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Assessing the impact of appendicectomy in daily activities/social life of children

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ABSTRACT

Background: Appendicectomy is a common surgical procedure for children presenting with appendicitis. Understanding the impact of appendicectomy on daily activities and social life is crucial for optimizing patient outcomes. **Aims and Objectives:** This study aimed to assess the impact of appendicectomy on children's daily activities and social lives. **Materials and Methods:** A retrospective analysis was conducted of patients aged ≥5 years who underwent appendicectomy at our center between April 2022 and April 2023. Data on demographics, surgical approach (open or laparoscopic), post-operative outcomes, and return to daily activities were collected using a standardized questionnaire. **Results:** Among the 70 identified cases, there was a male predominance (63%), with most presenting with acute appendicitis (85%). Laparoscopic appendectomy was the predominant surgical approach used (80%). Post-operative symptoms included pain (n = 12), vomiting (n = 3), fever (n = 2), and wound infection (n = 6). Appendicular abscesses were found in 9% of laparoscopic surgeries and 14% of open surgeries. The average duration of hospital stay was shorter in laparoscopic cases. Return to school and normal diet varied between surgical approaches, with laparoscopic cases generally showing a quicker recovery. **Conclusion:** Although appendicectomy is commonly performed, it has implications for children's daily routines and social interactions. Parental anxiety plays a crucial role in post-operative recovery. Future studies should focus on addressing these social determinants to optimize patient outcomes.

Key words: Appendicectomy; Children; Post-operative outcomes; Parental anxiety; Return to normal activity

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INTRODUCTION

Recurrent abdominal pain in children is characterized by at least three episodes of pain occurring over a minimum of 3 months, significantly affecting their daily functioning. Although the majority of cases are attributed to functional causes, approximately 5–10% of cases have an organic etiology.[1] Increasing attention is being paid to two distinct and less understood conditions that should be considered in the differential diagnosis of patients experiencing recurrent or chronic pain in the right lower quadrant: Recurrent appendicitis and chronic appendicitis.[2] The definition of which lacks a complete consensus; however, recurrent appendicitis typically involves multiple instances of acute inflammation of the appendix over time, with intermittent periods of symptom relief. In contrast, chronic appendicitis is characterized by persistent low-grade inflammation of the appendix leading to recurrent or prolonged abdominal discomfort.[3]

Acute appendicitis is a prevalent gastrointestinal ailment in pediatric patients. Statistics indicate that approximately one in every 13 individuals will encounter appendicitis at some juncture in life, with about one-third of the occurrences arising during childhood or adolescence.[1] Recent advancements have established a bifurcation of acute appendicitis into two distinct categories: simple appendicitis (non-perforating/uncomplicated) and complex appendicitis (necrotizing/perforating).[2] Notably, the distribution of these variants varied significantly across age groups. Among pediatric cases, simple appendicitis constitutes the majority, accounting for approximately 65% of all cases.[3,4]

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Conventionally, appendectomy has been the gold-standard treatment for acute appendicitis for over a century. However, contemporary medical practice has witnessed a transition from open appendectomy to laparoscopic procedures, with complex appendicitis now commonly managed postoperatively with antibiotic courses.[5] Moreover, the conventional notion of immediate surgical intervention for suspected appendicitis to prevent perforation gives way to the option of delayed surgery in selected cases, extending up to 24 h.[6]

The pursuit of optimal appendicitis management requires comprehensive data on post-appendectomy complication rates. Nevertheless, the available evidence exhibits considerable variance in reported complication rates, ranging from 5% to 15% across pediatric cases and reaching up to 29% in children with complex appendicitis.[4,7-9] With the growing interest in non-operative strategies involving antibiotic treatment for simple appendicitis, ongoing randomized controlled trials in pediatric cohorts are anticipated to shed light on alternative approaches.[10-13] Meanwhile, there is a critical need for an enhanced understanding of the risks associated with appendectomy in the current practice. Considering the widespread use of appendectomy to address appendicitis in children, it is essential to understand the impact of this surgery on daily routines and social interactions.

