

A Case of Left Ventricular Thrombus with Superior Mesenteric Vein Thrombosis Due to Atopic Dermatitis

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Summary

A 55-year-old man was presented to the emergency room because of abdominal pain for 4 days. He had a history of atopic dermatitis. Left ventricular (LV) asynergy and thrombus was detected on echocardiography, and superior mesenteric vein thrombosis was detected by computed tomography. There are no reported cases of this combination of thrombi. We hypothesized that the reason for this complication is the combination of coagulation disorder due to atopic dermatitis, silent myocardial infarction, and exacerbation of the coagulation abnormality due to bacteremia, leading to superior mesenteric vein and LV thrombosis. Atopic dermatitis that has potential risk factors of thrombus with sepsis could provoke thrombophilic state. Atopic dermatitis is a common disease, but continuous medical care is essential.

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Key words: Coagulopathy, Myocardial infarction, Autoimmune

The thrombophilic state may be defined as a condition that predisposes to thrombosis. It is well known that the pathogenesis of venous and arterial thromboses may be different. However, such differences may be more apparent than real. In fact, both venous and arterial thromboses may occur in any given patient with a thrombophilic state. It is widely known that the proinflammatory state including chronic skin disease is associated with thrombus.¹⁾ Atopic dermatitis that is a very common disease has potential to provoke thrombophilic state by itself and the condition surrounding it. We present a case of intracardiac and superior mesenteric vein thrombosis (SMVT) in a patient with atopic dermatitis and describe why this combination of thrombi occurred.

Case Report

A 55-year-old man was presented to the emergency room because of abdominal pain for 4 days. He had a history of atopic dermatitis but had not visited a hospital in the past 5 years. His family history included infantile paralysis in his father and allergic rhinitis and depression in his sister. He had a smoking history of 1-2 packs per day for 30 years and no history of alcohol consumption. On physical examination, the patient's blood pressure was 90/56 mmHg, heart rate was 103 beats/minute, oxygen saturation was 98% with room air, respiratory rate was 30 breaths/minute, and body temperature was 37.8°C. Cardiac auscultation showed no murmur, and breath sounds were

clear. His skin showed generalized lichenification. Abdominal findings on physical examination included the peritoneal irritation sign. Blood tests (Table) showed severe inflammation, acute renal dysfunction that was caused by infection and hypovolemia, malnutrition, and a high immunoglobulin E (IgE) level. Levels of myocardial enzymes were not elevated on admission. Protein C and S showed decrease of 39% and 54%, respectively. There are no elevation of tumor marker associated with lung and gastric cancer. Results of blood cultures received later showed bacteremia due to *Staphylococcus aureus*. We suspected the focus of bacteremia was from skin because of the causative organism and suffering from atopic dermatitis. Electrocardiogram (ECG) demonstrated a heart rate of 108 beats/minute, sinus tachycardia, and an abnormal Q wave in leads I and aVL (Figure 1). Cardiac enlargement and pulmonary congestion were absent on chest radiography. Abdominal enhanced computed tomography (CT) performed on admission showed superior mesenteric vein thrombosis (SMVT), small intestine necrosis, and peritonitis (Figure 2). There were no other infective findings such as abscesses and no evidence suspected with malignant disease. The patient underwent emergency surgery, during which he was treated with jejunectomy, jejunum single foramen type artificial anus, and the ileal viscous liquid stoma enlargement technique for SMVT. He was diagnosed with jejunal necrosis and acute general peritonitis intraoperatively. The surgery was completed successfully, and antibiotic treatment was initiated, but after surgery,

