Radiology Case Reports 19 (2024) 4322–4326

Available online at www.sciencedirect.com

ScienceDirect

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

Case Report

Superior mesenteric vein thrombosis secondary to acute appendicitis in a young male: A Case Report ☆

Melodi Yusibova, MD

Department of Radiology, Copenhagen University Hospital, Amager and Hvidovre Hospital, Kettegård Alle 30, Hvidovre 2650, Denmark

ARTICLE INFO

Article history:
Received 24 June 2024
Revised 3 July 2024
Accepted 6 July 2024

Keywords:
Superior mesenteric vein thrombosis
Acute appendicitis
Appendicular abscess
Ileocecal resection
Anticoagulation therapy

ABSTRACT

Acute appendicitis is one of the most common infectious diseases in the abdomen, while superior mesenteric vein thrombosis is a rare and potentially fatal complication of acute appendicitis. This report describes a case of a 26-year-old male initially presenting with nonspecific symptoms including coughing, runny nose, vomiting, and diffuse stomach ache. Radiological evaluation with an emergency computed tomography (CT) scan revealed acute complicated appendicitis with abscess formation, perforation, and a large thrombosis in the superior mesenteric vein (SMV). The patient underwent laparoscopic appendectomy with ileocecal resection of the appendix and right-sided ileostomy placement. Treatment included antibiotics and anticoagulant therapy. SMV thrombosis is challenging to diagnose clinically, and early diagnosis and treatment are vital. A CT scan plays a significant role in detecting unsuspected SMV thrombosis, highlighting the importance for radiologists to be aware of this rare complication to appendicitis.

Introduction

Acute appendicitis is one of the most common infectious diseases in the abdomen, with a lifetime risk affecting almost one in eleven persons [1]. It is categorized into two types; uncomplicated and complicated appendicitis. Complicated appendicitis is defined as an inflamed appendix with perforation, transmural necrosis, or periappendicular abscess formation. Treatment depends on this differentiation; uncomplicated appendicitis may be treated conservatively with antibiotics alone, whereas complicated cases usually require emergency appendectomy [1,2]. Radiological evaluation with a CT scan plays an important role in distinguishing between the two categories.

SMV thrombosis is a rare and serious complication of acute appendicitis [3,4]. The clinical presentation varies from acute symptoms of bowel ischemia to more subacute presentation with nonspecific symptoms such as nausea, vomiting, diarrhea and abdominal pain, making it hard to

