J Pediatr Adolesc Surg. 2020; 1:41-43
DOI: https:// doi.org/10.46831/jpas.v1i1.5

Original Article

Frequency and outcome of complicated appendicitis in toddlers and preschoolers

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Cite as: Khan N, Ayub M, Khan J, Ali Sajjad, Khattak I. Frequency and outcome of complicated appendicitis in toddlers and preschoolers J Pediatr Adolesc Surg. 2020; 1:41-43

ABSTRACT

Background: Acute appendicitis is a frequent indication of emergency abdominal surgery in the pediatric population. In younger children, especially toddlers, and preschoolers, the presentation is comparatively late resulting in complicated appendicitis. This study was done to determine the frequency and outcome of complicated appendicitis in toddlers and preschoolers.

Methods: This is a cross-sectional study done at the Department of Pediatric Surgery, Lady Reading Hospital Peshawar, during August 2018 and February 2019. The medical records of 144 toddlers and preschoolers who presented with acute appendicitis were reviewed for demography, clinical presentation, operative findings, and outcome. Frequency and types of complicated appendicitis were recorded.

Results: The mean age of study participants was 3 years (±2.84), including 46(32%) toddlers and 98(68%) preschoolers. Overall 62% of patients were male while 38% of patients were female. Complicated appendicitis was documented in 75% of patients. The common types of complicated appendicitis were perforation of the appendix with a localized abscess in 68 patients, gangrenous appendicitis in 4 patients, generalized peritonitis in 24 patients, and mass formation in 12 patients. All patients did well after surgery, except one who succumbed to complications of leukemia.

Conclusion: In our study, a great deal (75%) of toddlers and preschoolers had complicated appendicitis especially perforated appendicitis with localized peritonitis.

Keywords: Acute appendicitis, Toddlers, Preschoolers, Perforated appendicitis, complicated appendicitis.

INTRODUCTION

Acute appendicitis is a common surgical emergency and a frequent indication for abdominal surgery in the pediatric population.[1] Up to 8% of children with abdominal pain have acute appendicitis as its etiology.[2] However, in younger children, appendicitis is considered less common, but on the other hand, this age group is also attributed to delayed presentation with multiple complications. The common complications reported in the literature are appendicitis with perforation resulting in localized or generalized peritonitis, appendicular abscess, or mass formation.[3] The rate of perforation has been reported to be as high as 82% in children younger than 5 years and almost 100% for 1-year-old.[4] This study was planned to identify the frequency of complicated appendicitis in toddlers and preschoolers and their outcomes.

METHODS

This cross-sectional study was conducted in the Department of Pediatric Surgery, Lady Reading Hospital

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Email: nasimkhan101@yahoo.com
Submitted on: 14-06-2020
Conflict of interest: None

Accepted on: 12-07-2020
Source of Support: Nil

Peshawar, during August 2018 and February 2019. This study was conducted following the approval of the hospital ethical and research committee. A total of 144 toddlers and preschoolers with acute appendicitis were enrolled and evaluated for demography, clinical presentation, operative findings, and outcome. Per-operative assessment for signs of inflammation and complications like perforation, gangrene, and collection of pus in the peri-appendicular area and frank peritonitis, was performed. Postoperatively, the patients were managed with IV fluids, IV antibiotics, and analgesics.

Table 1: Type and frequency of complicated appendicitis

Type	Frequency	Proportion
Acute appendicitis (uncomplicated)	29	20%
Gangrenous appendix	4	3%
Perforation with localized abscess	68	47%
Mass formation	12	8%
Generalized Peritonitis	24	17%
Normal appendix (histologically)	7	5%

The data were analyzed with SPSS V.20. Mean (standard deviation) was computed for quantitative variables like age, duration of symptoms. Frequency and percentages were calculated for categorical variables like gender and complicated appendicitis. Complicated appendicitis was stratified with age, gender, and duration of symptoms to see effect modification. The post-stratification chi-square test was applied and a p-value <0.05 was considered as significant.

