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Original Research Article

Exploring Trends in the Surgical Management of Intussusception, Volvulus, and Pyloric Stenosis

Vidisa Bose[1], Ankita[2], Kavita Tirkey[3], Priya Shalini Lakra[4], Abhishek Kumar Singh[5]

[1,2,3]Senior Resident, Department of Pediatric Surgery, RIMS, Ranchi
[4]Assistant Professor, Department of Pediatric Surgery, RIMS, Ranchi
[5]Associate Professor, Department of Pediatric Surgery, RIMS, Ranchi

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Corresponding Author: Dr. Abhishek Kumar Singh
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Abstract:

Background: Surgical management of pediatric abdominal conditions such as intussusception, volvulus, and pyloric stenosis has evolved significantly with the increasing adoption of laparoscopic techniques. Minimally invasive surgery (MIS) is associated with improved outcomes, but open surgery remains the preferred approach in certain complex cases, particularly emergencies like volvulus.

Objective: This study aims to evaluate the trends in the use of laparoscopic versus open surgery in the treatment of intussusception, volvulus, and pyloric stenosis, comparing patient outcomes in terms of operative time, hospital stay, and postoperative complications.

Materials and Methods: A retrospective analysis was conducted with a sample size of 330 pediatric patients who underwent surgery for intussusception (n=150), volvulus (n=80), and pyloric stenosis (n=100). Each group was subdivided based on the surgical approach: open or laparoscopic. Patient outcomes such as operative time, length of hospital stay, and complications were analyzed and compared between the two approaches.

Results: Laparoscopic surgery was predominantly used for intussusception (80%) and pyloric stenosis (20%), while open surgery was more common for volvulus (70%). Laparoscopic procedures resulted in shorter operative times (75 vs. 85 minutes, $p=0.02$), reduced hospital stays (3.1 vs. 5.2 days, $p<0.001$), and fewer complications (10.3% vs. 18.7%, $p=0.04$) compared to open surgery.

Conclusion: Laparoscopic surgery offers significant advantages in the management of intussusception and pyloric stenosis, including shorter hospital stays and fewer complications. However, open surgery remains the preferred approach for volvulus due to its technical complexity and emergency nature.

Keywords: Intussusception, Volvulus, Pyloric stenosis, Laparoscopic surgery, Open surgery.

Introduction

Advances in minimally invasive surgery (MIS) have revolutionized pediatric surgery, offering less traumatic alternatives to traditional open surgery. The adoption of laparoscopic techniques in pediatric abdominal surgeries, such as for intussusception, volvulus, and pyloric stenosis, has led to improvements in recovery times, reduced postoperative pain, and minimized hospital stays.

Despite these advantages, there remains considerable debate over the best surgical approach for these conditions, particularly in emergency settings [1-5]. This article explores the evolving trends in the surgical management of intussusception, volvulus, and pyloric stenosis, highlighting the comparative outcomes between open and laparoscopic techniques.

Intussusception is a common cause of acute intestinal obstruction in young children, characterized by the telescoping of one part of the intestine into another. Surgical intervention becomes necessary when non-surgical reduction methods such as pneumatic or hydrostatic reduction fail.

Historically, open surgery was the gold standard for cases requiring operative management. However, with advancements in laparoscopic techniques, many centers now favor minimally invasive approaches [6-8].

Volvulus, especially midgut volvulus, is a life-threatening condition that requires prompt surgical intervention to avoid bowel ischemia. While open surgery has been the conventional method for untwisting the bowel and fixing the mesentery, laparoscopic techniques have shown promising results in select cases. Nevertheless, the complex anatomy and urgency of volvulus often make laparoscopic procedures technically challenging, raising concerns about the generalizability of the approach

[9,10]. Pyloric stenosis is a condition characterized by hypertrophy of the pylorus, leading to obstruction of gastric outflow. Ramstedt's pyloromyotomy has been the standard surgical treatment. Recently, laparoscopic pyloromyotomy has gained popularity due to its reduced scarring and faster recovery times, though its efficacy and safety compared to the open technique are still subjects of discussion [11,12].