☆ Competing Interests: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

E-mail address: melodi.yusibova.thomsen@regionh.dk

https://doi.org/10.1016/j.radcr.2024.07.026

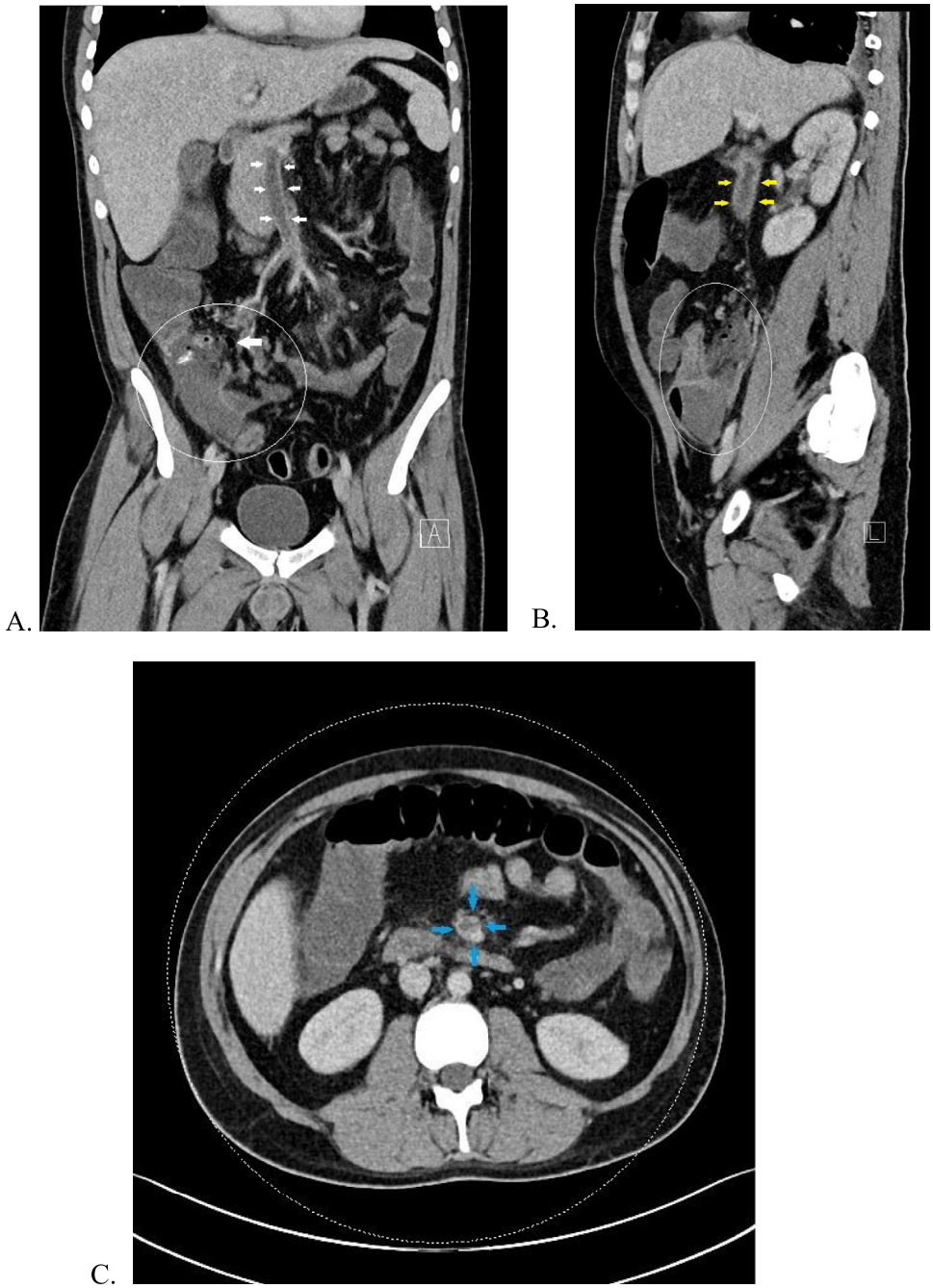

Fig. 1 – (A and B) Coronal and sagittal contrast-enhanced CT images demonstrating the filling defect (thrombosis) inside the enlarged SMV (small white arrows). In image (B), the filling defect extends into the portal vein (yellow arrows). In the right lower segment of the abdomen (white circle) on images (A and B), there is an abscess-formation measuring 5 x 5 x 10 cm (SSxAPxCC), along with periappendiceal free fluid and extraluminal gas indicating perforated appendicitis (thick white arrow). (C) Axial contrast-enhanced CT image showing a visible filling defect in the SMV (blue arrows).

distinguish clinically from other conditions [4,5]. The predominant symptom is mid-abdominal pain, while fever and signs of peritonitis suggest progression of ischemia to intestinal infarction [6]. Early diagnosis is necessary as SMV thrombosis is a potentially fatal condition [5]. This report presents a case of SMV thrombosis secondary to complicated acute appendicitis.

