Original Research Article

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Prevalence of perforated appendicitis and its determinants in pediatric appendicitis patients admitted in tertiary care centre, South India: a cross sectional study

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ABSTRACT

Background: Appendicitis remains a common indication for urgent surgical intervention in pediatric age group. Acute appendicitis has the highest incidence during the second decade of life. When the diagnosis is performed, perforation could be already present in 30%-75% of children, with young children being at higher risk. The challenge for the practitioner is to perform a timely diagnosis of acute appendicitis in first years of life before complications occur.

Methods: A facility based cross sectional study was conducted with sample size of 108. The patients diagnosed and operated for acute appendicitis using Alvarado score were correlated with intra operative findings.

Results: Total 108 patients with median age of 11 (IQR 9–13) years, were included in the study in which 66% were male. Overall 18% (95% CI 11%-25%) had perforated appendix and 5% (95% CI 2%-11%) had appendicitis with abscess. Male gender, patients presenting with fever, guarding, rigidity and patients presenting 48 hours after developing symptoms, had higher chance of perforation. Mean count of WBC (17000 v/s 11000) and neutrophils (75% v/s 68%) were found to be higher in patients with perforated appendicitis.

Conclusions: One-fifth of the pediatric appendicitis patients presenting in tertiary care patients had perforated appendicitis.

Keywords: Acute appendicitis, Alvarado score, Perforation

INTRODUCTION

Appendicitis remains a common indication for urgent surgical intervention in pediatric age group and early appendectomy has long been advocated to mitigate the risk of appendicular perforation. The effect of age and gender on time to perforation in acute appendicitis has not been well characterized. Acute appendicitis (AA) is the most frequently suspected disorder in patients presenting with acute abdominal pain and is the most common indication for urgent abdominal surgery. Acute

appendicitis has the highest incidence during the second decade of life, and represents a frequent indication for abdominal surgery in pediatrics.^{3,4} It is more common in males than in females (ratio 1.4:1).⁴ While up to 33% of affected children may present with distinct abdominal pain with consecutive pain localization in the right lower quadrant, nausea and vomiting, young children could show atypical or delayed symptoms presentation.⁵⁻⁷ When the diagnosis is performed, perforation could be already present in 30%-75% of children, with young children being at higher risk.⁸ Perforated appendicitis increases the

morbidity with intra-abdominal abscess being an important complication. The challenge for the practitioner is to perform a timely diagnosis of acute appendicitis in first years of life before complications occur. The challenge for the practitioner is to perform a timely diagnosis of acute appendicitis in first years of life before complications occur. The challenge for the practition is to perform a timely diagnosis of acute appendicities in first years of life before complications occur.

Aim

To determine the proportion of perforated appendicitis and factors associated with it, among appendicitis patients in pediatric age group, seeking care in tertiary care center.

METHODS

The data sheet was completed that included the patient's name, age, sex, laboratory analysis, duration of symptoms, and all the items that make up the Alvarado score. A semi structured interview schedule including socio-demographic details, clinical profile, investigation, and on table findings, was used to collect the data. Data was entered in MS–Excel and analyzed in SPSS. The proportion of perforated appendicitis was expressed in percentage with 95% confidence interval (CI). Indication for appendectomy was made based on clinical features and laboratory measurements and Alvarado score. Ultrasound was performed on all patients. Intra operative findings were recorded. All specimens were examined by a pathologist.

Study design

A facility based cross sectional study was conducted in a tertiary care centre in south India (MMCRI). Performa was created which included all the socio-demographic details, clinical presentation and the scoring system and also the on table findings of the patient. The data was entered in MS -EXCEL and was analyzed in SPSS.

Study setting

The study was conducted in one of the tertiary care hospital in south India in the Department of Pediatric surgery, MMCRI, Mysore.

Study period

The study included participants during one academic year from January 2017 to December 2017.

Inclusion criteria

All acute appendicitis cases in pediatric age group admitted in the centre and all the patients on whom emergency surgery was performed.

Exclusion criteria

Participants who refused surgery and patients who were not operated were excluded from the study.

RESULTS

The sample size of 108 patients had 66.7% (72) males and 33.3% (36) were females. 63% (68) of patients presented with fever, 93.5% (101) of patients presented with pain abdomen. 56.5% (61) of patients presented with vomiting, 58.3% (63) of patients presented with anorexia, 56.5% (61) of patients presented with nausea, 48.1% (52) of patients presented with diarrhoea, 50% (52) of patients presented more than 48hours after the onset of symptoms, 84.3% (91) 0f patients presented with localized right iliac fossa tenderness, 87% (94) of patients had rebound tenderness, 52.8% (57) of patients had diffuse tenderness, 51.9% (56) of patients presented with voluntary guarding, 18.5% (20) of patients presented with rigidity and 58.6% (63) of patients presented with temperature >38.6 degrees.

Table 1: Characteristics of paediatric age group patients admitted for appendicitis in tertiary care centre (n=108).

