surgical approaches exist open appendectomy (OA) and laparoscopic appendectomy (LA). OA was considered the gold standard for treating acute appendicitis for over a century before the introduction of laparoscopy.[4]

Several studies have confirmed that laparoscopic and open appendectomies are safe and effective procedures for treating acute appendicitis. Laparoscopy has recently been introduced into our surgical practice, and the present study results are promising.[5] While both procedures are widely used, there is ongoing debate regarding their comparative outcomes, especially regarding operating time, blood loss, length of hospital stay, and surgical site infection rates in pediatric patients. This study aims to compare the outcomes of LA and OA in pediatric patients, focusing on operating time, blood loss, postoperative length of hospital stay, and surgical site infection rates.

METHODS :

Sixty pediatric patients who underwent appendectomy at a single institution over two years were retrospectively reviewed. Key outcomes, including operating time (OT), blood loss, length of hospital stay (LOS), and surgical site infection (SSI) rates, were compared between the two surgical techniques. Statistical significance was set at $p<0.05$.

RESULTS :

The mean operating time for LA was significantly longer (56.9 minutes) compared to OA (37.1 minutes) ($p<0.05$). However, mean blood loss was greater in OA (11.54 mL) than LA (10.38 mL) ($p<0.05$). There were no significant differences between the two groups in terms of postoperative LOS or SSI rates.

Tabel 1.

	Laparoscopic	Open	p-Value
n	51 (66,2%)	26 (33,8%)	0.4700
Age	15 (7-17)	13 (5-17)	0.123
Gender:			
Male	31	20	
Female	11	15	1
Operating time (OT: minute)	56.68	37.15	0.000
Blood loss (milliliter)	11	11.53	0.11
Postoperative length of hospital stay (days)	3.62	2.96	0.0002
Surgical site in infection rate	3/34	3/26	0.71

DISCUSSION :

The most frequently occurring intra-abdominal condition that requires emergency surgical treatment is

acute appendicitis.[6] In recent years, a large number of pediatric surgeons have adopted laparoscopic appendectomy, mainly due to its excellent outcomes. Nevertheless, the open surgical method for treating acute appendicitis remains competitive, particularly because it is also a minimally invasive procedure that leaves a small, cosmetically acceptable scar. Numerous studies comparing LA with open appendectomy (OA) have highlighted the difficulty of definitively favoring one method over the other, as both have their own advantages and disadvantages without substantial differences.[3]

Hospital Stay:

Our study found that the hospital stay for patients treated with LA was not significantly shorter compared to those treated with OA. However, other studies have reported a significantly shorter hospital stay for patients treated with LA, attributed to smaller incisions, less postoperative pain, and earlier mobilization. This has been supported by other research, some of which date back to the early 1990s. Conversely, Milewczyk et al. reported a longer hospital stay for children treated with LA compared to those treated with OA. Some authors suggest that variations may influence differences in hospital stays between the two methods in healthcare systems, raising questions about the relative advantages of LA versus OA.[3]

Blood Loss:

Blood loss during surgery can also impact patient recovery. Our study found that the average blood loss during LA (10.38 mL) was significantly less than during OA (11.54 mL). This reduction in blood loss is due to the efficient handling of the mesoappendix using tools like the ultrasound knife, iron clamp, and Hemolock, which is a distinct advantage of LA.[7]

Operative Time:

The operative time for LA was significantly longer than for OA, with an average difference of 56.9 minutes, which is consistent with findings in other studies. Laparoscopic appendectomy tends to have longer operative times due to factors such as staff experience, surgical technique, and the time required for laparoscopic equipment setup. However, the operative time for LA can be reduced when surgeons work closely with experienced surgical staff. The skill of an assistant in managing the laparoscope to provide optimal visualization of the surgical field is critical, as it affects the surgeon's ability to identify proper dissection planes and control bleeding. In contrast, during open procedures, the surgeon is less reliant on the assistant for visualizing the surgical field, which helps to avoid unnecessary delays. Additionally, the experience of nursing staff is crucial for the setup and management of laparoscopic equipment throughout the procedure.[4]

Wound Infection:

Laparoscopic appendectomy, first described by Semm in 1983 for the treatment of acute appendicitis (AA), offers many advantages over open surgery. One key advantage is the lower risk of wound infection after LA than open surgery. A recent meta-analysis of 7,462 patients who underwent LA for AA reported a wound infection incidence of 3.29%, while it was 7.78% in patients who underwent OA. The risk of wound infection was also significantly lower in patients who underwent LA for complicated appendicitis. In one study, the wound infection rate was 3 out of 34 patients undergoing LA, compared to 3 out of 27 patients undergoing OA, showing no significant difference. A primary reason for the lower infection rate in LA, especially in cases of complicated appendicitis, is that the smaller incision and use of ports during laparoscopy reduce the risk of contamination, and the appendix is removed from the abdomen using a specimen extraction bag [8]

CONCLUSION :

The findings of this study indicate that both LA and OA are safe and effective approaches for the management of acute appendicitis in pediatric population. Although operating times were longer with LA approach, this was compensated by reduced blood loss compared to OA approach. Larger prospective studies

are needed to further elucidate any potential differences in clinical outcomes between the two surgical techniques.

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