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Incidence, Clinical Features and Complications in Patients with Appendicolith Associated Acute Appendicitis

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ABSTRACT

Introduction: Acute appendicitis is one of the most frequent causes of abdominal pain in patients presenting to the emergency department (ED) who need surgical treatment with an incidence of 100 to 200 cases per 100,000 person-years. In this study, we have decided to see the incidence, clinical features and complications associated with appendicolith associated acute appendicitis in the patients which presented to us with clinical features of acute appendicitis in our tertiary care hospital setup

Objective: To study the incidence, clinical features and complications associated with appendicolith associated acute appendicitis in the patients which presented to us with clinical features of acute appendicitis in our tertiary care hospital (IMS & SUM Hospital).

Methods: This is a prospective study, carried out in IMS & SUM Hospital, a tertiary care hospital, Odisha during the period between April 2019 to October 2020. All the patients presenting to the Emergency Department (ED) with symptoms suggestive of Acute Appendicitis were included in this study.

Results: Of the 200 patients who underwent appendectomy, 63 (31.5%) patients were ≤ 17 years of age. Following appendicectomy, appendicoliths were found in 66 (33%) appendicectomy specimens. The sensitivity of trans abdominal ultrasonography to detect appendicolith to be 53.03% with a positive predictive value and specificity to be 67.30% and 87.31% respectively. Overall, complicated appendicitis was more commonly seen in patients with appendicolith as compared to patients without appendicolith (69.7% vs 23.9%), and this value is significant (P < 0.001).

Conclusion: Acute appendicitis is more common in the pediatric age group (0-17 years) as compared to the adult population. Ultrasonography has very low sensitivity and is a poor predictor of appendicoliths in patients presenting with acute appendicitis. Appendicitis with appendicolith results in higher incidences of complicated appendicitis. Thus, these patients should undergo appendicectomy rather than conservative management.

Key Words: Acute Appendicitis, Appendicolith, Complicated Appendicitis, Appendectomy

INTRODUCTION

Acute appendicitis is one of the most frequent causes of abdominal pain in patients presenting to the emergency department (ED) who need surgical treatment with an incidence of 100 to 200 cases per 100,000 person-years.[1] Acute appendicitis can present as uncomplicated or complicated variants. Complicated appendicitis is traditionally defined as appendicitis complicated by the presence of gangrene, perforation, peri appendicular abscess, generalized peritonitis. The most common cause of Appendicitis is luminal obstruction by appendicolith.[2]

Appendicolith, also known as faecolith/coproliths/stercoliths is composed of faecal concretions or pellets, calcium phosphates, bacteria and epithelial debris and can lead to luminal obstruction followed by appendicitis. They can be seen in around 10% of patients with acute appendicitis.[3] Presence of appendicolith has been identified as an independent prognostic factor for failure of conservative management in cases of uncomplicated acute appendicitis and it has also been linked with increased incidence of complicated appendicitis.[4-8] The detection of appendicoliths in cases of acute appendicitis have increased due to the better imaging modalities and are also being detected in patients without inflammatory changes in the appendix.

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In this study, we have decided to see the incidence, clinical features and complications associated with appendicolith associated acute appendicitis in the patients who presented to us with clinical features of acute appendicitis in our tertiary care hospital setup (IMS & SUM Hospital).

MATERIALS AND METHODS

This is a prospective study, carried out in IMS & SUM Hospital, a tertiary care hospital, Odisha during the period between April 2019 to October 2020. All the patients presenting to the Emergency Department (ED) with symptoms suggestive of Acute Appendicitis were included in this study.

Demographic data collected included: age and sex. History of present illness data collected included duration of the symptoms and the presence/absence of nausea, vomiting, anorexia, diarrhoea, migration to the right lower quadrant (RLQ) and similar previous episodes. Duration of symptoms was defined as the time since the onset of symptoms to presentation to the ED. Physical examination data collected included the first recorded temperature (Fahrenheit), heart rate, systolic blood pressure (SBP), Alvarado score, and the presence/absence of RLQ tenderness, diffuse abdominal tenderness, RLQ rebound tenderness, diffuse abdominal rebound tenderness, Rovsing sign, Obturator sign, and Psoas sign, as documented by the surgeon or postgraduate resident.[9] Laboratory data collected included the first recorded ED value for total WBC and percentage of polymorphonuclear cells. Radiological data collected included ultrasonography (USG). Appendicolith on USG along with uncomplicated or complicated appendicitis (gangrene, perforation, peri-appendicular abscess, generalized peritonitis) was noted.

