




Case Report

Appendiceal Obliterans Fibrosis: A Five-Year Case Series Report in a Community Hospital

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Abstract

Acute appendicitis is the most common appendiceal disease, however, there are some chronic inflammatory disease pathologies such as appendiceal obliterans (AO) that mimic acute appendicitis. We present a five-year retrospective case series analysis in a community hospital for patients who underwent appendectomy. Fibrous obliteration of the appendix occurs when there is a replacement of the mucosa and submucosa with fibrotic tissues. In a small community hospital, there were 195 patients that underwent appendectomy within a five-year period, in which 6.66% of patients' final pathology confirmed AO. There are some similar clinical symptoms and computed tomography (CT) findings of AO that can mimic acute appendicitis, but there is no consensus for any criteria to definitively diagnose this condition radiologically. The current method to determine the etiology of this appendiceal condition is through appendectomy followed by histological evaluation by a pathologist. We aim to analyze prior patients and their risk factors to find an alternative diagnostic method. We explore several factors including age, to determine if there can be any basis to creating a diagnostic criterion for this condition. The mean age within our case series was 58 years old. While fibrous obliteration of the appendix is a chronic inflammatory process, patients may present with acute abdominal pain, making the diagnosis difficult. Therefore, clinicians should make AO a part of their differential diagnosis which may require surgical intervention.

Keywords

Fibrous Obliteration, Appendiceal Obliterans, Appendectomy, Acute Appendicitis, Neuroendocrine, Pathology, General Surgery

1. Introduction

Appendiceal obliterans (AO) is a benign histopathological finding in appendiceal samples. It has been characterized by several names such as fibrous obliteration, appendiceal neuroma, and appendiceal neuronal hyperplasia. Current litera-

ture suggests this process to be secondary to repeated bouts of appendicitis [1]. It occurs when the appendiceal wall is replaced with proliferation of spindle fibers that can replace the normal mucosa and lumen, as seen in Figure 1. Unlike acute

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appendicitis, which is due to pain fibers, it has been theorized that the proliferation of nerve fibers in appendiceal obliterations is due to hormonal secretions such as; vasoactive intestinal peptide (VIP), Substance P, and neuropeptides which known for modulating pain [8]. Most of the time, AO is discovered incidentally in patients who undergo appendectomy or other concomitant surgeries. Although there are findings on CT that can show generalized appendiceal pathology such as wall thickening, luminal dilatation, and fatty infiltration, there are no universally accepted criteria to diagnose AO through CT scans [10].

Histological findings are key in diagnosing AO. These distinct findings include the replacement of the lumen by spindle cells in a loose fibromyxoid background with chronic inflammatory cells, hypertrophied nerve bundles, neuroendocrine cells, adipose cells, and collagen. This reflects the chronic inflammatory nature of the development of AO. These repeated bouts of inflammation within the appendix may be secondary to appendicoliths, lymphoid hyperplasia, parasitic infections, or benign or malignant tumors. The occlusion of the appendiceal lumen will increase the intraluminal and intramural pressure, causing stasis of the lymphatic and blood vessels. As a result, the appendix becomes dis-

tended, and the walls become ischemic from insufficient vascularization, as seen in Figure 1. In addition, worsening bacteria with the presence of appendiceal obstruction may then develop into complicated appendicitis such as perforation, abscess, and peritonitis.

The incidence of appendiceal obliterations can vary based on population. The study by Leibovitch et al., showed 28.7% of the patients who underwent appendectomies had fibrous obliteration of the appendix [2]. Most cases of appendiceal obliterations were observed in adults older than 30 years of age, and uncommon in children. Our case series showed that our patients' mean age were 58-years old, with the youngest and oldest patients being 28 years old, and 83 years old respectively (refer to Table 1).

The purpose of our research is to perform an analysis of patients who have been diagnosed with AO in a small community hospital over a period of five years and to determine if there are any patterns to their clinical presentation. We analyzed the demographics of the patients, their symptoms upon presentation, radiologic findings, indications for surgery, and types of surgery. This research holds significance due to its potential to establish a first criteria to diagnose AO without the need for an appendectomy.

Table 1. Descriptive characteristics of adult appendiceal obliterations.

Case number	Age	Sex	Symptoms/Indications	CTAP	Surgical modality	Type of surgery
1	50	M	Colonic mass	no	Lap	Lap assisted right hemicolectomy
2	83	F	Abdominal pain, vomiting, constipation --> small bowel obstruction	CT	Lap, converted Exploratory-lap, open	Diagnostic laparoscopy
3	75	F	Elective reversal of colostomy	no	Lap	Appendectomy
4	28	F	RLQ pain	no	Lap	Appendectomy
5	44	F	Congenital intestinal malrotation	no	Lap	Appendectomy*
6	59	F	Abdominal pain -> perforated sigmoid, diverticulosis, acute peritonitis	no	Lap	Diagnostic laparoscopy, Hartmann's
7	56	M	Toxic megacolon	no	Lap	Appendectomy, cecostomy tube placement
8	67	F	Perforated viscus	CT	Lap	Partial cecotomy, appendectomy
9	78	F	Colonic mass	CT	Lap	Right colectomy
10	83	F	Abdominal pain	CT	Lap	Laparoscopic colon resection, appendectomy, colostomy
11	55	M	N/V/D, RLQ pain	CT	Lap	Appendectomy
12	34	F	RLQ Pain Nausea	CT	Lap	Diagnostic laparoscopy, LOA, Appendectomy
13	39	F	RLQ pain	CT	Lap	Appendectomy

