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# Tense Ascites as a Presentation of Protein S Deficiency in a 9-Year-Old Boy

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## ABSTRACT

Ascites is not a usual finding in prehepatic portal hypertension, including portal vein thrombosis, but when portal vein thrombosis is acute and massive, ascites can be a presenting feature. We report a 9-year-old boy with tense ascites and portal and superior mesenteric vein thrombosis. A 9-year-old boy was evaluated for tense ascites which led to umbilical hernia since one month before admission. He did not have any clinical or laboratory stigmata of parenchymal liver disease. Imaging studies showed superior mesenteric and portal vein thrombosis. In laboratory tests for pre-thrombotic states, he suffered from significant protein S deficiency. Thrombophilic states like protein S deficiency predispose patient to vascular thrombosis. This vascular thrombosis can be present with signs and symptoms related to their territories. Prevention of thrombosis and rethrombosis with anticoagulant therapy is recommended.

## Introduction

Portal hypertension can result from hepatic, posthepatic, or prehepatic causes. Portal hypertension often develops as a result of extrahepatic portal vein obstruction in children [1, 2]. However, the most common etiology of portal vein thrombosis in children is intra-abdominal infections. History of umbilical vein catheterization in the neonatal period and congenital anomalies of the portal venous system are other causes. Inherited or acquired thrombophilic states can cause vascular thrombosis, too [3].

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In Korea, Bo Kyoung Choi et al. reported that oral contraceptives consumption and pancreatitis are the main causes of acute portal vein thrombosis but deficiency of anticoagulant factors are rare [4]. Patients with portal vein thrombosis should be tested for an underlying thrombophilic condition such as mutation of the prothrombin, factor V Leiden, and Methyltetrahydrofolate Reductase (MTHFR); deficiency of protein S, protein C, or antithrombin III; and antiphospholipid syndrome [5-7].

## Case Presentation

This study presents a 9-year-old boy with a chief complaint of tense ascites leading to umbilical hernia for 1 month before admission. He had also a history of abdominal pain and appendectomy with normal pathology report of appendix 4 months before the admission. He had lost about 4 kg weight and had evidence of chronic pancreatitis in previous imaging in 4 months ago. We were found him ill and cachectic with tense ascites and umbilical hernia in the first examination, without any stigmata of chronic liver disease, jaundice, or edema. He had no organomegaly. After diagnostic intra-abdominal fluid paracentesis, chemical ascites was ruled out. High Serum-Ascites Albumin Gradient (SAAG) suggestive of portal hypertension was detected Table 1 and 2. So, intra-hepatic causes such as viral hepatitis, Wilson disease, and autoimmune hepatitis were ruled out.

Imaging studies including mesenteric, portal and inferior vena cava color Doppler sonography, and CT scan of abdomen, thorax, and pelvis with intravenous and oral contrast were done Figure 1 and 2. Doppler sonography of abdominal vessels showed portal vein thrombosis associated with cavernous transformation in porta hepatis and mesenteric and coronary collateral vein in the head of the pancreas. The main pancreatic duct was dilated with the beaded appearance and coarse parenchymal calcification in the pancreas was seen. His father had pancreatitis and pseudocyst operation 4 years ago. We checked his protein C (128 [normal=70-150]), protein S (12.2 [Normal=60-140]), and homocysteine (16.8 [upper limit=12.6]). Methyltetrahydrofolate Reductase(MTHFR) mutation was negative.

**Table 1.** Ascites vs. serum biochemical analysis

| The Result of the Tap of Ascites in Comparison of Serum | Serum | Ascites |
|---|---|---|
| Albumin | 3.1 g/dL | 1.5 g/dL |
| Total protein | 6.6 g/dL | 2.8 g/dL |
| Amylase | 1273 U/L | 457 U/L |
| Lipase | 141 U/L | 129 U/l |
| LDH | 536 U/L | 196 U/L |

**Table 2.** The results of other lab tests

| Results |
|---|
| WBC=8.3×10*9 /L (neut 52%, lymph 44%); Hb=12 g/dL; Platelets=310000 /µL |
| AST=21 IU/L; ALT=20 IU/L; ALKP=350 IU/L |
| Bilirubin total=0.5 mg/dL; Bilirubin direct=0.5 mg/dL |
| PT=12 s; PTT=35 s; INR=1.2 |
| Gamma GT=23 IU/L |
| Biochemistry=Normal |