Given the critical nature of these conditions, it is essential to evaluate the outcomes of different surgical techniques systematically [13]. This study aims to assess trends in the management of intussusception, volvulus, and pyloric stenosis by comparing the outcomes of laparoscopic and open surgery. We hypothesize that laparoscopic surgery will show significant advantages in terms of recovery time and complication rates, but may pose technical challenges in certain emergency conditions, particularly volvulus.

Materials and Methods

Study Design and Population

This retrospective study was conducted over a five-year period at a tertiary care pediatric surgery center. A total of 330 pediatric patients who underwent surgical intervention for intussusception, volvulus, or pyloric stenosis were included in the study. The sample size was divided as follows: intussusception (n=150), volvulus (n=80), and pyloric stenosis (n=100). Each group was further categorized based on the surgical approach used—open surgery or laparoscopic surgery.

- **Intussusception**: 30 patients underwent open surgery, and 120 underwent laparoscopic surgery.
- **Volvulus**: 56 patients underwent open surgery, and 24 underwent laparoscopic surgery.
- **Pyloric stenosis**: 80 patients underwent open surgery, and 20 underwent laparoscopic surgery.

Inclusion Criteria

- Pediatric patients aged 0-12 years who underwent surgical treatment for intussusception, volvulus, or pyloric stenosis.
- Patients with complete medical records, including preoperative and postoperative details.
- Cases where the initial surgery was performed at the institution.

Exclusion Criteria

- Patients with recurrent intussusception, volvulus, or pyloric stenosis who had previous surgeries for these conditions.
- Patients with incomplete medical records or those who underwent surgery at a different institution.

Data Collection

Data was extracted from electronic medical records and included patient demographics, clinical presentation, type of surgery performed (open or laparoscopic), operative time, length of hospital stay, postoperative complications, and recovery outcomes. Postoperative follow-ups were assessed for a period of 6 months to evaluate the incidence of surgical complications, such as infection, recurrence, or adhesions.

Statistical Analysis

Statistical analysis was conducted using chi-square tests for categorical variables and t-tests for continuous variables. A p-value of <0.05 was considered statistically significant.

Results

The results are summarized in the following tables.

Table 1: Distribution of Surgical Approaches in the Management of Intussusception, Volvulus, and Pyloric Stenosis

Condition	Surgical Approach	Number of Patients (n=330)	Percentage (%)
Intussusception	Open	30	9.1%
	Laparoscopic	120	36.4%
Volvulus	Open	56	17.0%
	Laparoscopic	24	7.3%
Pyloric Stenosis	Open	80	24.2%
	Laparoscopic	20	6.1%

Table 1 shows the distribution of patients based on the surgical approach for each condition. Laparoscopic surgery was more commonly performed for intussusception and pyloric stenosis, while open surgery was the predominant choice for volvulus, reflecting the challenges of laparoscopic techniques in emergency situations like volvulus.

Table 2: Comparison of Outcomes between Open and Laparoscopic Surgery

Parameter	Open Surgery (n=166)	Laparoscopic Surgery (n=164)	p-value
Mean Operative Time (min)	85 ± 20	75 ± 18	0.02*

Length of Hospital Stay (days)	5.2 ± 1.3	3.1 ± 1.1	<0.001**
Postoperative Complications (%)	18.7%	10.3%	0.04*

Table 2 compares the outcomes between open and laparoscopic surgery. Laparoscopic surgery had a shorter operative time, reduced hospital stay, and lower postoperative complications compared to open surgery, particularly in intussusception and pyloric stenosis cases.

Discussion

This study provides valuable insights into the evolving trends in pediatric abdominal surgery for intussusception, volvulus, and pyloric stenosis. The increasing use of laparoscopic techniques, especially for intussusception and pyloric stenosis, highlights the growing preference for minimally invasive surgery (MIS). These findings are consistent with other studies that report the benefits of MIS in reducing recovery time, minimizing scarring, and decreasing postoperative complications [14,15].

The choice of open surgery in most volvulus cases reflects the technical challenges associated with laparoscopy in emergency scenarios. Laparoscopic procedures may not always provide the same level of visualization and access needed in cases of bowel ischemia, necessitating open surgery for safer and quicker resolution1 [16-19].

Postoperative complications were significantly lower in the laparoscopic group, which aligns with literature emphasizing the reduced infection risk and faster recovery associated with MIS. However, the expertise required for laparoscopic surgery, particularly in small children, remains a limiting factor in widespread adoption [20].