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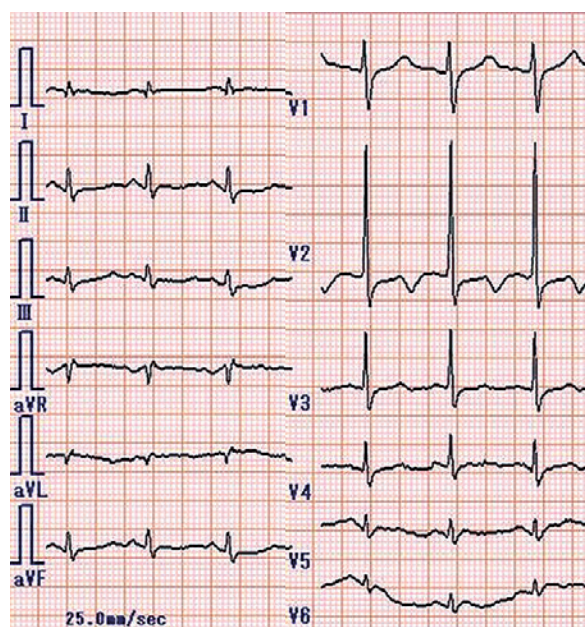
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Table. Laboratory Data

Item	Result
WBC	17,440 / μ L
Neut	91.2 %
Lym	7.0 %
RBC	224 $\times$ 10 ⁴ / μ L
Hb	5.0 g/dL
Plt	11.1 $\times$ 10 ⁴ / μ L
PT-INR	1.19
APTT	30.2 seconds
Fib	264 mg/dL
D-dimer	20.4 μ g/dL
FDP	37.2 μ g/dL
AT III	61 %
TP	4.1 g/dL
Alb	1.0 g/dL
T-bil	0.2 mg/dL
AST	12 IU/L
ALT	7 IU/L
LDH	207 IU/L
ChE	76 IU/L
BUN	62.6 mg/dL
Crea	3.55 mg/dL
Na	142 mmol/L
K	4.8 mmol/L
Cl	115 mmol/L
CRP	14.6 mg/dL
Protein C	39 %
Protein S	54 %
Anti-cardiolipin antibody	negative
IgG	824 mg/dL
IgA	230 mg/dL
IgM	23 mg/dL
IgE	50,603 IU/mL

nonsustained ventricular tachycardia was recorded on ECG; echocardiography was performed on the second hospital day. Left ventricular (LV) end-diastolic diameter was enlarged at 56 mm, and the ejection fraction was approximately 40%, with asynergy from posterior to inferior. Echocardiography also revealed a thrombus in the LV along the area of asynergy. The LV thrombus (LVT) was ball-like, immovable, and measured 22 $\times$ 18 mm in size (Figure 3). We were to perform coronary artery angiography, but the patient rejected it with contrariness. There were no organic lesions of coronary arteries by coronary CT. We also performed SPECT imaging using thallium-201 (²⁰¹Tl) and ¹²³I- β -methyl-p-iodophenyl-pentadecanoic acid (BMIPP) (Figure 4). ²⁰¹Tl SPECT imaging showed defect on the lateral wall that consisted with the left ventricular asynergy. On the other hand, ¹²³I-BMIPP SPECT imaging showed defect on the lateral wall but the area was wide compared with defect of ²⁰¹Tl and perfusion/metabolism mismatch with infarction. Brain magnetic resonance imaging (MRI) performed at this time did not show cerebral infarction. We considered the patient unsuitable to undergo thrombectomy because his general condition was still unstable after surgery; thus, we started intravenous heparin promptly. Echocardiography was performed every day at the bedside, and the LVT gradually reduced in size. Six days after admission, the LVT began to collapse and

**Figure 1.** Electrocardiogram. Electrocardiogram (ECG) demonstrated heart rate 108/minute, sinus tachycardia, and abnormal Q wave in I and aVL.

bowed like seaweed (Figure 5). Brain MRI showed multiple acute cerebral infarcts, and abdominal enhanced CT showed splenic and renal infarcts (Figure 6). However, there were no apparent symptoms or organic disorders. LVT was with a tendency to reduction more. Eleven days after admission, LVT could not be detected on echocardiography. We discontinued heparin and initiated warfarin treatment, and the patient had a good clinical course and was ambulatory when discharged 4 months after admission. No recurrences of LVT were detected on echocardiography after 9 months follow-up, and the asynergy on the lateral wall remained.