Management data included Antibiotics and appendectomy (Open or Laparoscopic). Intraoperative findings were noted. After an appendectomy, the specimen was cut open to check for the presence of intraluminal appendicolith and sent for histopathological study.

RESULTS

Of the 200 patients who underwent appendectomy, 63 (31.5%) patients were ≤ 17 years of age and the rest 137 (68.5%) patients were of 18 years or more. Following appendicectomy, appendicoliths were found in 66 (33%) appendicectomy specimens. The incidence of appendicolith in paediatric age group was found to be 42.9% (27 patients) and 28.4% (39 patients) in adult population which was significant (P-value = 0.044) [Table 1 and 3].

Out of 66 patients with appendicolith, 34 patients (51.5%) presented with fever of more than 101°F whereas only 31 patients (23.1%) without appendicolith had fever more than 101°F [Table 2]. Vomiting was associated with 57.5% (38 patients) of patients with appendicolith as compared to only 36.5 % (49 patients) of patients without appendicolith [Table 2]. Generalized guarding was present in 12.1% (8 patients) of patients with appendicolith as compared to 2.2% (3 patients) without it [Table 2]. A history of a similar episode in the past was seen in 34.8% (23 patients) of patients with appendicolith and 14.9% (20 patients) in patients without [Table 2].

Preoperative transabdominal ultrasonography was done in all the 200 patients, revealing appendicolith in 52 patients. The results of the pre-operative ultrasonography were compared with the postoperative detection of appendicolith in the appendix specimen. This revealed the sensitivity of trans abdominal ultrasonography to detect appendicolith to be 53.03% with a positive predictive value and specificity to be 67.30% and 87.31% respectively [Table 3].

Intraoperatively, 22.7% of patients with appendicoliths had perforation as compared to 5.2% of patients without (P-value < 0.001) and 25.7% of patients had a gangrenous appendix with appendicolith vs 8.9% patients without appendicolith. Overall, complicated appendicitis was more commonly seen in patients with appendicolith as compared to patients without appendicolith (69.7% Vs 23.9%), and this value is significant (P-value < 0.001)[Table 4].

DISCUSSION

Acute appendicitis presents in the emergency department either as uncomplicated or complicated varieties. Most of the cases (70 – 80 %) are uncomplicated. In the past few years, the incidence of uncomplicated acute appendicitis is declining, whereas the incidence of complicated appendicitis remains unchanged.[9,10] Early diagnosis and surgical resection of the appendix have been the mainstay for the treatment of acute appendicitis for many years. However, there is a paradigm shift in the approach and management of acute appendicitis with recent evidence showing that early surgical intervention is not always mandatory and acute appendicitis can be managed effectively with proper dosage of antibiotics.[11,12] Many studies in the past concluded appendicolith as an independent prognostic risk factor for failure of non-surgical management of uncomplicated acute appendicitis and also showed its association with the increase in the incidences of appendiceal perforations.[4-8]

Older studies supported the theory of Appendicolith's being the main cause of obstruction, leading to appendicitis. Collins described the prevalence of appendicolith as 44.25% in 71,000 specimens.[13] Study of Collins included 12,119 prophylactic appendicectomies and 6,409 post-mortem specimens but only 11,961 cases of simple appendicitis. Since prevalence in each category was not calculated, conclusions about the association of appendicolith with appendicitis cannot be made.

Various other studies have also shown appendicolith prevalence of 33-44% in cases of appendicitis.[14-16] However, larger series studies are done after 1970, show a decrease in the prevalence of appendicolith with the percentage ranging between 1.5% to 15%.[17-23] A study by Jonas et all. (sample size < 100 cases) in the post-1970s era, showed the prevalence of appendicolith was 52%.[24] In the present study, overall appendicolith prevalence was found to be 33%. Previous studies showed the prevalence of appendicolith in the paediatric age group (≤17 years) with acute appendicitis to be between 19-65%.[6,25,26] Similar results were found in our study with 42.9% in the paediatric age group versus 28.4% in adults having appendicoliths in patients of acute appendicitis.

