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An Unusually Long Appendix: A Case Report and Literature Review

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Abstract

BACKGROUND: Acute appendicitis is one of the most common conditions in emergency surgery and appendectomy is the most frequently performed surgical procedure. The complexity of this pathology is reflected in the numerous congenital malformations and anatomical variations of the vermiform appendix. Anatomical variations are mainly related to its length and position. The average length of the appendix was found to be 9.5 cm in the male and 8.7 cm in the female, but different length has been reported, from 1 cm to even a 33 cm on the cadaver.

CASE PRESENTATION: A 34-year-old man was admitted to the general surgery department due to symptoms that began the previous day. The patient complained of lumbar pain which later migrated to the periumbilical region and the right lower quadrant (RLQ) of the abdomen followed by fever, nausea, and vomiting. On clinical examination, he had a tenderness in RLQ with abdominal guarding. Laboratory analyzes showed leukocytosis and high markers of inflammation. Urinalysis and abdominal ultrasound were normal. Taking into consideration the clinical presentation and laboratory parameters, a decision was made to proceed for an open appendectomy. Intraoperatively, the appendix was inflamed, very long, partly retrocaecal, and partly paracolic in position, with two coils, extending upward. After dividing the mesoappendix, it measured 20 cm in length. The appendectomy was performed. Post-operative recovery was without complications. The patient was discharged from the hospital on the 3rd post-operative day.

CONCLUSION: Although acute appendicitis is very frequent condition in emergency surgery, making the diagnosis could be challenging due to numerous differential diagnostic dilemmas. The position of the appendix and direction of its extension could lead to misdiagnosis. The synthesis of clinical examination, laboratory analyzes, and diagnostic procedures should lead clinicians to the right diagnosis and surgical treatment, avoiding possible complications and additional costs.

Introduction

One of the most common conditions that require urgent surgical intervention is appendicitis. In Europe, the incidence is variable, from 151/100,000 person-years in Western Europe to 105/100,000 person-years in Eastern Europe [1]. The prevalence of acute appendicitis is 8% in Europe, and the risk of disease is slightly higher in young [2]. Although it is a seemingly routine operation, it can often be demanding. The complexity of this pathology is reflected in the numerous congenital malformations and anatomical variations of the vermiform appendix [3]. The average length of the appendix was found to be 9.5 cm in the male and 8.7 cm in the female, but different length has also been reported [4], [5]. Some previous studies have investigated whether appendix length is a risk factor for acute appendicitis [6]. The typical clinical presentation of appendicitis includes epigastric or periumbilical pain migrating to the right lower quadrant (RLQ) of the abdomen, nausea with or without vomiting, loss of appetite, and elevated temperature. However, the clinical diagnosis of acute appendicitis is often challenging and involves a synthesis of clinical findings, laboratory analysis, and imaging such as abdominal ultrasound (US), computed tomography, and eventually magnetic resonance imaging [2].

Case Report

A 34 years-old man was admitted to the general surgery department for observation and possible operative treatment due to suspected appendicitis. At hospital admission, the patient reported pain in the RLQ of the abdomen with propagation to the right lumbar region. The symptoms started the day before with the lumbar pain, migrating later to the epigastric region and then to the RLQ of the abdomen. After that, he had nausea and vomited three times. His appetite was poor. He also had a fever of 38°C. On the same day, he was examined in another hospital and returned home with the advice to report again in case of progression of the

symptoms. The bowel function was normal. The patient denied dysuric complaints. He did not report any other comorbidities or diseases of significance.

On clinical examination, his pulse rate was 90 bpm, blood pressure 125/80 mmHg and body mass index 27.9. The axillary temperature was 36.7°C and rectal temperature was 37.8°C. He had tenderness in RLQ with abdominal guarding. Blood tests showed a total white cell count of 9.82 × 10*9/L, hemoglobin 143 g/L, and C-reactive protein 101,1 mg/L. All other blood tests were normal. Urinalysis and US were also, both normal. Taking into consideration the clinical presentation and laboratory parameters, a decision was made to proceed with an open appendectomy.

Intraoperatively, the caecum was in the right iliac fossa. The appendix was inflamed, very long, partly retrocaecal and partly paracolic in position, with two coils, extending upward. After dividing the mesoappendix, it measured 20 cm in length (Figure 1). The appendectomy was performed. Post-operative recovery was without complications. The patient was discharged from the hospital on the 3rd post-operative day, with stable vital parameters and no subjective complaints. The histopathology report was consistent with the working diagnosis and intraoperative findings.