Characteristics	Frequency	Proportion
Gender		
Male	72	66.7
Female	36	33.3
Symptoms		
Fever	68	63
Pain	101	93.5
vomiting	61	56.5
Anorexia	63	58.3
Nausea	61	56.5
Diarrheoa	52	48.1
Duration >48hrs	54	50
Localized RIF tenderness	91	84.3
Rebound tenderness	94	87
Diffuse tenderness	57	52.8
Guarding	56	51.9
Rigidity	20	18.5
Temp. >38.6	63	58.6

Among the male patients 19.4% of patients had perforated appendicitis and 80.6% had acute appendicitis whereas 11.1% of female patients had perforated appendicitis and 88.9% of them had acute appendicitis. Fever was complained by 77.9% of acute appendicitis and 22.1% of perforated appendicitis. Pain was complained by 83.2% of acute appendicitis and 16.8% of perforated appendicitis. Vomiting was complained by 85.2% of acute appendicitis patients and 14.8% of perforated appendicitis. 82.5% of acute appendicitis patients had anorexia and was complained by 17.5% of perforated appendicitis patients. Nausea was complained by 80.3% of acute appendicitis patient and 19.7% of appendicitis patients. Diarrhoea was perforated complained by 82.7% of acute appendicitis and 17.3% of perforated appendicitis. 84.6% of patients with acute appendicitis presented more than 48 hours after the onset of symptoms where as it were 24.1% in perforated appendicitis. Localized tenderness was present in 84.6% of acute appendicitis and 15.4% of perforated appendicitis patients. Rebound tenderness was present in 84% of acute appendicitis and 16% of perforated appendicitis. Diffuse tenderness was present in 75.4% of acute appendicitis and 24.6% of perforated appendicitis.

Voluntary guarding was present in 76.8% of acute appendicitis and 23.2% of perforated appendicitis. Raised temperature was present in 84.1% of acute appendicitis and 15.9% of perforated appendicitis. Rigidity was present in 90% of perforated appendicitis and only 10% of acute appendicitis patients.

Table 2: Factors associated with perforated appendicitis among paediatric age group patients admitted for appendicitis in tertiary care centre (N=108).

Characteristics	Acute appendicitis N (%)	Perforated appendicitis N (%)	P value
Gender			
Male	80.6	19.4	0.412
Female	88.9	11.1	
Symptoms			
Fever	77.9	22.1	0.063
Pain	83.2	16.8	1.000
vomiting	85.2	14.8	0.608
Anorexia	82.5	17.5	1.000
Nausea	80.3	19.7	0.597
Diarrheoa	82.7	17.3	1.000
Duration >48hrs	75.9	24.1	0.069
Localized RIF tenderness	84.6	15.4	0.478
Rebound tenderness	84	16	0.700
Diffuse tenderness	75.4	24.6	0.220
Guarding	76.8	23.2	0.073
Rigidity	10	90	0.000
Temp. >38.6	84.1	15.9	0.799

Total 108 patients with median age of 11 (IQR 9–13) years, were included in the study in whom 66% were male. Overall 18% (95% CI 11%-25%) had perforated appendix and 5% (95% CI 2%-11%) had appendicitis with abscess. Male gender, patients presenting with fever, guarding, rigidity and patients presenting 48 hours after developing symptoms, had higher chance of perforation. Mean count of WBC (17000 v/s 11000) and Neutrophils (75% v/s 68%) were found to be higher in patients with perforated appendicitis.

DISCUSSION

Abdominal pain is one of the most common symptoms of patients seeking medical attention. Acute appendicitis is the most common cause of acute abdominal pain, and distinguishing appendicitis from other disorders is sometimes difficult, particularly in young preverbal children. Early and accurate diagnosis of acute appendicitis is required to reduce the morbidity and mortality associated with delayed diagnosis and its complications. On the other hand, it is very important to reduce the number of unnecessary appendectomies.

Alvarado score was originally developed by Alfredo Alvarado in 1986 as an aid to the diagnosis of patients

with appendicitis. The score was based on a cohort of 305 patients based at the Nazareth Hospital in Philadelphia in the United States who presented with suspected appendicitis. The charts of these patients were reviewed retrospectively, and the sensitivity and specificity of 8 predictive factors were assessed. Alvarado recommended that the patients with a score less than 5 can be discharged as non-appendicitis, those with a score of 5 or 6 required observation, whereas those with a score of 7 or higher needed to proceed to surgery because it was likely that they had appendicitis. 16 Schneider et al, observed 588 patients aged 3 to 21 years and, using the Alvarado that recommended a score of 7 as a cutoff value for having appendicitis, they found a PPV of 65%, an NPV of 46%, a sensitivity of 72%, and a specificity of 81%. Mandeville et al, in their study on 287 patients found that an Alvarado cutoff score of 7 or higher would give 118 correct diagnoses; sensitivity, 76%; specificity, 72%; and PPV, 76%. On the basis of these findings, the Alvarado score saw universal use, and there have been many studies showing it as a useful tool in the diagnosis of acute appendicitis. 17-22 In present study 108 patients were included and was diagnosed using the Alvarado score and among which 18% patients were found to have perforated appendix and 5% patients were found to have appendicitis with abscess. The patients presenting late and with increased total counts, predominating neutrophils in blood picture have more chance of perforated appendix and abcess.