RESULTS

Of 144 patients, 46 (32%) were toddlers (1-3 years) while 98 (68%) were preschoolers (3-5 years). The mean age at presentation was 3 years (SD ± 2.84). There was a male preponderance in our study (male: 89, 62%; female: 55, 38%; M:F= 1.6:1). Twenty-six (18%) patients had a duration of symptoms ≤48 hours while 118 (82%) patients had a duration of symptoms for >48 hours.

Table 2: Stratification of w.r.t age complicated appendicitis distribution (n=144)

COMPLICATED APPENDICITIS	1-3 Years	3-5 Years	Total
Yes	35	73	108(75%)
No	11	25	36 (25%)
Total	46	98	144 (100%)

Chi square test has been applied in which P value was 0.8364

The majority of the patients in our study had abdominal pain (depicted by irritability and abdominal tenderness in toddlers) with or without localization, anorexia/reluctance to feed, increased/upper high limit of TLC, except one patient which was a known case of leukemia with pancytopenia. Ultrasound was helpful in only 38 (26%) cases, favoring acute appendicitis.

All patients underwent open appendectomy through gridiron incision, except 18 (12.5%) patients who were operated through right upper transverse laparotomy incision because their provisional diagnosis was generalized peritonitis. Complicated appendicitis was found in 108 (75%) patients. Table 1 describes the type and frequency of complicated appendicitis encountered in our study. Of these 108 complicated appendicitides, 32% were encountered in toddlers whereas 68% in preschoolers. On stratification of complicated appendicitis with respect to age of presentation (Table 2,p-value 0.8364), duration of symptoms (Table 3, p-value 0.8024), and gender (Table 4,p-value 0.9211), the differences were not statistically significant. Among those with complicated appendicitis, 23 (21%) patients developed wound infection and 8 (7%) patients developed pelvic abscess. Patients operated through gridiron incision were discharged on the 2ndpostoperative day and the average stay for laparotomy and complications was 4 days. On follow-up, 3 patients in the complicated appendicitis cohort also developed adhesive bowel obstruction, two were managed non-operatively and one patient needed operative adhesiolysis. One patient who was known case of leukemia with pancytopenia, operated for acute appendicitis, succumbed postoperatively.

Table 3: Stratification of complicated appendicitis w.r.t duration of disease (n=144)

COMPLICATED APPENDICITIS	≤ 48 hours	>48 hours	Total
Yes	19	89	108
No	7	29	36
Total	26 (18%)	118 (82%)	144 (100%)

Chi square test was applied in which P value was 0.8024

DISCUSSION

Despite the availability different scoring systems (pediatric appendicitis score) and imaging aid, the diagnosis of acute appendicitis in young children is an uphill task.[10] Most such patients present late with various complications e.g. perforation with resulting abscess formation, generalized frank peritonitis, and sepsis. The overall rate of missed diagnosis is as high as 70-100% among infants and toddlers and 19-57% in preschoolers.[3] In this study, we also encountered complicated appendicitis in 75% of cases. It is more common in males compared to females (ratio 1.4:1).[1] The same has been observed in our study (M:F= 1.6:1).

The delay in the diagnosis and management of acute appendicitis has been blamed on nonspecific presentations because of mobile cecum and the variable position of the appendix.[5]There is an overlap of symptoms with many other common pediatric illnesses like upper and lower respiratory tract infections, acute gastroenteritis, urinary tract infections, constipation, intussusception, obstructed inguinal hernia, orchitis, testicular torsion,

right hip arthritis, along with the inability of the child to express and communicate properly and with a difficult abdominal examination in this age group. The most common presenting symptom in children less than 5 years old is pain, followed by nausea, vomiting, fever, anorexia, and diarrhea. The most common sign on physical examination is focal tenderness (61% of the patients) followed by guarding (55%), diffuse abdominal tenderness (39%), rebound tenderness (32%), and mass formation (6%).[6,7]

Table 4: Stratification of complicated appendicitis w.r.t gender distribution (n=144)

COMPLICATED APPENDICITIS	Male	Female	Total
Yes	67	41	108 (75%)
No	22	14	36 (25%)
Total	89	55	144 (100%)