Historically, appendicolith has been associated with clinically severe appendicitis. In our study fever of more than 101°F was seen in 51.5% of patients with appendicolith as compared to only 23.1% of patients without appendicolith. Vomiting was more associated with acute appendicitis with appendicolith as compared to only appendicitis (57.5% vs 36.5%). Similarly, generalized guarding/ rigidity was seen in 12.1% of appendicolith positive patients as compared to 2.2% of patients without appendicolith. History of the similar episode of pain in the RIF was present in 34.8% of patients with appendicolith as compared to 14.9% of patients without appendicolith, suggesting, the attacks of appendicitis tend to recur in patients of an appendicolith, if not treated with appendicectomy in the first instance.

In our study, 22.7% of the patients with appendicolith presented with a perforated appendix as compared to only 5.2% of patients without appendicolith. These results are similar to the findings of Fitz and Wangensteen.[27,28] Studies in the past show Transabdominal ultrasonography (USG) to have a sensitivity of 86%-95% and specificity (78%-84%) in diagnosing acute appendicitis.[29] But computed tomography (CT) is more sensitive for diagnosing appendicolith in patients with appendicitis as compared to ultrasonography. CT scan is not done routinely for all the cases of acute appendicitis, so in our study, we have tried to find out the sensitivity, positive predictive value and specificity of ultrasonography in detecting appendicolith in a patient with acute appendicitis. In our study, the sensitivity, positive predictive value and specificity of USG in detecting appendicolith were found to be 53.03%, 67.30% and 87.31% respectively.

CONCLUSION

Based on the study findings, we can conclude that appendicolith in cases presenting with acute appendicitis is more common in the pediatric age group (0-17 years) as compared to the adult population. Acute appendicitis patients with appendicolith have a higher chance to develop a fever of more than 101°F and have episodes of vomiting as compared to patients without appendicolith. History of similar episodes of pain in the RLQ in the past, managed conservatively, is more common in patients of acute appendicitis with appendicolith. Appendicitis with appendicolith results in higher incidences of complicated appendicitis. Thus, these patients should undergo appendicectomy rather than conservative management. Ultrasonography has very low sensitivity and is a poor predictor of appendicoliths in patients presenting with acute appendicitis.

Conflict of Interest: There is no conflict of interest among the authors.

Author Contribution: Dr.Debasish Samal and Dr.Tejaswi Mishra have contributed in performing the surgeries, concept, study design, data analysis, statistical analysis and manuscript preparation, Dr.Godalu Trinath Patra contributed in performing the surgeries manuscript editing and manuscript review. Dr. Ayush Vardhan and Dr.Ankur Gogoi Cheleng have contributed towards literature search, data acquisition, manuscript editing.

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Table 1: Age dependent prevalence of Appendicitis

Age Groups (in years)	Appendicitis with Appendicolith (n=66)	Appendicitis without Appendicolith (n=134)	p-value
0 - 17	27 (42.9%)	36 (57.1%)	0.044
≥18	39 (28.4%)	98 (71.6%)	

Table 2: Clinical Features of Appendicitis

Clinical Features	Appendicitis with Appendicolith (n=66)	Appendicitis without Appendicolith (n=134)	Total
Fever more than 101°f	34 (51.5%)	31 (23.1%)	65
Vomiting	38 (57.5%)	49 (36.5%)	87
Localized Guarding / Rigidity	58 (87.8%)	131 (97.7%)	189
Generalized Guarding / Rigidity	8 (12.1%)	3 (2.2%)	11
History of Similar Episode in the Past	23 (34.8%)	20 (14.9%)	43

Table 3: USG Findings in Appendicectomy

USG Findings	Appendicectomy Specimen Positive for Appendicolith	Appendicectomy Specimen Negative for Appendicolith	Total
USG Positive for Appendicolith	35	17	52
USG Negative for Appendicolith	31	117	148
Total	66	134	200

Table 4: Intra-operative Findings of Appendix in Appendicectomy

Intra-operative Findings of Appendix	Appendicitis with Appendicolith (n=66, 100%)	Appendicitis without Appendicolith (n=134, 100%)	Total (n=200, 100%)	p -value
Inflamed appendix	20 (30.3%)	102 (76.1%)	122 (61.0%)	<0.001
Peri-appendicular dense adhesions	14 (21.2%)	13 (9.7%)	27 (13.5%)	0.025
Gangrenous appendix	17 (25.7%)	12 (8.9%)	29 (14.5%)	0.002
Perforated appendix	15 (22.7%)	7 (5.2%)	22 (11.0%)	<0.001

Figure 1: Appendectomy specimen cut open to show Appendicolith

Figure 2: Appendectomy specimen in case of a Perforated appendix showing Appendicolith.