Discussion

In our case, there is hypercoagulable state in terms of coexistence of LVT and SMVT associated atopic dermatitis. LVT usually occurs in the presence of impaired left ventricular function, such as dilated cardiomyopathy, aneurysm, or following myocardial infarction.²⁻⁶⁾ Rarely, other causes such as antiphospholipid antibody syndrome,⁷⁾ protein C deficiency,⁸⁾ Factor V Leiden mutation,⁹⁾ cardiac trauma, *Salmonella* septicemia, myeloproliferative disorders,¹⁰⁾ eosinophilic endocarditis,¹¹⁾ or Takotsubo cardiomyopathy^{12,13)} can give rise to LVT. Cases of LVT occurring without any obvious heart disease have also been reported.^{14,15)} LVT is one of the risk factors for systemic thromboembolism. LVT develops in approximately 30% of patients with anterior myocardial infarction and is associated with an elevated risk of systemic thromboembolic events.¹⁶⁾ The reported incidence of ischemic stroke in the prethrombotic era varied from 0.8% to 5.5%, with many cases presumed to be cardioembolic from LVT.¹⁷⁾ In the present case, though we suspected myocardial infarction

due to left circumflex (LCX) occlusion based on electrocardiography and echocardiography, myocardial enzyme levels were not elevated with the exception of creatine kinase level, which likely increased due to intestinal necrosis after hospitalization. It was unlikely to be the organic lesion of coronary arteries by coronary CT but possible coronary spastic angina that occurred earlier. The findings of CT and scintigraphy supposed myocardial infarction with coronary artery spasm. The patient had atopic dermatitis, and his IgE level was markedly elevated; this was considered to represent Kounis syndrome, which is a group of symptoms that manifest as unstable vasospastic or nonvasospastic angina and even as acute

myocardial infarction that is triggered by the release of inflammatory mediators following an allergic insult.¹⁸⁾

Regarding therapy for LVT, a study compared the long-term clinical outcomes of LVT using current therapeutics, anticoagulation, operative treatment, and antiplatelet agents. The rate of post-treatment thromboembolism was not significantly different among the treatment groups.¹⁹⁾ There is no consensus on the most appropriate LVT treatment, which can include heparin, warfarin, thrombolysis, and surgical or catheter-based thrombectomy. It is recommended that in patients with massive, protruding, free-floating, fresh thrombus, and a history of acute systemic embolization, thrombectomy should be considered to avoid further embolization.^{20,21)} In our patient, we chose to treat with heparin because the condition of the patient did not permit operation.

The proportion of recognition as mesenteric vein thrombosis was 2.7 per 100,000 patient-years.²²⁾ Thus, SMVT is an uncommon but lethal cause of intestinal ischemia. It has a nonspecific presentation and symptoms that are out of proportion to the physical findings. Prompt



Figure 2. Enhanced computer tomography. Abdominal enhanced computed tomography showed superior mesenteric vein thrombosis (reversed black and white), small intestine necrosis, and peritonitis.

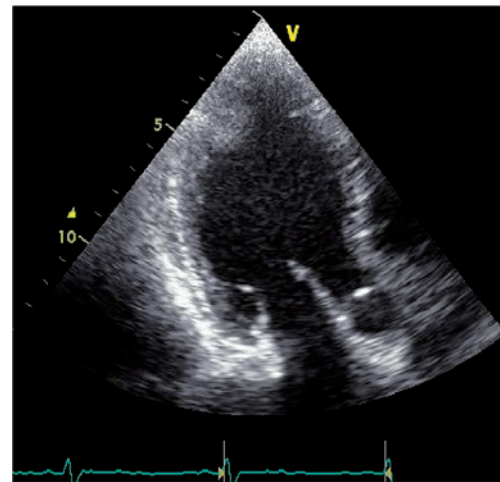


Figure 3. Echocardiography (Day 2). Echocardiography revealed thrombus in left ventricular (dotted circle). It was ball-like, and a diameter was the thing of the 22 × 18 mm size on posterolateral.