Aims and objectives

This study aimed to assess the impact of appendicectomy on the daily activities and social lives of children.

MATERIALS AND METHODS

This retrospective analysis focused on patients who underwent appendicectomy at our center for over 12 months, specifically between April 2022 and April 2023.

Inclusion criteria

The study included patients aged ≥5 years who were diagnosed with appendicitis and managed by either open or laparoscopic appendicectomy.

Exclusion criteria

Data collection and response rate

Patient records from the specified period were thoroughly reviewed to identify cases of appendicectomy. Seventy cases were identified, and these patients were subsequently contacted through telephone. A standardized questionnaire was used to collect data on post-operative outcomes and experience. Of the 70 patients, 55 responded to the questionnaire, providing valuable insights into their appendicectomy experience.

Demographic and surgical data

Among the respondents, the gender distribution included 38 were male and 17 were female. All patients were within the age range of 5–12 years. The surgical procedures included 14 open appendicectomies (nine males and five females) and 41 laparoscopic appendicectomies (26 males and 15 females).

Variables studied

The analysis covered various variables related to appendicectomy and the post-operative period. This included the type of presentation leading to appendicectomy, mode of surgical management (open or laparoscopic), duration of hospital stay post-surgery, post-operative morbidities such as complications, time taken to return to activities of daily living (ADLs), reasons for any delay in resuming ADLs, and duration until resumption of an unrestricted normal diet.

Ethical considerations and data analysis

Ethical considerations, including patient confidentiality, informed consent, and adherence to the ethical guidelines for retrospective analyses, were strictly followed throughout the study to ensure the integrity and validity of the findings. Descriptive statistics were employed to summarize the demographic and surgical data, as well as the variables studied. A comparative analysis between patients who underwent open appendicectomy and laparoscopic appendicectomy was conducted using appropriate statistical tests.

RESULTS

The sex distribution revealed a predominance of males, accounting for 63% (35 cases), compared to females, representing 37% (20 cases). The majority of cases presented with acute appendicitis, constituting 85% (47 cases), whereas a smaller proportion presented with subacute or interval appendicitis, comprising 15% (8 cases) of the total. Regarding surgical interventions, laparoscopic appendicectomy was the predominant approach, used in 80% of cases (44 cases), with open appendicectomy accounting for 20% (11 cases) of the surgeries performed (Table 1).

The reported symptoms after appendicectomy included pain in 12 cases, vomiting in three cases, and fever in two cases. In addition, six cases exhibited signs of wound infection, whereas 28 cases reported no specific complaints (Table 1).

The operative findings showed that among the laparoscopic surgeries, appendicular abscess was found in five patients, accounting for 9% of cases. In contrast, among the open

surgeries, the appendicular abscess was found in eight cases, constituting 14% of cases. Regarding the duration of stay post-surgery, 29 patients had a stay of <3 days, 12 patients had a stay between 3 and 5 days, and 10 patients had a stay of <5 days but >3 days. In addition, four patients had a stay longer than 5 days (Table 2).

The average return to school after laparoscopic surgery was as follows: 25 cases returned between 7 and 14 days, and 16 cases returned after more than 14 days. For open surgery, three patients returned to school within 7–14 days and 11 returned after more than 14 days. Regarding the average return to a normal diet post-surgery, 19 cases resumed within 7 days after laparoscopic surgery, 12 cases between 7 and 14 days, and 10 cases after more than 14 days. For open surgery, two patients resumed within 7–14 days, and 12 resumed after more than 14 days (Table 3).

Regarding weight changes, after laparoscopic surgery, there was 2% weight gain and 4% weight loss. In comparison, after open surgery, there was 2–3% weight gain and 3% weight loss. For laparoscopic surgery, the percentage of patients returning to normal activities within the following timeframes was observed: within <7 days, 0%; within 7–14 days, 45%; and after >14 days, 29%. For open surgery, the percentage of patients returning to normal activities within the following timeframes was observed: within <7 days, 0%; within 7–14 days, 5%; and after >14 days, 21% (Table 4).