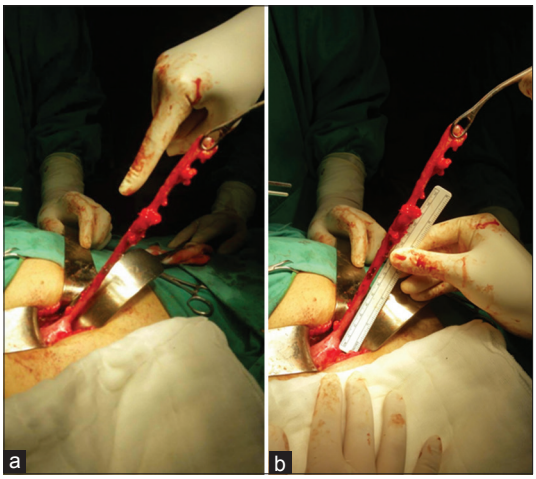

Figure 1: An unusually long and inflamed appendix. (a) Operative finding after dividing the mesoappendix; (b) the appendix measured 20 cm in length

Discussion

Acute appendicitis is considered as one of the most frequent causes of abdominal pain, while appendectomy is the most frequent emergency surgery, presenting with rates of 12% for men and 25% for women [3]. In the literature available so far, congenital malformations and anatomical variations of the appendix are associated not only with atypical clinical presentation but also with a specific pathology and other congenital abnormalities. The most common congenital malformations are agenesis and duplication. On the other hand, anatomical variations are mainly related to length and position [3], [7]. The usual length is between 5 cm and 10 cm. According to some studies, the most common variations in the length are between 1 cm and 28 cm (Table 1), while other studies describe even a 33 cm long appendix on the cadaver [8], [9], [10], [11], [12], [13], [14]. The largest appendix removed, recorded in the Guinness World Records, measured 26 cm [15]. Furthermore, some data suggest that age is one of the factors which correlates with the length of the appendix. Its length decreases in the elderly, thus it is longer in children and adolescents. Sex, as well, affects its length, it is longer in men than in women [3]. According to one study, the length of the appendix is an independent risk factor for the development of acute appendicitis. People with a relatively long or short appendix have a lower chance of developing acute appendicitis than people with an appendix of an intermediate length of 4–10 cm [6]. Usually, the appendix is arising from the posteromedial cecal wall, about 2 cm below the ileocecal junction [16]. The base of appendix is relatively constant at McBurney's point. The appendix can have a variable course, so the appendiceal tip may be found in different locations [17]. Depending on the position, clinical presentation of a patient with appendicitis can be diverse. In one study, performed on 377 adult cadavers the most common positions were retrocecal (43.5%), subcecal (24.4%), post-ileal (14.3%), pelvic (9.3%), paracecal (5.8%), and pre-ileal appendices (2.4%). Other positions were relatively rare [18], such as the position of the appendix in the left lower quadrant, which develops in association with two types of congenital anomalies: Situs viscerum inversus and midgut malrotation [19]. The other studies showed similar results [20].

Table 1: Data on the appendix in different studies

Author	Year of Publication	Number of Patients	Length (mm)	Type of Specimen	Country
Ajmani *et al.* [4]	1983	100	87–95	Cadaver	India
Laraqui *et al.* [5]	2019	1	230	Gross pathology	Morocco
Pickhardt *et al.* [6]	2013	321	23–139	Gross pathology	USA
Boddeti *et al.* [8]	2013	1	280	Cadaver	India
Casado Méndez *et al.* [10]	2014	236	60–130	Gross pathology	Cuba
Mohammadi *et al.* [11]	2017	693	55–115	Cadaver	Iran
Bakar *et al.* [12]	2013	56	60–163	Cadaver	Bangladesh
El-Amin *et al.* [13]	2015	60	70–110	Cadaver	Sudan
Patil *et al.* [14]	2014	30	60–75	Cadaver	South India
Souza *et al.* [18]	2015	377	10–200	Cadaver	Brazil
Mwachaka *et al.* [20]	2014	48	70–110	Cadaver	Kenya

The location of the appendix and direction of its extension often leads to misdiagnosis because they can cause symptoms of other conditions and diseases. Therefore, differential diagnoses to be considered are: Biliary and renal colic, urinary tract infection (UTI), testicular or ovarian torsion, ruptured ovarian cyst, ectopic pregnancy, pelvic inflammatory diseases, endometriosis, diverticulitis, etc. [18], [19]. To the best of our knowledge, this case represents the longest reported appendix in Serbia. The clinical

course in our case was atypical and was conditioned by the retrocecal and paracolic position of an unusually long and inflamed appendix. Although the origin of the appendix was in typical place, in the right iliac fossa, the tip of the very long appendix was behind and partly laterally of ascedenting colon. Such a course of appendix caused atypical symptoms in our patient and deceived the clinicians at the first examination. In other words, the appearance of pain and tenderness in the right lumbar region and RLQ is a consequence of the position and irritation of the inflamed unusually long appendix. Taking into account the clinical presentation and increased markers of inflammation, and after elimination of UTI, the accurate diagnosis was made, within proper time. Furthermore, the adequate treatment prevented potential complications and additional costs.

Conclusion

In summary, although acute appendicitis is a very frequent condition in emergency surgery, making the diagnosis could be challenging due to possible variable length and position of the appendix, which could lead to misdiagnosis. With all this in mind, the synthesis of clinical examination, laboratory analyzes and diagnostic procedures could lead clinicians to the right diagnosis and early surgical treatment, avoiding possible complications.

Declarations

Declaration of humans and animal protection

The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and to the Helsinki Declaration of the World Medical Association updated in 2013.

Data confidentiality

The authors declare having followed the protocols in use at their working center regarding patients' data publication.

Patient consent

A written consent was obtained from patient for the publication of this report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Authors' Contributions

ST: Operated on the patient and edited the manuscript, BT: Searched literature and provided critical review of the manuscript, JG, HK: Searched literature and wrote the manuscript, NC: Searched literature and designed the work.

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