

Two Cases of Fibrous Obliteration of the Appendix, Mimicking Acute Appendicitis¹

급성 충수돌기염으로 오인된 충수돌기의 섬유성 폐색증(Fibrous Obliteration): 2예 보고¹

Sun-Ju Choi, MD¹, Yun-Jin Jang, MD¹, Dakeun Lee, MD², Seung Hyun Cho, MD¹, Gab Chul Kim, MD¹, Ji Hea Bae, MD¹, Jin Young Park, MD³, Jae Min Cheon, MD³

Departments of ¹Radiology, ²Surgery, Kyungpook National University Hospital, Kyungpook National University School of Medicine, Daegu, Korea
³Department of Pathology, Ajou University Hospital, Ajou University School of Medicine & Graduate School of Medicine, Suwon, Korea

Acute appendicitis is the most frequent appendiceal disease, but some chronic inflammatory conditions can mimic it on computed tomography (CT). We recently experienced two rare cases of appendiceal conditions, which were uncommon to our radiologists and clinicians. This condition is called fibrous obliteration of the appendix, which is a condition that involves replacement of the mucosa and submucosa with fibrotic tissues. Due to similar clinical symptoms and CT findings, fibrous obliteration of the appendix can easily be mistaken as an acute appendicitis. Here, we introduce the symptoms, laboratory results, CT findings, and histological examination findings of two adult patients with fibrous obliteration of the appendix.

Index terms

Fibrous Obliteration
Appendix
Appendicitis
CT

INTRODUCTION

Fibrous obliteration of the appendix is considered as a part of the aging process that results in loss of the normal appendiceal mucosa and Peyer patches, which eventually replaces the mucosa and submucosa with fibrotic tissues (1). It can also mimic acute appendicitis. However, this condition is uncommon to clinicians and radiologists and its imaging findings are rarely seen. Here, we report two cases of appendiceal fibrous obliteration mimicking acute appendicitis on CT in adult patients.

CASE REPORT

Case 1

A 63-year-old male with abdominal distension for 1 week vis-

ited our emergency department. He had experienced intermittent right abdominal and epigastric pain for more than 1 year. The patient's abdomen was not tender, and the laboratory results including complete blood cell count (CBC) and C-reactive protein were within the normal ranges. The patient underwent abdominal CT which showed luminal dilatation of the appendix (Fig. 1A). The lumen of the appendix was filled with fatty component (-33 Hounsfield unit) and contained an enhancing linear structure in the center (Fig. 1B). In addition, a suspicious focal wall defect and adjacent mild fatty infiltration were noted in the distal portion of the appendix. Although neither localized pain in the right-lower quadrant nor leukocytosis was seen, an emergency laparoscopic appendectomy was performed due to abnormality in the appendix based on CT. The surgeon diagnosed the condition as acute appendicitis, during the operation.

Received December 10, 2013; Accepted April 11, 2014
Corresponding author: Yun-Jin Jang, MD
Department of Radiology, Kyungpook National University Hospital, 130 Dongdeok-ro, Jung-gu, Daegu 700-721, Korea.
Tel. 82-53-420-5390 Fax. 82-53-422-2677
E-mail: yjjang@knu.ac.kr