Table 1: Demographic data of the study

Variables	Number of patients	Percentage
Gender		
Male	35	63
Female	20	37
Presentation		
Acute	47	85
Subacute/interval	8	15
Type of surgery		
Laparoscopy	44	80
Open	11	20
Clinical symptoms		
Pain	12	21.8
Vomiting	3	5.4
Fever	2	3.6
Wound infection	6	11
No complaints	28	51

Table 2: Operative findings

Operative findings	Laparoscopic finding of appendicular abscess in five patients – 9%	Open finding of appendicular abscess in eight cases – 14%
Duration of stay	<3 days – 29 cases 3–5 days – 12 cases	<5 days 10 cases>5 days 4 cases

Table 3: Outcomes after surgery

Variables	Laparoscopic	Open
AVG returns to school		
7 Days	0	0
7–14 days	25	3
>14 days	16	11
AVG returns to normal diet		
7 days	19	0
7–14 days	12	2
>14 days	10	12

DISCUSSION

The analysis of our cohort revealed a higher prevalence of males, constituting 63% of cases, compared to females at 37%. Most patients presented with acute appendicitis (85%), with a minority presenting with subacute/interval appendicitis (15%). Laparoscopic appendicectomy was the predominant surgical approach, utilized in 80% of the cases, while open appendicectomy accounted for 20%. Following surgery, notable symptoms included pain (12 cases), vomiting (three cases), fever (two cases), and wound infection (six cases), although a substantial proportion reported no specific complaints (28 cases). A similar retrospective analysis was conducted by Knaapen et al., which included 131 patients, most of whom were male (56%), with a mean age of 10.4 years. Most patients presented with simple appendicitis (50%), and only 4% of patients presented with non-inflamed appendicitis.[14]

Appendicular abscesses were detected in 9% of laparoscopic surgeries and 14% of open surgeries. Regarding the duration of hospital stay, most patients (29 cases) were discharged within 3-day post-laparoscopic surgery, while for open surgery, 10 patients had a stay between 3 and 5 days, and four patients had a stay longer than 5 days. The average return to school after laparoscopic surgery varied, with 25 cases returning between 7 and 14 days and 16 returning after more than 14 days. For open surgery, three patients returned within 7–14 days, and 11 returned after more than 14 days. Similarly, the resumption of a normal diet showed variability, with laparoscopic cases resuming mostly within 7 days (19 cases), whereas open surgery cases had a more extended range, with 12 cases

Table 4: Change in weight after surgery and return to normal daily activities/school

Variables	Laparoscopic (%)	Open (%)
Change in weight		
Weight gain	2	2–3
Weight loss	4	3
Return to normal daily activities/school		
<7 days	0	0
7–14 days	45	5
>14 days	29	21

resuming between 7 and 14 days and 12 cases after more than 14 days. Post-surgery weight changes were observed, with laparoscopic cases showing 2% weight gain and 4% weight loss, whereas open surgeries exhibited 2–3% weight gain and 3% weight loss. In terms of returning to normal activities, the majority of laparoscopic cases returned within 7–14 days (45%), whereas open surgeries had a longer duration, with 21% returning after more than 14 days.

The findings of this investigation underscore that appendectomy, even in a specific subset of patients, may not always proceed without complications, indicating the need for further efforts to mitigate post-appendectomy complications. This is especially pertinent given the growing consideration for non-operative antibiotic-based management of uncomplicated appendicitis as an alternative to surgical intervention. Nevertheless, within the adult demographic, outcomes following non-operative management for acute uncomplicated appendicitis have been inconsistent. While some studies suggest a potential reduction in complication rates by 39–71% with non-operative approaches, others note an event-free treatment success comparable to surgical methods.[15-17] Palabiyik and Demir, in a prospective study between children (8–18 years) reported chronic pain in patients undergoing open-surgical procedures for appendicitis with a higher incidence in female patients affecting the quality of life.[18]