Case presentation

A 26-year-old male with a history of autism and attention-deficit hyperactivity disorder (ADHD) consulted an out-of-hours general practitioner after four days of coughing, runny nose, nausea with occasional vomiting, and diffuse stomach

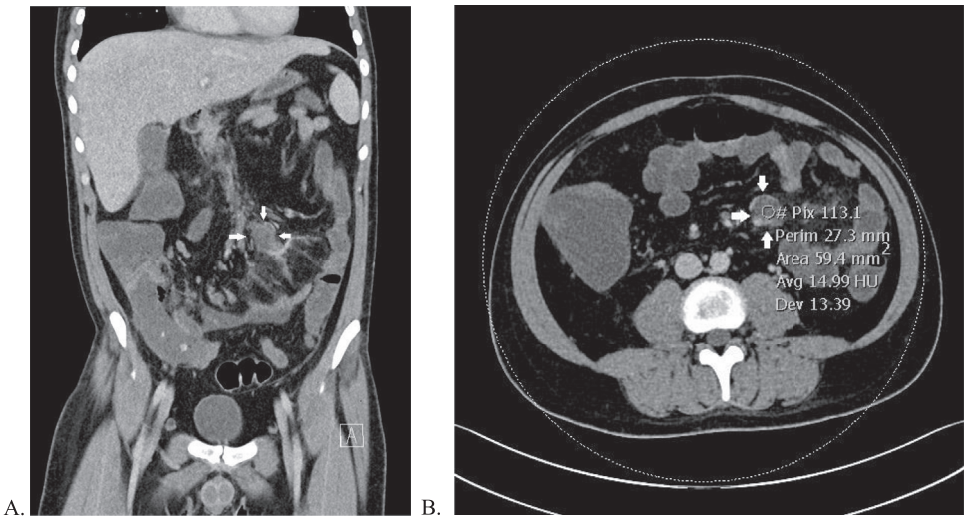

Fig. 2 – (A and B) Coronal and axial contrast-enhanced CT images demonstrating the abscess-like formation in the small bowel mesentery with localized fat stranding around it. The collection measures 14.99 Hounsfield units, indicating fluid (white arrows).

ache. He had a positive COVID-19 test two days prior to the visit. During assessment his vital signs were stable: blood pressure was 128/86 mmHg, pulse was 115 beats per minute, oxygen saturation was 94% and temperature was 38.4 °C. On physical examination, his abdomen was soft, but he exhibited tenderness upon direct pressure in the right lower abdominal fossa. He did not present signs of peritonitis. He was admitted to the emergency department for further assessment of his abdomen to rule out possible acute appendicitis. In the emergency department, initial bloodwork revealed elevated C-reactive protein (CRP) level of 160 mg/L (normal values: 0-10 mg/L), white blood cell count of 13.4 $\times$ 10^9/L (normal values: 3.5-8.8 $\times$ 10^9/L), potassium level of 2.9 mmol/L (normal values: 3.5-4.4 mmol/L), International Normalized Ratio (INR) of 1,4 (normal values: 0.8-1.2) and confirmed COVID-19 positivity. He was kept for reassessment the following day, during which his abdominal pain had significantly decreased. His CRP had decreased to 150 mg/L from 160 mg/L (normal values: 0-10 mg/L) and white blood cell count to 12.1 $\times$ 10^9/L from 13.4 $\times$ 10^9/L (normal values: 3.5-8.8 $\times$ 10^9/L), potassium to 2.8 mmol/L from 2.9 mmol/L (normal values: 3.5-4.4 mmol/L) and INR to 1.3 from 1.4 (normal values: 0.8-1.2). He did not present with fever. Physical examination still revealed mild tenderness upon pressure in the right abdominal fossa, but acute appendicitis was not clinically suspected. A normal lung X-ray was performed. His symptoms were attributed to COVID-19 or mesenterial adenitis. The patient was discharged with a one-week course of antibiotic treatment with Amoxicillin/Clavulanic Acid and potassium supplementation for low potassium.

