Contents lists available at ScienceDirect

Asian Pacific Journal of Tropical Biomedicine

journal homepage: www.elsevier.com/locate/apjtb

Document heading doi:10.1016/S2221-1691(11)60004-X © 2011 by the Asian Pacific Journal of Tropical Biomedicine. All rights reserved.

Can fruit seeds and undigested plant residuals cause acute appendicitis

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ARTICLE INFO

Article history:

Received 7 February 2011

Received in revised form 27 February 2011

Accepted 15 March 2011

Available online 1 April 2011

Keywords:

Acute appendicitis

Fruit-vegetable consumption

Bezoar

Fruit seed

ABSTRACT

Objective: To investigate the relation between fruit seeds, plants residuals and appendicitis.**Methods:** Among cases that underwent appendectomy, the appendicitis cases having fruit seeds and undigested plant residuals in their etiology were examined retrospectively. Also, histopathological features, age, sex, and parameters of morbidity and mortality were used.**Results:** Fruit seed was found in one case (0.05%) with presence of pus in appendix lumen, undigested plant residuals in 7 cases (0.35%). It was determined that there were appendix inflammation in 2 of the plant residuals cases, while there were obstruction and lymphoid hyperplasia in the appendix lumen of 5 cases. No mortality was observed. **Conclusions:** The ratio of acute appendicitis caused by plants is minimal among all appendectomised patients, but avoidance of eating undigested fruit seeds and chewing plants well may help to prevent appendicitis.

1. Introduction

The acute appendicitis observed in almost 7% of population is an acute illness of the *Appendix vermiformis*. It is the most common disease which requires emergent surgery. The obstruction of appendix lumen is the main cause of appendicitis. Basically fecalith, lymphoid hyperplasia, seeds of fruits and vegetables, barium obturator, and tumors of large intestine and appendix can be found as etiology of acute appendicitis. In our study, the cases with presence of undigested plant residuals and fruit seeds in the appendix lumen were studied and were discussed together with the literature data[1–5].

2. Materials and methods

Our study is a retrospective clinical study. The specimen removed from the patients operated under general

anesthesia with the diagnosis of acute appendicitis was put into sterilized bottles with 10% formal-saline solution and was sent to pathology laboratory. Cases with presence of undigested plant residuals and fruit seeds in their etiology were involved in our study according to the result of pathological examination. The relation between age, sex, histopathological features and mortality of the studied cases were discussed.

3. Results

Among 1 969 cases diagnosed as acute appendicitis that underwent appendectomy between 2002 and 2009, 8 cases with presence of undigested plant residuals and fruit seeds were studied (0.4%, 8/1 969) with female/male ratio of 7/1. Their average age was 39 and all showed similar main complaints and examination findings as other acute appendicitis.

All 8 cases were discharged from hospital without any complication. Confirmed by histopathological examination, undigested plant residuals and fruit seeds were found in 7 and 1 cases, respectively (Figure 1 and 2). There was pus in appendix lumen of the fruit seed case. Appendix inflammation was presented in 2 cases having undigested

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plant residuals in lumen, but not in other 5 cases. However, lumen obstruction and lymphoid hyperplasia were determined in these 5 cases. 7 out of the 8 patients underwent appendectomy during autumn and winter months, and (fruit seed case) in June.

Figure 1. Appendectomy material showing undigested plant residuals.

Figure 2. Appendectomy material with presence of fruit seed.

4. Discussion

Generally speaking, the relation between appendix base and cecum do not change, but tip of appendix can be in different directions. The positions relative to the direction of appendix can be as follows: retrocecal, pelvic, sub-cecal, ileocecal and right pericolic[6].

Appendicitis is more common in males with a ratio of male/female of 1.4/1. It was estimated that 8.6% of men and 6.7% of women develop acute appendicitis in their lifelong. Young age is a risk factor, and nearly 70% of appendicitis cases are under 30. Appendix can be infiltrated by materials such as fecal material, microbes and parasites. Because most of these materials are on the streamlines, they can enter into organ lumen without leading to any symptoms. However, this can cause inflammation such as appendicitis.

When appendicular mucosa continues fluid secretion, the internal pressure of lumen in obstructed appendix increases, and the increased pressure on appendix wall can lead to mucosal ischemia by exceeding the capillary pressure. Bacterial reproduction and translocation in internal lumen sticks to all wall layers of appendix, and leads to inflammation, edema and necrosis. The typical clinical process begins with intermittent stomachache like cramps thought to be caused by the blockage of appendicular lumen. Pain can be partially or extensively around navel, and can be difficult to localize. Typically, this is followed by nausea, but nausea can also not be presented. When inflammation becomes transmural and causes pyogenesis in peritoneum covering right lower quadrant, the character of pain would be changed and the obtuse colic pain would be replaced by constant and severe pain[1,3,7–10].

95% of the substances which are taken orally but not digested pass through the digestive system without any problem. More heavier substances, on the other hand, locate in the lower part of cecum and can easily enter appendix lumen. Because the peristaltic activity of appendix is not able to discharge this substance into cecum, the accumulation of foreign bodies can lead to obstruction of the lumen, and therefore lead to inflammation. The foreign bodies leading to appendicitis can be listed as follows; metal needles, shot particles swallowed by eating the animals meat, tooth stick, tooth fills, as well as fruit seeds. Some of the fruit seeds swallowed are removed from the body naturally, while some of them can be the cause of appendicitis. There are reported cases of appendicitis which are caused by seeds of vegetables and fruits such as cacao, orange, melon, barley, oat, fig, grape, date, cumin, and nut[11–14].

Materials in the appendix lumen (e.g. fecalith) do not cause inflammation of the appendix all the time but these may cause acute abdominal pain that mimics acute appendicitis and this patients are required to undergo appendectomy for acute appendicitis. So in appendectomy series the range of fecalith in noninflamed appendix is 20%–30%[15,16].

In the series which Byard and his colleagues published in 1988, it was reported that among 1 409 appendectomy materials, fruit seed was observed only in one of the cases. (1/1 409, 0.07%)[17].

In one study, fruit seed was found in 1 among 1 969 appendectomy materials (1/1 969, 0.05%). 34 fruit seed cases were reported by others[18].

Since the fruit seeds in appendix are very rare, relevant publications are generally submitted to literature as case reports. The appendicitis cases with fruit seeds included in this study were similar to that reported by Byard *et al.* We consider that those 34 fruit seed subjects in literature do not reflect the facts due to the publishing criteria of the journals as well as the difficulties in scanning articles of the journals, and lack of indexing. Moreover, though appendectomy is

the most common general surgical operation and can be performed in all hospitals, yet no publications related to the series are available in hospitals.

Phytobezoar develops through the combination of plant substances which are not digested in the gastrointestinal system^[19–21].

Since undigested plant wastes are observed in the lumen of appendectomy material, they can be called as 'microphytobezoar'. It was reported that phytobezoars consisting Trabzon palm or citrus led to intestinal obstruction^[22–25].

Most of the people eat fruit seeds and plant residuals do not develop appendicitis generally. Ratio of acute appendicitis caused by plants is minimal in all appendectomised patients. Nevertheless, we would like to suggest undigested fruit seeds shouldn't be eaten and plants be chewed well. We think that clinically and laboratory training must be performed in this area^[26].

Conflict of interest statement

We declare that we have no conflict of interest.

Acknowledgements

We would like to express our special thanks to Professor Ziya Alkan (Ege University Medicine Faculty, Parasitology Department) for his kind help in this study.

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