**Figure 1.** Thoracoabdominopelvic CT SCAN with intravenous and oral contrast

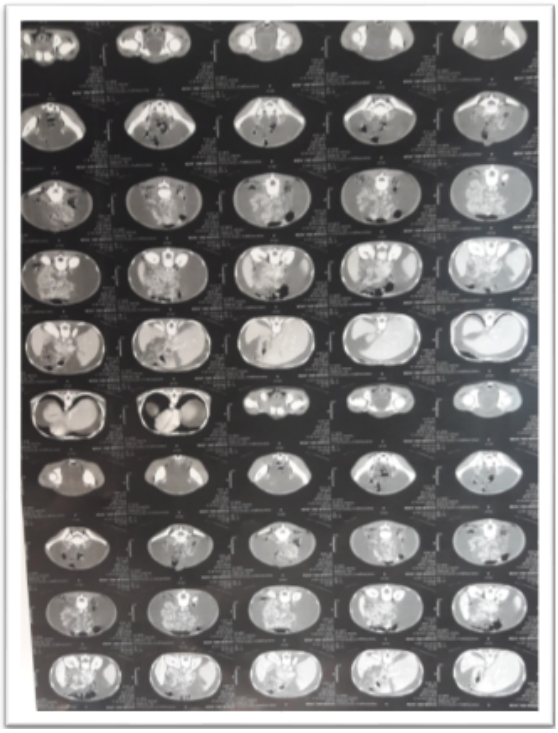

**Figure 2.** Thoracoabdominopelvic CT SCAN with intravenous and oral contrast

Surveillance upper Gastrointestinal (GI) endoscopy for esophageal or gastric varices was negative, too. We asked for surgical intervention which was not possible because of its chronic process, so medical therapy with anticoagulants was recommended. Intra-venous heparin and after 2 days, oral warfarin were started. At the time of discharge, the maintenance dose of warfarin was continued targeted to maintain PT-INR between 2 to 3.

He was put on a low salt diet, diuretic, and pancreatic enzymes replacement therapy. He showed signs of pancreatic insufficiency in pancreatic function tests (low stool trypsin activity and low elastase I). All of the family members including his parents and sibling were checked for protein S deficiency and his father showed protein S deficiency, too.

## Discussion

Thrombosis of portal vein can reduce blood supply to the liver and cause portal hypertension [8]. In children, the most common etiology of portal vein thrombosis is intra-abdominal infections and history of umbilical vein catheterization in the neonatal period; other less common causes include inherited or acquired thrombophilic states such as mutation of prothrombin or factor V Leiden; deficiency of protein C, protein S, or antithrombin III; or antiphospholipid syndrome [3].

Studies have shown that anticoagulation therapy in patients with acute or recent portal vein thrombosis can be recanalyzed the thrombus vessels in more than 80% of cases. Anticoagulation therapy is necessary for patients with inherited coagulation disorders. In complicated cases, shunt surgery or Transjugular Intrahepatic Portosystemic Shunt (TIPS) procedure is used [8]. In Mexico, Majluf-cruz et al. studied 36 patients with portal hypertension and non-cirrhotic portal vein thrombosis. They found that 30% of the patients had protein C deficiency and 9% had protein S deficiency [9].

In another study in France, many patients with portal vein thrombosis suffered from protein S deficiency [10]. In a study in the United Kingdom, Fisher et al. found 38% prevalence of protein S deficiency in patients with portal vein thrombosis [11]. Other reports have also confirmed protein C or S deficiencies in patients with idiopathic portal hypertension [12].

During thrombus formation, coagulation and anticoagulation assay may show false results but in our patient, the four months history of abdominal pain that was led to appendectomy shows During thrombus

formation, coagulation and anticoagulation assay may show false results but in our patient, the four months interval between abdominal pain and appendectomy and our assay exclude this fault. Protein C and S should be measured in patients with portal thrombosis. In conclusion, our case showed that portal vein thrombosis can be provoked by protein S deficiency. In patients with protein S or C deficiency, family members should be screened, too.

## Ethical Considerations

### Compliance with ethical guidelines

There was no ethical considerations to be considered in this research.

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### Conflict of interest

The authors declared no conflict of interest.

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