Fourteen days later, the patient was readmitted to the hospital in a septic state with high fever, confusion, diffuse and constant central abdominal pain, vomiting, and jaundice. Abnormal blood panel results showed anemia with hemoglobin of 6.4 mmol/L (normal values: 8.3-10.5 mmol/L), increased CRP to 220 mg/L (normal values: 0-10 mg/L), white blood cell count of 9.4 $\times$ 10^9/L (normal values: 3.5-8.8 $\times$ 10^9/L), hyponatremia of 128 mmol/L (normal values: 137-144 mmol/L), hypokalemia of 2.3 mmol/L (normal values: 3.5-4.4 mmol/L), hypocalcemia of 0.99 mmol/L (normal values: 2.15-2.15 mmol/L), hypoalbuminemia of 19 g/L (normal values: 36-48 g/L), Alanine Aminotransferase (ALAT) of 90 U/L (normal values: 10-70 U/L), Lactate Dehydrogenase (LDH) of 240 U/L (normal values: 105-205 U/L), bilirubin of 104 μmol/L (normal values: 3-25 μmol), and INR of 2.0 (normal values: 0.8-1.2). He was admitted to the gastro-surgical ward, where an emergency CT scan of the abdomen and pelvis with contrast in the portal phase revealed an acute complicated case of appendicitis with abscess formation, perforation, and a large thrombus in the superior mesenteric vein (SMV) (Figs. 1 A-C).

Additionally, the CT scan revealed an abscess-like formation in the small bowel mesentery (Fig. 2, white arrows on A and B).

A laparoscopic appendectomy was performed. Perioperatively, the patient was treated with Piperacillin/Tazobactam, Metronidazole, Gentamicin, Fluconazole, and Tranexamic Acid. The laparoscopy revealed a necrotic base of the cecum and appendix in a large abscess cavity enclosed laterally against the abdominal wall. A fistula had formed from the base of the appendix to the central part of the small bowel mesentery, revealing pronounced induration and an abscess-like formation within the mesentery (Figs. 2 A and B). Surgery also revealed generalized venous stasis in the entire course of the small bowel, which had petechiae and looked icteric. Due to the patient's severe complications a terminal ileostomy was performed.

Five days postsurgery, another CT scan of the abdomen and pelvis was performed following the recent ileocecal resection of the appendix and the right-sided ileostomy (Fig. 3).

Postsurgery, the patient continued treatment with Piperacillin/Tazobactam, Metronidazole, and Fluconazole,