Chi square test has been applied in which P value was 0.9211

Mallick MS studied 106 patients of ≤5 years of age requiring appendectomy and reported a male preponderance in their study. Sixty-four patients (60.3%) had complicated appendicitis, 38 (35.3%) had acute appendicitis without complications, and 4 (3.7%) had normal appendix, in his study.[8] In our study, we also had a 5% rate of negative appendectomy, but the frequency of complicated appendicitis was high comparatively. Similar frequency of complicated appendicitis (70%) was reported by Singh et al. [4], but their rate of negative appendicitis was 9%.[4] In their study, perforated appendicitis was more common in patients who were younger than 5 years. More than 60% of patients presented with complicated appendicitis when the duration of symptoms was more than 72 hours.[9] Similarly, in our study, 61% of patients with complicated appendicitis were late presenters but the difference was not statistically significant (Table 3).

Asad et al. studied the cause of complicated appendicitis and late presentation. Complicated appendicitis and late presentation in 77% patients were due to missed diagnosis by the physicians, 31% was due to missed diagnosis by the non-doctors, 23.08% was due to conservative management at various hospitals by the surgeons in periphery having no proper pediatric surgery setup, and 23.08% presented late because of self-medication at home resulting in complications and increased morbidity.[10] This aspect was not evaluated in our study.

CONCLUSION

Complicated appendicitis is more common in children under five years because of delayed diagnosis resulting in worrisome complications which can be prevented with timely diagnosis. In our study, 75% of children under five-year of age (excluding neonates and infants) developed complicated appendicitis; perforated appendicitis with localized peritonitis being the most common complication. Every abdominal pain in this age population should be evaluated in a proper pediatric surgery setup for better management.

Consent to Publication: No clinical figure is used in this manuscript.

Authors Contribution: Author(s) declared to fulfill authorship criteria as devised by ICMJE and approved the final version. Authorship declaration form, submitted by the author(s), is available with the editorial office.

Acknowledgements: None

REFERENCES

1. Hall MJ, DeFrances CJ, Williams SN, Golosinskiy A, Schwartzman A. National hospital discharge survey: 2007 summary: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics; 2010. Available from: https://books.google.com.pk/books?id=R0eRIEq0ad0C&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
2. Almström M, Svensson JF, Patkova B, Svenningsson A, Wester T. In-hospital surgical delay does not increase the risk for perforated appendicitis in children: a single-center retrospective cohort study. An Surg. 2017; 265:616-21.
3. Almaramhy HH. Acute appendicitis in young children less than 5 years: review article. Italian J Ped. 2017; 43:15.
4. Singh M, Kadian YS, Rattan KN, Jangra B. Complicated appendicitis: analysis of risk factors in children. African J Paed Surg. 2014; 11:109.
5. Marzuillo P, Germani C, Krauss BS, Barbi E. Appendicitis in children less than five years old: a challenge for the general practitioner. World J Clin Pediatr. 2015; 4:19.
6. Nance ML, Adamson WT, Hedrick HL. Appendicitis in the young child: a continuing diagnostic challenge. Pediatr Emerg Care. 2000; 16:160-2.
7. Minneci PC, Mahida JB, Lodwick DL, Sulkowski JP, Nacion KM, Cooper JN, et al. Effectiveness of patient choice in nonoperative vs surgical management of pediatric uncomplicated acute appendicitis. JAMA Surg. 2016; 151:408-15.
8. Mallick MS. Appendicitis in pre-school children: A continuing clinical challenge. A retrospective study. Inter J Surg. 2008; 6:371-3.
9. Amin P, Cheng D. Management of complicated appendicitis in the pediatric population: when surgery doesn't cut it. Semin Intervent Radiol. 2012; 29: 231-6.
10. Asad S, Ahmed A, Ahmad S, Ali S, Ahmed S, Ghaffar S, et al. Causes of delayed presentation of acute appendicitis and its impact on morbidity and mortality. J Ayub Med Coll Abbottabad. 2015; 27:620–3.