M = male; F = female; CT = Computed tomography; CTAP = Computed tomography of the abdomen and pelvis; RLQ = Right Lower Quadrant; Lap = Laparotomy; N = Nausea; V = Vomiting; D = Diarrhea

2. Case Series of Appendiceal Obliterans

Our five-year retrospective case analysis was performed from 2018 to 2023 as there were a total of 195 appendectomies performed in our small community hospital. We present a case series of incidental appendiceal obliterations in patients that were managed through appendectomies. We found 13 patients that showed final pathology of AO, of which nine out of 13 patients (69.23%), with a mean age was 66 years old for those who had other additional surgeries, as seen in [Table 1](#). Of these patients, 4 showed clinical signs and symptoms of acute appendicitis, with right lower quadrant abdominal pain, while two patients also had symptoms of nausea and only 1 patient had symptoms of vomiting. However, none of our patients within our case series showed a typical appendicitis presentation; peri-umbilical pain that migrates toward the right lower quadrant pain, associated with nausea, vomiting, decreased appetite, and low grade fever [12]. In addition, two out of four of the patients showed leukocytosis, and only two patients had CT imaging of thickened appendix, greater than 6 mm, which could not rule out appendicitis. The remaining nine patients underwent appendectomy as a part of a larger planned surgery with incidental finding of AO. Case number 12 in [Table 1](#), was a 34-year-old female patient with a past medical history of obesity and only surgical history of gastric bypass, presented to the emergency department with one day of right lower quadrant abdominal pain, with CT imaging unable to visualize the appendix. She had leukocytosis of 14 cells per microliter, otherwise the rest of her labs were unremarkable. She underwent diagnostic laparoscopy, and laparoscopic appendectomy with intra-operative finding of retrocecal appendix, non-perforated, and thickening near the base of the cecum, as seen in [Figure 2](#).

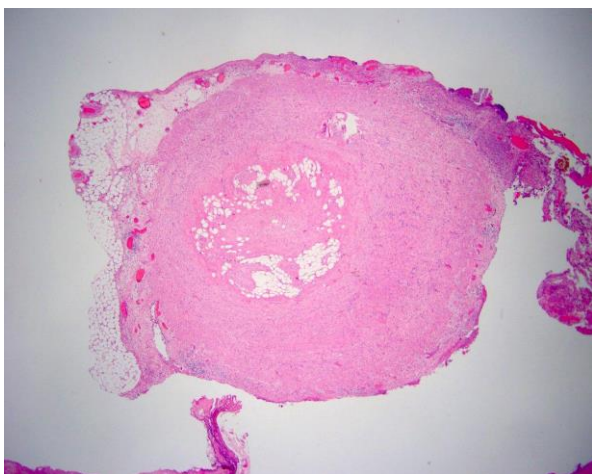


Figure 1. Obliterated lumen at low power [9].



Figure 2. Fibrosed appendix.

The second case, number 11 in [Table 1](#), was a 55-year-old man with only past medical history of obesity, with a body metabolic index of 43. He presented with right lower quadrant abdominal pain with associated symptoms of nausea, vomiting, and diarrhea. On the physical exam he was afebrile, with heart and lung benign, but with right lower quadrant tenderness. He otherwise had no abnormal laboratories. This patient did not have any signs of CT imaging of appendicitis. Despite the fact that the CT scan revealed no inflamed or thickened appendix, nor ileal thickening, or obstruction, it was decided to perform a diagnostic laparoscopy, since the patient had persistent abdominal pain. Intraoperatively, it was decided to perform an appendectomy since the appendix was mildly inflamed and nonperforated. The final pathology report revealed appendiceal obliterations, and not acute appendicitis, as initially it was presumed to be early appendicitis.

3. Discussion

Appendiceal obliterations (AO) is postulated to be secondary to repeated bouts of appendiceal inflammation and can mimic acute appendicitis clinically. In this case series, we presented at least two patients' clinical course who had appendiceal obliterations of the appendix on final pathology. Also, these patients did not have any CT imaging findings to suggest acute appendicitis. There were nine other cases that had concomitant surgeries, in addition to appendectomy, as these patients had other co-morbidities and their hospital course included; acute abdomen in which the patient would require emergent exploratory laparotomy and right hemicolectomies, as well as bowel resections.

