Parasitic Infestation of the Appendix, Masquerading as Acute Appendicitis

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Objectives: To evaluate the prevalence of parasitic infection in surgically removed appendices and investigate the role of parasitic infestation in the etiology of acute appendicitis.

Background: Enterobius vermicularis is considered the most common helminth worldwide. Interestingly, the presence of parasite in the appendix may cause appendiceal colic even without eliciting an acute inflammatory reaction. The definitive diagnosis of parasitic infestation is generally achieved only after the histopathological examination of the resected appendix specimens.

Materials & Methods: A retrospective study over a span of 3 years included 593 pediatric and adolescent patients who underwent surgery for a diagnosis of acute appendicitis between January 2013 to December 2015. Microscopic slides of specimens which were histopathologically diagnosed to contain parasites were retrieved from the archives and reviewed for features of acute inflammation and parasite type. Patients were divided into 2 groups according to the presence or absence of the appendicitis.

Results: Total 593 appendectomies were performed in the PIMS hospital, of these 62(10.45%) were found to contain parasite on histopathology. This includes 24(38.71%) male and 38(61.29%) female patients. It was observed that 51 (82.25%) appendectomies were for acute appendicitis; however histopathological examination proved only worm infestation.

Conclusion: Worm infestation without appendicitis is more frequent in children (64.52%) than adults (35.48%). Low prevalence of parasites among the appendectomy specimens did not support the notion that parasites were the major cause of appendicitis in children. Parasites rarely cause appendicitis but its symptoms resemble appendicitis. If we de-worm the children at school level on a regular basis we might prevent many future unnecessary appendectomies.

Keywords: Appendicitis, parasitic infection, enterobiusvermicularis

Introduction

Human appendix is a blind ended tube present between the junction of small and large intestine. Suspected acute appendicitis is the most frequent cause for emergency operations in visceral surgery and appendicitis is the most common surgical disease of the children and the adults. Parasitic infestation caused by the enterobiusvermicularis estimated to affect up to 209 million people all over the world. The life time risk of having an appendectomy is 12% for men and 25% for women, however for men and women life time risk of acute appendicitis is 8.6% and 6.7% respectively.

Appendicitis is caused by multifactorial reasons. Fecal stasis and lymphoid hyperplasia is the most common causes of appendicitis where as unusual causes of appendicitis are intestinal parasites and tumors.

Parasites may sometime influence appendix. This situation can differ between an innocent reaction and an inflammatory response threatening life. A reported 250,000 appendectomies are performed annually with 15% result in removal of normal appendix. Around 4 - 8% of the children are reported to be infected by parasite globally. The presence of parasite in the appendix may cause appendiceal colic even without eliciting acute inflammation. The presence of pin worm in the appendix has been shown to cause symptoms of appendicitis or appendiceal colic but frequently without any histological evidence of acute inflammation. This colic due to parasitic infestation is explained by the hypothesis of appendiceal lumen obstruction. The parasitic infestation is a leading cause of iron deficiency anemia, growth retardation, while heavy infestation with both round worm and whip worm causes protein energy malnutrition. Moreover it can lead to intestinal obstruction in infested children. Timely diagnosis and treatment with de-worming of the patients prevent probable future complications that may necessitate surgical procedure.
The rationale of our study was to determine the widespread occurrence of parasitic infestation of the appendix and to access its possible relation to acute appendicitis.

Materials & Methods

Study Design: This is a descriptive study involves retrospective analysis of 593 patients who had undergone appendectomy for symptoms of acute appendicitis.

Duration: This study was conducted from January 2013 to December 2015 for a period of 3 years.

Setting: This study is carried out at histopathology department, Pakistan institute of medical sciences, Islamabad. Microscopic slides of resected appendix specimens were reviewed and classified according to the presence of acute inflammation and parasite type.

Inclusion Criteria: All patients that were admitted and surgically treated for acute appendicitis and had worm infestation in their appendix at PIMS hospital.

Exclusion Criteria: All patients that were admitted and surgically treated for acute appendicitis but did not have worm infestation in their appendix at PIMS hospital.

The diagnosis of acute appendicitis was based on history and clinical examination, leukocytosis and strengthened by ultrasonography. All specimens were submitted in 10% formalin for histopathological evaluation. Age, sex, clinical features and pathological finding were documented. The data was analyzed using SPSS version 20.

Results

Out of 593 specimens 62 (10.45%) contained parasite at histopathological examination. Female constituted approximately 62%.

Patient’s age ranged from 6 to 63 years and the most frequent age group was 10-15 years. Out of 62 cases 40 were children.

Patients were divided into 2 groups according to the presence or absence of acute inflammation. Group 1 composed of 51 (82%) cases which showed only worm infestation without inflammation while remaining 11 (Group 2), showed both worm infestation and acute inflammation.

However, acute inflammation is frequently seen in age group of 10-15 years while least in above 20 years as shown in figure 1.