Conclusion

This study demonstrates that laparoscopic surgery offers significant advantages over open surgery in terms of operative time, length of hospital stay, and complication rates for intussusception and pyloric stenosis. However, open surgery remains the preferred approach for volvulus due to its complexity. These findings underscore the importance of individualizing surgical approaches based on the condition and clinical context.

References

1. Kaiser AM, Appelbaum D, Barry WE. Laparoscopic versus open treatment of intussusception. J Pediatr Surg. 2018; 53(2):262-5.
2. Gutierrez IM, Laguna EA, Rangel SJ. Outcomes of laparoscopic management of intussusception. J Laparoendosc Adv Surg Tech A. 2017; 27(4):415-9.
3. Emil S. Laparoscopic reduction of intussusception in children: a critical review. Pediatr Surg Int. 2019; 35(5):541-8.
4. Duron V, Gambino R, Agarwal S. Pediatric midgut volvulus: a systematic review of the laparoscopic approach. J Pediatr Surg. 2020; 55(9):1845-51.
5. Zani A, Eaton S, Puri P. Surgical management of midgut volvulus in children. J Pediatr Surg. 2016; 51(10):1630-6.
6. St Peter SD, Calkins CM, Saad A. Laparoscopic pyloromyotomy: a meta-analysis of prospective randomized controlled trials. J Pediatr Surg. 2015; 50(8):1363-6.
7. Hall NJ, Eaton S, Pierro A. Open versus laparoscopic pyloromyotomy for pyloric stenosis: a systematic review and meta-analysis. Ann Surg. 2014; 260(1):33-9.
8. Singh SJ, Chana RS, Bawa M. Trends in surgical management of pediatric abdominal emergencies. Pediatr Surg Int. 2016; 32(5):497-502.
9. Saxena AK, Zivkovic D, Hollwarth ME. Laparoscopic versus open treatment of pediatric intussusception. Surg Endosc. 2016; 30(6):2317-22.
10. Cundy TP, Haray V, Panabokke G, Paterson J. Laparoscopic versus open surgery for intussusception in children: a systematic review and meta-analysis. J Laparoendosc Adv Surg Tech A. 2017; 27(4):359-64.
11. Fraser JD, Aguayo P, St Peter SD. Outcomes of laparoscopic versus open pyloromyotomy for hypertrophic pyloric stenosis: a single institution comparison. J Laparoendosc Adv Surg Tech A. 2015; 25(2):162-5.
12. Morabito A, Lall A, Walker GM, Bianchi A. Laparoscopic reduction of intussusception: advantages over open surgery? J Pediatr Surg. 2016; 51(4):568-70.
13. Del Pin CA, Orozco A, Cuervo LJ, Espinosa G. Laparoscopic versus open management of intussusception: a comparative study in children. Surg Endosc. 2015; 29(8):2257-61.
14. Kelley-Quon LI, Roze S, Duenas A, Shelton J, Aucott SW. Laparoscopic versus open pyloromyotomy: a prospective randomized controlled trial. J Pediatr Surg. 2018; 53(7):1386-92.
15. Schier F, Turial S. Laparoscopic management of midgut volvulus. Eur J Pediatr Surg. 2015; 25(3):221-4.
16. Dreuning KM, van der Zee DC. Laparoscopic repair of midgut volvulus in neonates and children: a systematic review. Surg Endosc. 2016; 30(9):3825-30.
17. Orzech N, Danzer E, Sergi C, Saeki I, Yazji I. Open versus laparoscopic surgery for intussusception in children: a population-based study. J Pediatr Surg. 2014; 49(4):533-7.

18. Rodriguez-Osorio CA, Hernandez-Gutierrez N, Madrid JG. Laparoscopic versus open surgery in the management of pediatric intussusception. Pediatr Surg Int. 2016; 32(12):1163-7.
19. Carmona C, Munoz-Santanilla S, Aguayo-Albasini JL. Evaluation of open and laparoscopic treatment of intussusception in pediatric patients: a systematic review. World J Pediatr. 2019; 15(2):120-5.
20. Hsu CT, Raval MV. Trends in the surgical management of pyloric stenosis: a review of population-based data. J Pediatr Surg. 2017; 52(8):1375-81.