It is well established in medical literature that patients with episodes of acute appendicitis show an increase of inflam-

matory markers. However, intriguingly, previous studies have shown that patients with even normal morphological appendices can have neuroendocrine inflammatory disorders and increased biomarkers, findings that can exist in typically benign findings such as appendiceal obliterations [3]. However, within our 195 patients who underwent appendectomies during this period, we did have two cases that showed pathology reports of neuroendocrine proliferation, but we did not include it in our data since we wanted to focus on just AO final pathologies. While some literature describes neuroendocrine involvement in AO as a possible etiology of this condition, other literature describes it as a separate pathology [3]. For this reason, we decided to exclude this data from our case series and focus on the patients whose pathology reports confirmed AO. The same pathologist in our community hospital, within this 5-year period of retrospective review was the only one who reported on the final pathology of the obliterations fibrosis of the appendix. This limits the possibility of errors and inconsistency within pathological reporting.

We have done a comprehensive search into 195 total appendectomies performed at a local community hospital, in which 13 patients had confirmed pathology reports of AO. Twenty eight percent of the patients presented with right lower quadrant pain, without having experienced peri-umbilical pain.

Most patients with incidental AO do not have any abnormal CT findings as evident in one study that found normal CT in 35 of 36 cases of AO [7]. Similar to our findings, CT imaging was not helpful in diagnosing obliterations fibrosis of the appendix, or at least there is no consensus of the CT findings as AO is a diagnosis of exclusion. There are no specific criteria in CT imaging or clinical presentation that helps to diagnose AO. Four of the patients with findings of AO were from colon procedures that concurrently involved appendectomies. The primary indications for these procedures were unrelated to the appendix but due to the inflammatory nature of these indications and the anatomical proximity of the appendix to the colon, perhaps that may have resulted in histopathological changes of the appendix. Colon cancer, diverticulitis, Crohn's disease, and other pro-inflammatory diseases of the colon may spread to the appendix through similar blood supply and/or lymphatic drainage and can manifest as elevated inflammatory markers [4]. In addition, one study found inflammatory changes in appendiceal samples from patients with pathologies such as parasitic infection with *Enterobius vermicularis* and endometriosis [5]. These markers can further support an incidental finding of AO [3].

Furthermore, a notable association has been established between advanced age and abnormal appendiceal pathology, defining advanced age as individuals aged over 70 years. [2] In our study, an average mean of 58 years old and presenting with atypical presentation such as right lower quadrant abdominal pain, but not preceding any epigastric pain with peri-umbilical pain. The two oldest patients were 83 years old, and they were both females (Table 1).

Among the nine patients (69%), three patients exhibited incidental findings of AO, where their primary surgical indication stemmed from other factors, either elective or emergency surgeries. In accordance with the table, case number three underwent an elective reversal of colostomy, with no abdominal symptoms, which she had an appendectomy, with confirmation of AO. Case number nine, who underwent a right hemicolectomy for colonic mass, also confirmed incidental finding of AO. Also, case number 10, had an exploratory laparoscopy, that included a right hemicolectomy that includes an appendectomy for pneumoperitoneum secondary to stercoral colitis, with incidental finding of AO (refer to Table 1). These findings underscore the importance of considering advanced age as a significant factor in the presentation and pathology of appendiceal obliterations with other acute surgical pathologies or presentation that required an appendectomy.

It has been suggested that patients with right lower quadrant abdominal pain but normal appearing radiologic findings such the patients in the case series can benefit from an appendectomy [6]. However, other literature recommends prophylactic appendectomies only in high-risk cases due to long term risk of adhesion related complications [11]. As such, the awareness of AO by clinicians cannot be excluded as right lower quadrant abdominal pain, but also prompt consideration of neuroendocrine and inflammatory pathologies should be in the differential, that may lead to appendiceal malignancies in older patients greater than 60 years old [7].

4. Conclusion

Appendiceal obliterations can be a sign of repeated inflammation from appendicitis or other pathology unrelated to the appendix, increased neuroendocrine markers from a potential tumor, or an incidental finding in otherwise normal appearing appendices. Due to the unique pathophysiology of fibrous obliteration of the appendix, it does not have the classical clinical presentation nor CT imaging of acute appendicitis. As a result, it is important to keep AO in mind when evaluating a patient with atypical lower abdominal pain. We were able to surmise that age may play a factor in the development of this condition, but were unable to find other factors that can contribute to a unified diagnostic criterion for appendiceal obliterations.

5. Disclosures

Human subjects: Consent was obtained or waived by all participants in this study. Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following: Payment/services info: All authors have declared that no financial support was received from any organization for the submitted work. Financial relationships: All authors have declared that they have no financial relationships

at present or within the previous three years with any organizations that might have an interest in the submitted work. Other relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

Abbreviations

AO	Appendiceal Obliterans
CT	Computerized Tomography
VIP	Vasoactive Intestinal Peptide

Conflicts of Interest

The authors declare no conflicts of interest.

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