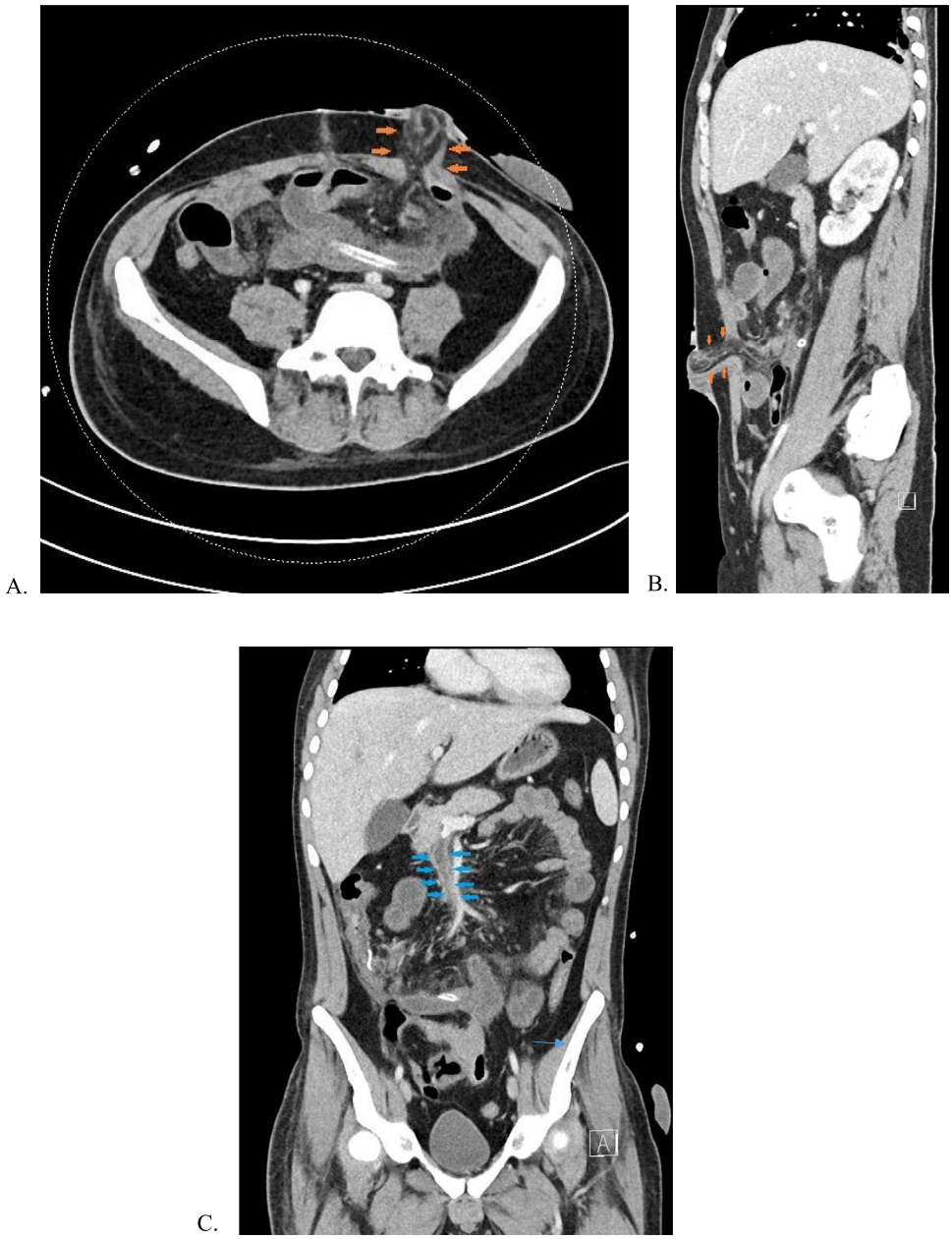

Fig. 3 – (A and B) Axial and sagittal CT images showing the ileocecal resection of the appendix and the right- sided ileostomy (orange arrows). The scan revealed slightly dilated small bowel loops with fluid towards the stoma. A percutaneous drain was placed, with the tip located between the liver and abdominal wall. (C) Coronal CT image demonstrating persisting thrombus in the SMV and its tributaries, without any signs of progression (blue arrows). The scan also showed regression of the abscess-like collection in the mesentery (Fig. 2 A and B).

as well as anticoagulant therapy with Tinzaparin (Innohep) in therapeutic doses.

Blood culture revealed *Escherichia coli* (E.coli) in the blood. The pathology result of the ileocecal biopsy showed acute necrotizing inflammation and peritonitis. There was no sign of malignancy.

The patient was discharged from the hospital eleven days postsurgery with anticoagulant treatment with Apixaban (Eliquis) for six months, after which a control CT scan of the abdomen will be done.

Discussion

SMV thrombosis is a rare but serious complication of acute appendicitis. Risk factors for SMV thrombosis include obesity, intra-abdominal inflammatory conditions, thrombophilia, and certain procedures such as laparoscopic sleeve gastrectomy, and pancreatic and splenic surgery. Occlusion of the SMV may cause bowel ischemia and infarction, leading to a high mortality rate [4,5]. The nonspecific symptoms make

clinical suspicion difficult, which is why imaging plays a key role in the diagnosis. CT with contrast in the portal phase is highly sensitive for diagnosing SMV thrombosis. The treatment depends on the severity of the thrombosis and presence of complications. In mild cases, it is recommended to treat with low-molecular-weight heparin (LMWH) and then switch to oral anticoagulants or vitamin K antagonists. The length of the anticoagulant treatment depends on whether an identifiable transient risk factor is present; in such cases, treatment is given for six months. Lifelong treatment may be considered for patients with underlying thrombophilia or idiopathic thrombosis [6].

This report demonstrated SMV thrombosis secondary to a complicated case of acute appendicitis in a young patient who initially presented with nonspecific symptoms such as coughing, runny nose, vomiting, and diffuse stomach ache, in addition to a positive COVID-19 test. His clinical state appeared to improve shortly after admission, and he was not clinically assessed to have appendicitis; therefore, he was discharged without imaging. Within two weeks, his clinical state deteriorated.