ACUTE INFLAMINATION IN PATIENTS

<table>
<thead>
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<th>Age group</th>
<th>Worm Infestation without acute Inflammations</th>
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Figure 1. Frequency of acute inflammation according to age group.

Enterobiusvermicularis was the only cause of worm infestation in all cases. Table 1.

Table 1: Worm infestation with and without acute inflammation in relation to age groups.

Figure 2. Enterobiusvermicularis infestation without acute inflammation (Thin arrow) (H&E X 100)
Discussion

Gastrointestinal tract (GIT) infections due to parasitic infestation occur worldwide. Now parasitic diseases are seen more frequently in developed countries. It has been a controversial issue in terms of its role in the etiology of acute appendicitis. GIT infection due to enterobiusvermicularis is considered the most common helminthic infection. It has been postulated that enterobiusvermicularis infestation with the acute appendicitis varies from 0.2%-41.8% worldwide. Although seen in all ages and socioeconomic levels, it is most common in children aged from 5-14 years.

Pin worm was more often associated with un-inflamed appendices than inflamed appendices and mucosal invasion was not seen. Therefore it would seem unlikely that these parasites cause acute appendicitis. Parasite has the propensity to colonize people without causing much specific symptoms, like pruritus ani and restless sleep. However pin worm may be a cause of symptoms resembling appendicitis, because a significantly higher proportion of patients with symptoms had pin worm compared with patients who had an incidental appendectomy. Ova release from female parasite may be a feature of appendiceal obstruction, which consequently is followed by a bacterial overgrowth and finally ending to acute appendicitis an appendiceal colic caused by parasitic infestation cannot be differentiated from the right lower quadrant pain of unusual acute appendicitis.

Clinical diagnosis of acute appendicitis is generally made on the basis of history of migratory pain and physical findings of rebound tenderness coupled with neutrophilic leukocytosis both in children and adults.

Parasitic infestation of the appendix was thought to cause acute appendicitis. Our morphological findings however showed reactive lymphoid hyperplasia gangrenous appendicitis and perforation with peritonitis. lymphoid hyperplasia in response to the presence of parasite may be the first tissue reaction leading to appendiceal colic. The association of enterobiusvermicularis and appendicitis was described in 1899. Since then there have been several studies describing this entity. Our study shows a higher prevalence as compared to other studies done locally and regionally. Parasitic infestation accounted for 10.4% of the total cases. A local study conducted in Islamabad by Manzoor A. et al., showed a prevalence of 4.02%. Sahsp, et al in Nepal reported that enterobiusvermicularis was indentified in 1.62% cases among patients having clinical diagnosis of appendicitis. Ramezani MA, et al conducted a study in Iran confirmed the relationship between enterobiusvermicularis and occurrence of acute appendicitis in only 2.9% cases. Wiebe BM, et al from Denmark concluded a study which indicates presence of this parasite in appendix can give the symptoms of acute appendicitis in 4% cases. Intiazwan, et al in 2010 reported that 72.7% patients had worm inside the vermiiform appendix but not appendicitis. Gialamas, et al reported 1085 appendectomies in a Greek hospital, of this 7 were found to have enterobiusvermicularis infection and only 1(14.28%) showed evidence of appendicitis. Ariyarathenam, et al in UK conducted a study reported that 6 underwent laparoscopic appendectomies of these only 1(16.66%) was noted to be inflamed.

In our study worm infestation without acute inflammation is seen in 82.25% cases while 17.75% have worm along with appendicitis. Akbuluts, et al reported that there was evidence of acute inflammation in 12(32.43%) cases while in 25(67.56%) cases there was no pathological change. All the studies suggest the presence of pin worm may cause an appendicitis syndrome identical to acute appendicitis without acute inflammation. The studies suggest that the pin worm sometimes directly caused the inflammation by causing an inflammatory reaction or obstructing the appendix.

If we de-worm the children on a regular basis at school level we might prevent many unnecessary surgeries. The treatment of choice for
enterobiusvermicularis is Mebendazole or Pyrantel pamoate with Albendazole as an alternative treatment. Mebendazole acts by inhibiting microtubule synthesis, has a low incidence of adverse effects. For pin worm the treatment is 100mg once, then repeated 2 weeks later. The drug must be repeated because it does not kill the eggs, therefore it must be repeated to increase efficiency. Pyrantel pamoate is active against mature and immature worm; however it is not active against ova. The dose for pin worm infection is 11mg/kg up to 1g given once and repeated in 2 weeks. Albendazole dosage is 400mg once repeated in 2 weeks for pin worm infection.20

Conclusion

The presence of enterobiusvermicularis in an appendix specimen mimicking symptoms of appendicitis is a unique finding. In countries like Pakistan with low socio-economic status and no access to clean drinking water, helminthic infection is a common problem. A simple measure like de-worming on a regular basis of children and adolescents, we can avoid unnecessary surgeries and the potential complications associated with them. These measures will also help reduce the disease burden as well as save on the economy in the health sector.

References

**HISTORY**

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D. Manuscript Writing  
E. Critical Review  
F. Facilitated for Reagents/Material/Analysis