In our study, irrespective of the mode of surgery, patients were affected by social determinants that influenced the outcomes. In addition, parental anxiety was seen as a pioneering factor affecting children's return to daily activities and return to school. Different results have been documented in children, with a recent meta-analysis indicating an initial success rate of 90% with non-operative treatment, showing no substantial variance in complications compared to appendectomy.[19] Conversely, another meta-analysis encompassing primarily the same studies suggested that non-operative treatment is less effective and linked to a heightened readmission rate.[20]

Limitations of the study

One of the primary limitations of this study is its retrospective nature, which can introduce bias and limit the ability to establish causal relationships. In addition, the sample size may be relatively small, impacting the generalizability of the findings. Furthermore, the study may not have captured all relevant variables that could influence post-appendicectomy outcomes, such as socioeconomic factors or pre-existing medical conditions. Future prospective studies with larger sample sizes and more comprehensive data collection could provide further insights into the factors influencing post-appendicectomy recovery and outcomes.

Outcomes

The resumption of a normal diet typically occurs before the return to normal activities or school attendance. The delay in resuming normal activities is primarily attributed to concerns related to potential infections, suture-related issues, potential injury during physical activities, and apprehension regarding unknown post-surgical complications.

CONCLUSION

In this retrospective study, we investigated the social determinants influencing the resumption of normal activities post-appendectomy, regardless of the mode or presentation of the surgery. Notably, parental anxiety emerged as a significant factor affecting the return to normalcy. The sequence of events we examined included the return to daily activities, followed by the resumption of an unrestricted normal diet, and finally, the return to school.

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REFERENCES

1. Addiss DG, Shaffer N, Fowler BS and Tauxe RV. The epidemiology of appendicitis and appendectomy in the United States. Am J Epidemiol. 1990;132(5):910-925.
https://doi.org/10.1093/oxfordjournals.aje.a115734
2. Bhangu A, Søreide K, Di Saverio S, Assarsson JH and Drake FT. Acute appendicitis: Modern understanding of pathogenesis, diagnosis, and management. Lancet. 2015;386(10000):1278-1287.
https://doi.org/10.1016/s0140-6736(15)00275-5
3. Cameron DB, Anandalwar SP, Graham DA, Melvin P, Serres SK, Dunlap JL, et al. Development and implications of an evidence-based and public health-relevant definition of complicated appendicitis in children. Ann Surg. 2018;271(5):962-968.
https://doi.org/10.1097/SLA.0000000000003059
4. Bolmers MD, van Rossem CC, Gorter RR, Bemelman WA, van Geloven AA, Heij HA, et al. Imaging in pediatric appendicitis is key to a low normal appendix percentage: A national audit on the outcome of appendectomy for appendicitis in children. Pediatr Surg Int. 2018;34(5):543-551.
https://doi.org/10.1007/s00383-018-4244-2
5. Gorter RR, Eker HH, Gorter-Stam MA, Abis GS, Acharya A, Ankersmit M, et al. Diagnosis and management of acute appendicitis. EAES Consensus Development Conference 2015. Surg Endosc. 2016;30(11):4668-4690.
https://doi.org/10.1007/s00464-016-5245-7