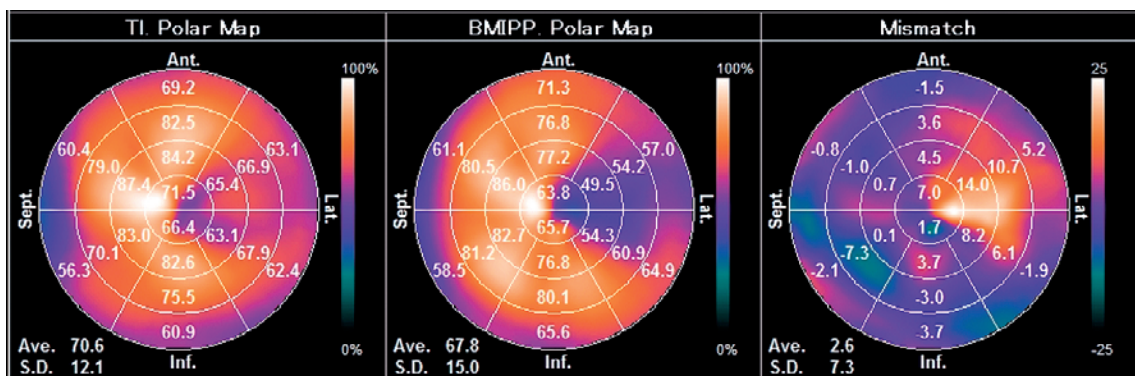


Figure 4. ²⁰¹Tl and ¹²³I-BMIPP SPECT. Bull's eye maps of thallium-201 (²⁰¹Tl) and ¹²³I-β-methyl-p-iodophenyl-pentadecanoic acid (BMIPP) are shown. ²⁰¹Tl SPECT imaging showed defect on the lateral wall. ¹²³I-BMIPP SPECT imaging showed defect on the lateral wall, but the area was wide compared with the defect of ²⁰¹Tl or perfusion/metabolism mismatch with infarction existed.

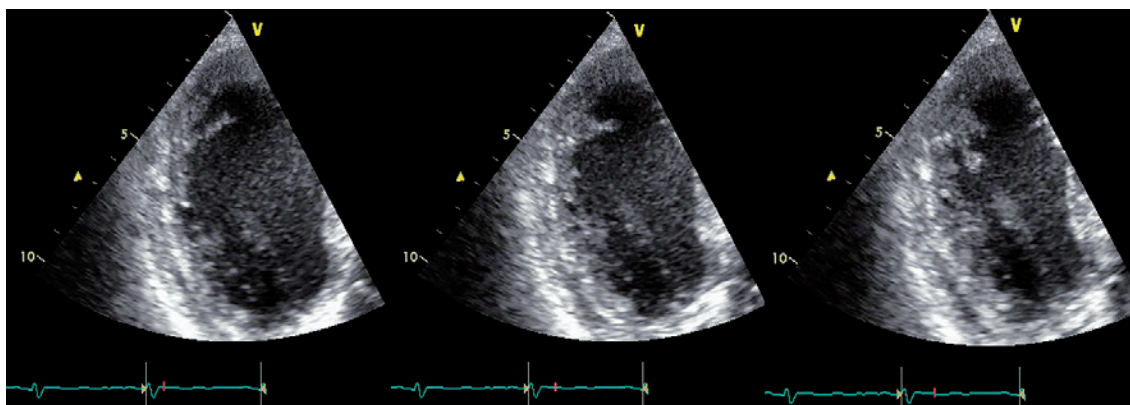


Figure 5. Echocardiography (Day 6). LVT started to collapse and bowed like seaweed at day 6.

