Acute Appendicitis Complicating into Portal and Superior Mesenteric Vein Thrombosis

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ABSTRACT
This case report describes a young man who presented with 9-day history of sudden-onset epigastric and right-sided lower abdominal pain. He was tachycardiac with temperature of 102°F. Tenderness was present in the peri-umbilical area and right iliac fossa. Investigations revealed a raised total leucocyte count (predominantly neutrophilic). Triphasic CT scan abdomen found thrombosis of right portal vein and its hepatic tributaries along with superior mesenteric vein (SMV) and its tributaries. Co-existent fluid in right hemipelvis abutting the cecum and appendiceal tip was suggestive of acute appendicitis. He was resuscitated with fluids and analgesics and started on intravenous metronidazole and ceftriaxone. Anticoagulation with subcutaneous heparin was commenced and eventually switched over to warfarin. Appendicectomy was not performed as the patient responded to conservative treatment. Appendicitis is associated with multiple complications but secondary venous thrombosis has rarely been reported with it.


INTRODUCTION
Acute appendicitis is the most common surgical emergency presenting to surgical outpatients and emergency rooms. If diagnosed early and treated promptly, it carries a good outcome; but at times late diagnosis or earlier mis-diagnosis can lead to complications. We hereby present a case of acute appendicitis complicating into portal and superior mesenteric vein thrombosis, which is a very rare sequel of appendicitis.

Portal vein thrombosis (PVT) may occur in 10 - 25% of patients with cirrhosis and may also be associated with hepatocellular carcinoma. Other risk factors include oral contraceptive pills, pregnancy, chronic inflammatory diseases (e.g. acute pancreatitis), injury to portal venous system (inclusive of surgery), other malignancies and treatment of thrombocytopenia with eltrombopag.

Portal thrombopylephlebitis (septic thrombophlebitis of portal vein) may complicate intra-abdominal inflammatory disorders such as appendicitis, diverticulitis or peritonitis, particularly when anaerobic organisms (esp. Bacteroides species) are involved. Septic thrombophlebitis of the superior mesenteric vein (SMV) is rarely caused by acute appendicitis.

Considered uniformly lethal in the pre-antibiotic era, portal venous thrombosis still carries a mortality of 10 - 30%. Early diagnosis, use of antibiotics, and prompt surgical treatment have reduced the incidence of ascending portal thrombophlebitis to 0.05% in acute appendicitis and 3% in appendiceal rupture. PVT typically presents with fever, rigors, and right upper quadrant abdominal pain; but sometimes abdominal pain may be absent. Portal vein thrombosis, due to causes other than intra-abdominal sepsis, expectedly does not present with fever but with abdominal pain, hepatosplenomegaly and ascites. The clinical symptoms of SMV thrombophlebitis are varied and atypical; so the diagnosis is commonly delayed, resulting in a reported mortality rate of 30 - 50%. This report described a rare complication of PVT and SMV thrombosis in acute appendicitis, which responded to conservative management.

CASE REPORT
A 29-year man presented with 9-day history of sudden-onset epigastric and right-sided lower abdominal pain. The pain was said to be of sudden onset and worsened progressively over days. There was no associated nausea or vomiting, but the patient had developed anorexia over the last few days. He did not have any prior significant medical or surgical history.

He was ill-looking and febrile with a temperature of 102°F. Vitals were pulse rate of 102/minute, blood pressure of 110/60 mmHg, respiratory rate of 28/minute, and oxygen saturation (SO2) of 99% on room air. Abdomen was tender in the peri-umbilical area and right iliac fossa. Rebound tenderness was present in right iliac fossa. Bowel sounds were audible. Rest of the examination was unremarkable.

Investigations revealed a normal hemoglobin and
platelet count, but raised total leucocyte count (TLC) of 14,900/mm³. Differential leucocyte count showed 78% neutrophils, 15% lymphocytes, 5% monocytes and 2% eosinophils. Serum amylase, and liver and renal function tests were unremarkable. Hepatitis B and C serology was negative. Urine routine examination was also unremarkable.