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

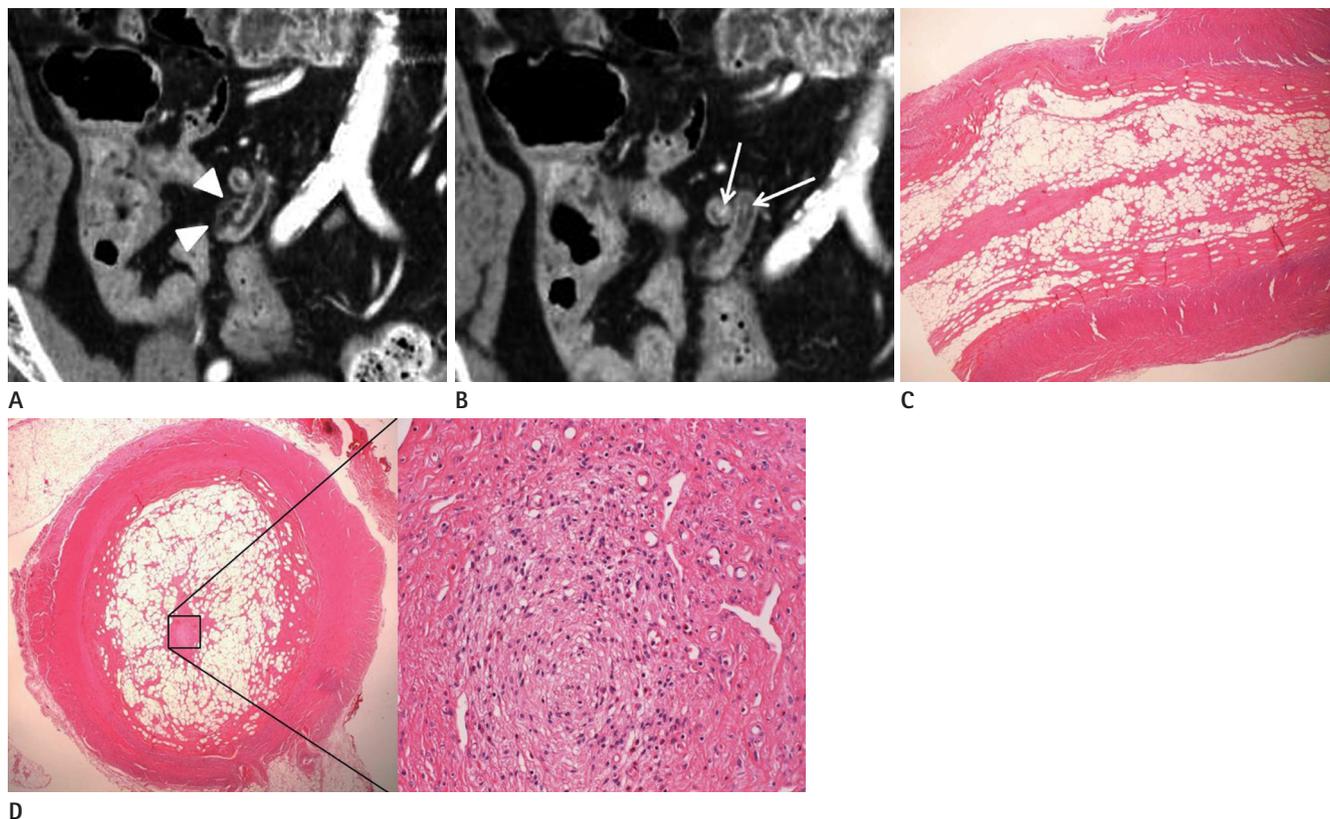


Fig. 1. Computed tomography (CT) findings and pathological images of fibrous obliteration in the appendix of a 63-year-old man. **A.** Coronal CT scan shows borderline dilatation of the appendix filled with a fatty component (-33 Hounsfield unit). A focal wall defect in the distal portion of the appendix and an adjacent mild fatty infiltration (arrowheads) is visible. **B.** Coronal CT scan shows the linear-enhancing core of the appendix (arrows). **C, D.** Photomicrographs of a histopathological specimen in longitudinal (**C**) and cross-sectional (**D**) view of the distal appendix [hematoxylin and eosin stain, $\times 1.25$ (**C, D**-left), $\times 200$ (**D**-right)] show adipocyte and fibroblast proliferation filling the appendiceal lumen and focal destruction of the mucosa (or ragged mucosa). Several arterioles are visible in the center. The suspicious focal wall defect on the CT scan was not visible in the histopathological specimen.

On histological examination, the appendix was observed to lack normal appendiceal mucosa including lymphoid follicles, and the lumen was displaced by fatty infiltration and fibrous proliferation (Fig. 1C, D).

Interestingly, the linear enhanced structure in the center of the appendiceal lumen corresponded well to the fibrous core of the specimen, which was comprised of fibroblastic proliferation and capillary-sized blood vessels (Fig. 1B). Unlike the CT findings, no appendiceal wall defect was observed on pathologic examination. Ultimately, the fibrous obliteration of the appendix was diagnosed.

Even though this patient's epigastric pain remained persistent, the right abdominal pain was resolved after the surgery.

Case 2

A 43-year-old female was admitted for the surgical treatment

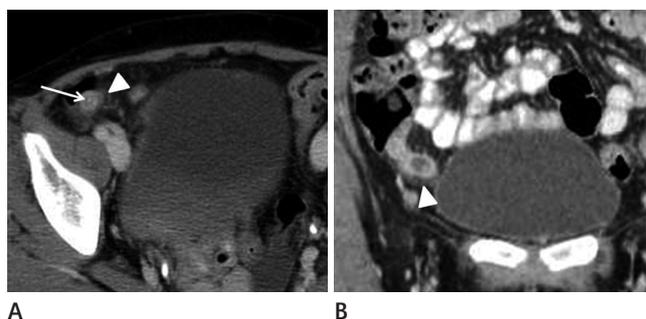


Fig. 2. Computed tomography (CT) findings of fibrous obliteration in the appendix of a 43-year-old woman. **A.** Axial CT scan shows periappendiceal infiltration (arrowhead) and a linear-enhancing core structure (arrow). **B.** Coronal CT scan shows periappendiceal infiltration (arrowhead). Note the thickened appendiceal wall and dilated lumen.