CONCLUSION

One-fifth of the pediatric appendicitis patients presenting in tertiary care patients had perforated appendicitis. Careful assessment of the associated determinants can predict the risk of having perforated appendicitis.

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Institutional Ethics Committee

REFERENCES

- Augustin T, Cagir B, VanderMeer TJ. Characteristics of perforated appendicitis: effect of delay is confounded by age and gender. J Gastrointestinal Surg. 2011;15(7):1223.
- Hasbahçeci M, Erol C, Törü M, Şeker M. Effect of surgeon's judgement on the diagnosis of acute appendicitis. Turkish J Surg/Ulusalcerrahidergisi. 2014;30(1):22.
- 3. Addiss DG, Shaffer N, Fowler BS, Tauxe RV. The epidemiology of appendicitis and appendectomy in the United States. Am J Epidemiol. 1990;132:910-25
- 4. 4.Hall MJ, DeFrances CJ, Williams SN, Golosinskiy A, Schwartzman A. National Hospital Discharge Survey: 2007 summary. Natl Health Stat Report. 2010;(29):1-20, 24.
- 5. Davenport M. Acute abdominal pain in children. BMJ. 1996;312:498-501.
- Horwitz JR, Gursoy M, Jaksic T, Lally KP. Importance of diarrhea as a presenting symptom of appendicitis in very young children. Am J Surg. 1997;173:80-2.
- 7. Irish MS, Pearl RH, Caty MG, Glick PL. The approach to common abdominal diagnosis in infants and children. PediatrClin North Am. 1998;45:729-72.
- 8. Stefanutti G, Ghirardo V, Gamba P. Inflammatory markers for acute appendicitis in children: are they helpful. J Pediatr Surg. 2007;42:773-6.
- Bansal S, Banever GT, Karrer FM, Partrick DA. Appendicitis in children less than 5 years old: influence of age on presentation and outcome. Am J Surg. 2012;204:1031-5.
- 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 Pediatrics. 2015;4(2):19.
- Kulik DM, Uleryk EM, Maguire JL. Does this child have appendicitis? A systematic review of clinical

- prediction rules for children with acute abdominal pain. J Clin Epidemiol. 2013;66:95-104.
- Bansal S, Banever GT, Karrer FM, Partrick DA. Appendicitis in children less than 5 years old: influence of age on presentation and outcome. Am J Surg. 2012;204:1031-5.
- 13. Pogorelić Z, Biočić M, Jurić I, Milunovic KP, Mrklic I. Acute appendicitis as a complication of varicella. Acta Medica (Hradec Králové). 2012;55:150-2.
- 14. Pogorelić Z, Stipić R, Druzijanić N, Perko Z, Grandic L, et al. Torsion of epiploic appendage mimic acute appendicitis. Coll Antropol. 2011;35:1299-302.
- 15. Perko Z, Bilan K, Pogorelić Z, Tomic S, Vilovic K, Krnic D, et al. Acute appendicitis and ileal perforation with a toothpick treated by laparoscopy. Coll Antropol. 2008;32:307-9.
- 16. Alvarado A. A practical score for the early diagnosis of acute appendicitis. Ann Emerg Med. 1986;15:557-64.
- 17. McKay R, Shepherd J. The use of the clinical scoring system by Alvarado in the decision to perform computed tomography for acute appendicitis in the ED. Am J Emerg Med. 2007;25:489-93.
- 18. Bhatt M, Joseph L, Ducharme F. Prospective validation of the pediatric appendicitis score in a Canadian pediatric emergencydepartment. Acad Emerg Med. 2009;16:591-6.
- 19. Subotic AM, Sijacki AD, Dugalic VD, Antić AA, Vuković GM, Vukojević VS, et al. Evaluation of the Alvarado score in the diagnosis of acute appendicitis. Acta Chir Iugos. 2008;55:55-61.
- 20. Arian GM, Sohu KM, Ahmad E, Haider W, Naqi SA. Role of Alvarado score in diagnosis of acute appendicitis. Pak J Surg. 2001;17:41-6.
- 21. Hsiao KH, Lin LH, Chen DF. Application of the MANTRELS scoring system in the diagnosis of acute appendicitis in children. Acta Paediatr Taiwan. 2005;46:128-31.
- 22. Sun JS, Noh HW, Min YG, Lee JH, Kim JK, Park KJ, et al. Receiver operating characteristic analysis of the diagnostic performance of a computed tomographic examination and the Alvarado score for diagnosing acute appendicitis: emphasis on age and sex of the patients. J Comput Assist Tomogr. 2008;32:386-91.

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