The clinical presentation of appendicitis can vary between patients, challenging the clinical evaluation, especially when other differential diagnoses are present. This case demonstrates the importance of imaging in ruling out appendicitis early on. If acute appendicitis is complicated with liver dysfunction, early diagnosis and sufficient control of the primary infection are important while considering SMV thrombosis [7].

In this case, the patient also had a viral infection with COVID-19, which can mask and mimic other underlying pathologies, further challenging the diagnosis. It is not known if the COVID-19 infection was a contributing predisposing factor for the SMV thrombosis in this case, but it should be considered, as COVID-19 can cause coagulopathy [8].

It should also be noted that the patient had a history of autism and ADHD. Patients with neurodevelopmental disorders may express symptoms of discomfort or pain differently, which can lead to misinterpretation of the severity of symptoms [9,10]. This should be taken into consideration by medical staff when examining patients.

Conclusion

This case illustrates how early diagnosis and treatment of appendicitis can prevent rare complications such as SMV thrombosis. SMV thrombosis is challenging to diagnose clinically, and early diagnosis and treatment are vital. A CT scan plays a significant role in revealing an unsuspected diagnosis of SMV thrombosis. Radiologists must be aware of this rare complication to appendicitis.

Patient consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

REFERENCES

[1] Bom WJ, Scheijmans JCG, Salminen P, Boermeester MA. Diagnosis of uncomplicated and complicated appendicitis in adults. Scandinav J Surg 2021;110(2):170–9. doi:10.1177/14574969211008330.
[2] Di Saverio S, Podda M, De Simone B, Ceresoli M, Augustin G, Gori A, et al. Diagnosis and treatment of acute appendicitis: 2020 update of the WSES Jerusalem guidelines. World J Emergency Surg 2020;15(1):2–11. doi:10.1186/s13017-020-00306-3.
[3] Lee KW, Choi Y. Superior mesenteric vein thrombosis accompanied with severe appendicitis. Korean J Hepatobiliary Pancreat Surg 2014;18(3):101. doi:10.14701/kjhbps.2014.18.3.101.
[4] Warshauer DM, Lee JK, Mauro MA, White GC. 2nd. Superior mesenteric vein thrombosis with radiologically occult cause: a retrospective study of 43 cases. AJR Am J Roentgenol 2001;177(4):837–41. doi:10.2214/ajr.177.4.1770837.
[5] Phoenix E, Beck J, Patterson TJ, Spence RAJ, Taylor MA, Spence GM. A systematic review of the management of acute superior mesenteric vein thrombosis in adults. J Pancreatol 2020;3(3):111–20. doi:10.1097/JP9.0000000000000051.
[6] Acosta S, Salim S. Management of acute mesenteric venous thrombosis: a systematic review of contemporary studies. Scandinav J Surg 2021;110(2):123–9. doi:10.1177/1457496920969084.
[7] Takehara K, Miyano S, Machida M, Kitabatake T, Fujisawa M, Kojima K. Superior mesenteric vein thrombosis as a complication of acute appendicitis: report of a case. Clin J Gastroenterol 2013;6(4):269–73. doi:10.1007/s12328-013-0390-1.
[8] Silva JTC, Neto OCL, da F. Acute mesenteric ischemia and COVID-19: an integrative review of the literature. Rev Col Bras Cir 2023;50:10–14. doi:10.1590/0100-6991e-20233334-en.
[9] Donaghy B, Moore D, Green J. Co-occurring physical health challenges in neurodivergent children and young people: a topical review and recommendation. Child Care in Practice 2023;29(1):3–21. doi:10.1080/13575279.2022.2149471.
[10] Sala R, Amet L, Blagojevic-Stokic N, Shattock P, Whiteley P. Bridging the gap between physical health and autism spectrum disorder. Neuropsychiatr Dis Treat 2020;16:1605–18. doi:10.2147/NDT.S251394.