of ovarian cystic lesions. The patient had no specific symptoms and CBC performed at the admission was within the normal range. Gynecologic magnetic resonance imaging was performed

3 weeks prior to the admission and CT was not obtained during admission. The surgeon noted during the operation that the appendix was edematous, and an incidental appendectomy was performed. The pathological diagnosis of the ovarian lesions was benign cysts (right rete cyst and left paratubal cyst), and the secondary diagnosis was fibrous obliteration of the appendix. The CT scans that were obtained one year prior to the surgery showed a thick appendiceal wall with periappendiceal infiltration, which is suggestive of appendicitis. There were enhancing core structures in the dilated lumen that is similar to the above case (Fig. 2). The CT was performed to evaluate the ovarian cysts, and CBC was not performed because the patient had no specific abdominal pain at the time.

DISCUSSION

Fibrous obliteration has been considered a neuroma, which is commonly known as a potential precursor to carcinoid; but neuroma may more accurately be identified as one of the causes of appendiceal fibrous obliteration (1).

Its incidence has been reported to be as high as 51.2% (2), but its pathogenesis remains unknown.

Fibrous obliteration is probably a part of the aging process. It begins in the distal portion and extends proximally, resulting in the loss of normal appendiceal mucosa and Peyer patches, and finally replaces the mucosa and submucosa by fibrous tissue (3). It is frequently accompanied by entrapped fat and connective tissue, and infiltrated by eosinophils (4). The predominance of fibrotic specimen is considered as a characteristic of the end-stage in this process. Because the repeated, minimal, subclinical inflammatory attacks during this process are thought to trigger this lesion, it can mimic appendicitis (5) which has a very similar process. Distal fibrous occlusion may be accompanied by neuronal hyperplasia that can possibly and eventually results in carcinoid tumors (3).

The deposition of submucosal fat in the large and small bowels has been documented in the patients with both acute and chronic inflammatory disorders of the bowel. However, submucosal fat deposition in the bowel wall is not limited to inflammatory bowel disease, but it is also shown in other longstanding chronic diseases (6, 7).

Several studies have reported that the fibrous obliteration of

the appendix can mimic an acute appendicitis. According to Raman et al. (8), one case of fibrous obliteration was noted on the retrospective CT, from the pathological review of 650 adult patients presenting to the emergency department with acute lower abdominal pain. In contrast, the CT from Case 1 of our study revealed a normal appendix, and there were no findings to explain the pain in the right lower quadrant (RLQ). Rhea et al. (9) reported one case of fibrous obliteration, among 753 patients, where the patient was suspected of appendicitis and underwent CT for diagnostic evaluation. Examining the condition based on CT scans was unreliable in this case, because it would lead to the diagnosis of an acute appendicitis. Checkoff et al. (10) reported 10 cases of chronic inflammatory appendiceal conditions, including one case of fibrous obliteration, which mimicked acute appendicitis on CT; this was among 106 patients who underwent surgery within 7 days after performing a CT scan. Fibrous obliteration in a 36-year-old female with RLQ pain presented with a distended appendix (9 mm) with periappendiceal infiltration and mass effect on the cecum.

We reviewed the pathological records in our institution with the intent of elucidating distinctive findings on the imaging of this disease. From 2000 to 2010, a total of 3210 cases of appendectomy were performed in our institution, including the cases of incidental appendectomy. The fibrous obliteration in the appendix was histologically diagnosed in 68 cases (2.1%). Among these cases, 37 patients underwent a preoperative CT scan, most of which were obtained as a part of preoperative work-up for the treatment of colorectal cancer or gynecological tumor. One case was excluded from CT scan, due to enterocolitis-induced inflammation in the lower abdomen that could have caused serositis of the appendix. Among 36 CT scans, only 1 CT scan (3%) showed appendiceal abnormality, which was described in the Case 2 above. In all cases, the interval between CT scan and surgery was less than 1 month.

The retrospective review of the pathological results and CT scans in our institution revealed that the finding of fibrous obliteration tends to be incidental. The frequency of fibrous obliteration in the appendix was higher in this study than in the earlier reports. The reason for this might be due to inclusion of the patients who underwent incidental appendectomy in the absence of clinical findings indicative of acute appendicitis.

Most cases of fibrous obliteration diagnosed in our institution

(35/36, 97%) did not show abnormal findings on CT scans. In both cases presented here, an intraluminal linear-enhancing core structure and fatty accumulation of the appendix were present on CT images. To our knowledge, specific imaging findings of appendiceal fibrous obliteration have been rarely reported and no appendiceal disease with both a linear-enhancing core structure and fatty accumulation has yet been reported. We think that this feature of a linear-enhancing core might be secondary to arterioles in fibroblast proliferation (Fig. 2).