6. Cameron DB, Williams R, Geng Y, Gosain A, Arnold MA, Guner YS, et al. Time to appendectomy for acute appendicitis: A systematic review. J Pediatr Surg. 2018;53(3):396-405.
https://doi.org/10.1016/j.jpedsurg.2017.11.042
7. Tiboni S, Bhangu A, Hall NJ and Paediatric Surgery Trainees Research Network and the National Surgical Research Collaborative. Outcome of appendicectomy in children performed in paediatric surgery units compared with general surgery units. Br J Surg. 2014;101(6):707-714.
https://doi.org/10.1002/bjs.9455
8. Markar SR, Blackburn S, Cobb R, Karthikesalingam A, Evans J, Kinross J, et al. Laparoscopic versus open appendectomy for complicated and uncomplicated appendicitis in children. J Gastrointest Surg. 2012;16(10):1993-2004.
https://doi.org/10.1007/s11605-012-1962-y
9. Fujishiro J, Watanabe E, Hirahara N, Terui K, Tomita H, Ishimaru T, et al. Laparoscopic versus open appendectomy for acute appendicitis in children: A nationwide retrospective study on postoperative outcomes. J Gastrointest Surg. 2020;25(4):1036-1044.
https://doi.org/10.1007/s11605-020-04544-3
10. Fisher J. Comparison of Medical and Surgical Treatment of Uncomplicated Acute Appendicitis in Children. Available from: https://classic.clinicaltrials.gov/ProvidedDocs/37/NCT02991937/Prot_SAP_000.pdf [Last accessed on 2016 Dec 09].
11. Xu J, Liu YC, Adams S and Karpelowsky J. Acute uncomplicated appendicitis study: Rationale and protocol for a multicentre, prospective randomised controlled non-inferiority study to evaluate the safety and effectiveness of non-operative management in children with acute uncomplicated appendicitis. BMJ Open. 2016;6(12):e013299.
https://doi.org/10.1136/bmjopen-2016-013299
12. Knaapen M, van der Lee JH, Bakx R, The SM, van Heurn EW, Heij HA, et al. Initial non-operative management of uncomplicated appendicitis in children: A protocol for a multicentre randomised controlled trial (APAC trial). BMJ Open. 2017;7(11):e018145.
https://doi.org/10.1136/bmjopen-2017-018145
13. Hall NJ, Eaton S, Abbo O, Arnaud AP, Beaudin M, Brindle M, et al. Appendectomy versus non-operative treatment for acute uncomplicated appendicitis in children: Study protocol for a multicentre, open-label, non-inferiority, randomised controlled trial. BMJ Paediatr Open. 2017;1(1):bmjpo-2017-000028.
https://doi.org/10.1136/bmjpo-2017-000028
14. Knaapen M, van Amstel P, van Amstel T, The SM, Bakx R, van Heurn EL, et al. Outcomes after appendectomy in children with acute appendicitis treated at a tertiary paediatric centre: Results from a retrospective cohort study. Langenbecks Arch Surg. 2021;406(1):163-169.
https://doi.org/10.1007/s00423-020-01976-y
15. Salminen P, Tuominen R, Paajanen H, Rautio T, Nordström P, Aarnio M, et al. Five-year follow-up of antibiotic therapy for uncomplicated acute appendicitis in the APPAC Randomized Clinical Trial. JAMA. 2018;320(12):1259-1265.
https://doi.org/10.1001/jama.2018.13201
16. Rollins KE, Varadhan KK, Neal KR and Lobo DN. Antibiotics versus appendicectomy for the treatment of uncomplicated acute appendicitis: An updated meta-analysis of randomised controlled trials. World J Surg. 2016;40(10):2305-2318.
https://doi.org/10.1007/s00268-016-3561-7
17. Harnoss JC, Zelienka I, Probst P, Grummich K, Müller-Lantzsch C, Harnoss JM, et al. Antibiotics versus surgical therapy for uncomplicated appendicitis: Systematic review and meta-analysis of controlled trials (PROSPERO 2015: CRD42015016882). Ann Surg. 2017;265(5):889-900.
https://doi.org/10.1097/SLA.0000000000002039
18. Palabiyik O and Demir G. Chronic pain after open appendectomy and its effects on quality of life in children aged 8-18 years. Pain Res Manag. 2021;2021:6643714.
https://doi.org/10.1155/2021/6643714
19. Huang L, Yin Y, Yang L, Wang C, Li Y and Zhou Z. Comparison of antibiotic therapy and appendectomy for acute uncomplicated appendicitis in children: A meta-analysis. JAMA Pediatr. 2017;171(5):426-434.
https://doi.org/10.1001/jamapediatrics.2017.0057
20. Kessler U, Mosbahi S, Walker B, Hau EM, Cotton M, Peiry B, et al. Conservative treatment versus surgery for uncomplicated appendicitis in children: A systematic review and meta-analysis. Arch Dis Child. 2017;102(12):1118-1124.
https://doi.org/10.1136/archdischild-2017-313127

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