Abdominal ultrasound scan was unremarkable. CT scan abdomen showed thrombosis of right portal vein and its segmental branches (Figure 1). A further triphasic CT scan abdomen confirmed thrombosis of right portal vein and its hepatic tributaries. Extensive thrombosis was also seen in superior mesenteric vein (SMV) and its tributaries extending into portal venous confluence with resultant mesenteric edema (Figure 2). Minimal fluid and edema in right hemipelvis, abutting the cecum and appendiceal tip, were suggestive of acute appendicitis.

He was resuscitated with fluids and analgesics and started on intravenous metronidazole and ceftriaxone. Anticoagulation with subcutaneous heparin at a dose of 40 mg twice daily was commenced and eventually switched over to warfarin to be used for 6 months with weekly check on INR. Appendicectomy was not performed as the patient responded to conservative treatment.

The patient made a remarkable recovery with conservative management and was discharged on oral antibiotics and warfarin with follow-up advised to take place after 2 weeks.

**DISCUSSION**

Before 1950, the incidence of acute appendicitis complicated with septic thrombophlebitis of the portomesenteric veins was 0.4%. With the development of broad-spectrum antibiotics, early diagnosis and early surgical treatment of intraperitoneal septic conditions have made the incidence of septic thrombophlebitis of the SMV very low. Due to the symptoms being non-specific, the diagnosis of septic thrombophlebitis of the SMV is generally delayed, and the mortality rate is very high.

Liver function test abnormalities are usually present but frank jaundice is uncommon. Colour Doppler ultrasonography and contrast-enhanced CT are usually the initial diagnostic tests. CT or MR venography of the portal or superior mesenteric venous system is generally confirmatory.

A study carried out by Plemmons reviewed the different causes of pylephlebitis. Eighteen cases were collected from the literature since 1979, reviewing diagnostic and management issues. A precipitating focus of infection (most commonly diverticulitis) was identified in 13 (68%) of the cases. Bacteremia (often polymicrobial) was present in 88% of the patients. The most common blood isolate was *Bacteroides fragilis*. Overall mortality was 32%, but most of the patients who died had severe sepsis prior to the initiation of antibiotic therapy. In no case was improvement in a patient's clinical status clearly attributable to the use of heparin, but some beneficial effect of anticoagulation could not be ruled out.

In a case of SMV septic thrombophlebitis caused by acute appendicitis, the patient was successfully treated with surgical intervention, appropriate antibiotics, and anticoagulation therapy. A follow-up of abdominal computed tomography scan after 3 months of treatment showed that the SMV thrombosis had been resolved.

The standard treatment of infected venous thrombosis involves fluid and electrolyte resuscitation, intravenous antibiotic therapy that should be able to cover anaerobic and aerobic bacteria, and anticoagulation. Tung et al. suggested prolonged use of antibiotic therapy because of difficulty in adequate penetration into infected thrombus; but ideal duration of therapy is unclear.
Although the role of anticoagulation therapy in the management of thrombophlebitis is still controversial,7,10 most reported cases have used heparin followed by warfarin. Some clinicians used low-molecular-weight heparin for anticoagulant therapy. There is no evidence to support underlying hypercoagulability association with acute appendicitis-induced SMV thrombosis. A standard duration of anticoagulation therapy is unclear, but most cases in the literature have used continuous treatment for 2 months. Early use of heparin has shown to achieve re-canalization in 75% of the cases.9 Re-canalization, however, can also be achieved using antibiotic therapy alone. Tissue plasminogen activator (TPA) is better avoided owing to increased risk of haemorrhage should an appendicectomy be required.9

This patient made a remarkable recovery with conservative treatment alone. But it cannot be clear whether the improvement in clinical status be attributed to use of antibiotics, anticoagulants or both.

REFERENCES