The association between fibrous obliteration and clinical symptoms such as abdominal pain remains unclear (1). Some authors have suggested that the neuropeptides are related to the abdominal pain. Serotonin and substance P were found in the nerve fibers within fibrous obliteration of the appendix; these neuropeptides are considered to be contributors to the muscular spasticity and abnormal peristalsis that lead to abdominal pain in some patients (4, 5).

Crabbe et al. (11) reported that appendectomy had the benefit of resolving symptoms in the patients with recurrent and chronic appendicitis. Accordingly, the abdominal pain was resolved after appendectomy in the patient reported in Case 1. An appendectomy might be recommended for patients with fibrous obliteration in the appendix because fibrous obliteration may progress to carcinoid and abdominal pain can be provoked by neuropeptide released from the nerve fibers.

Although fibrous obliteration of the appendix is frequently encountered by pathologists, it remains as an uncommon disease to radiologists and clinicians. The awareness of fibrous obliteration of the appendix, its imaging features, and the clinical presentation described in this study would be helpful for the radiologists in distinguishing them from acute appendicitis and avoiding an emergency operation.

REFERENCES

1. Misdraji J, Graeme-Cook FM. Miscellaneous conditions of the appendix. *Semin Diagn Pathol* 2004;21:151-163
2. Michalany J, Galindo W. Classification of neuromas of the appendix. *Beitr Pathol* 1973;150:213-228
3. Noffsinger A, Fenoglio-Preiser CM, Maru D, Gilinsky N. *Gastrointestinal diseases: atlas of nontumor pathology*. Washington DC: American Registry of Pathology, 2007: 633-634
4. Stanley MW, Cherwitz D, Hagen K, Snover DC. Neuromas of the appendix. A light-microscopic, immunohistochemical and electron-microscopic study of 20 cases. *Am J Surg Pathol* 1986;10:801-815
5. Olsen BS, Holck S. Neurogenous hyperplasia leading to appendiceal obliteration: an immunohistochemical study of 237 cases. *Histopathology* 1987;11:843-849
6. Jones B, Fishman EK, Hamilton SR, Rubesin SE, Bayless TM, Cameron JC, et al. Submucosal accumulation of fat in inflammatory bowel disease: CT/pathologic correlation. *J Comput Assist Tomogr* 1986;10:759-763
7. Muldowney SM, Balfe DM, Hammerman A, Wick MR. "Acute" fat deposition in bowel wall submucosa: CT appearance. *J Comput Assist Tomogr* 1995;19:390-393
8. Raman SS, Lu DS, Kadell BM, Vodopich DJ, Sayre J, Cryer H. Accuracy of nonfocused helical CT for the diagnosis of acute appendicitis: a 5-year review. *AJR Am J Roentgenol* 2002;178:1319-1325
9. Rhea JT, Halpern EF, Ptak T, Lawrason JN, Sacknoff R, Novelline RA. The status of appendiceal CT in an urban medical center 5 years after its introduction: experience with 753 patients. *AJR Am J Roentgenol* 2005;184:1802-1808
10. Checkoff JL, Wechsler RJ, Nazarian LN. Chronic inflammatory appendiceal conditions that mimic acute appendicitis on helical CT. *AJR Am J Roentgenol* 2002;179:731-734
11. Crabbe MM, Norwood SH, Robertson HD, Silva JS. Recurrent and chronic appendicitis. *Surg Gynecol Obstet* 1986; 163:11-13

급성 충수돌기염으로 오인된 충수돌기의 섬유성 폐색증(Fibrous Obliteration) : 2예 보고¹

최선주¹ · 장윤진¹ · 이다근² · 조승현¹ · 김갑철¹ · 배지혜¹ · 박진영³ · 천재민³

급성 충수돌기염은 충수돌기의 가장 흔한 질환이지만, 이외의 다른 몇몇의 만성적인 염증 상태들 또한 급성 충수돌기염과 유사한 영상 소견을 보일 수 있다. 저자들은 최근 영상학과 의사와 임상 의사 모두에게 친숙하지 않은 충수돌기의 섬유성 폐색증(fibrous obliteration)으로 확진된 2예를 경험하였다. 이는 충수돌기 점막층과 점막하층이 섬유성 조직으로 대체 되어 내강의 폐색을 유발하는 상태로, 임상적 증상과 복부 전산화단층촬영 소견이 급성 충수돌기염과 유사할 수 있어 오인될 수 있다. 이에 우리는 충수돌기의 섬유성 폐색증의 임상적 소견과 복부 전산화단층촬영 소견, 조직학적 소견을 소개하고자 한다.

경북대학교 의학전문대학원 경북대학교병원 ¹영상학과, ³외과, ²아주대학교 의과대학/의학전문대학원 아주대학교병원 병리과