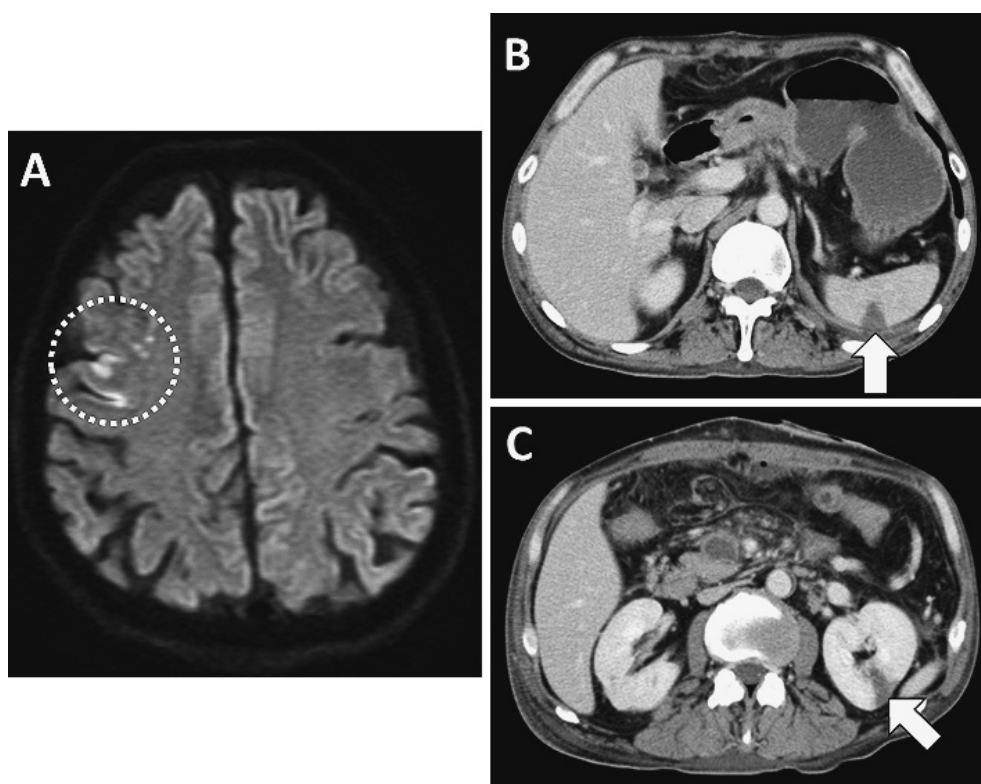


Figure 6. Brain MRI and enhanced computer tomography (Day 6). **A:** Brain MRI showed acute multiple cerebral infarction (dotted circle). **B, C:** Abdominal enhanced CT showed splenic and renal infarction (arrow).

recognition is important because early diagnosis and rapid aggressive treatment are mandatory to avoid bowel necrosis. The possibility of SMVT should be taken into consideration when acute abdominal symptoms develop in patients with a prior thrombotic episode or a documented thrombophilic disorder. Though the diagnosis of SMVT can remain elusive and it may not be recognized until laparotomy is performed, CT is the method of choice for suspected cases of mesenteric venous thrombosis. CT helps in establishing the diagnosis in 90% patients.²³⁻²⁵⁾ Causes of SMVT are prothrombotic states (antithrombin III deficiency, protein C deficiency, protein S deficiency,

hyperhomocysteinemia, oral contraceptive use, pregnancy, neoplasms), hematologic disorders (polycythemia vera, essential thrombocythemia, paroxysmal nocturnal hemoglobinuria), inflammatory diseases (pancreatitis, peritonitis, intraabdominal sepsis, inflammatory bowel disease, diverticulitis), postoperative state (abdominal operations, splenectomy, sclerotherapy for esophageal varices), cirrhosis, portal hypertension, and miscellaneous causes (blunt abdominal trauma, decompression sickness).²⁶⁾ After diagnosis of SMVT, anticoagulant therapy is the initial treatment. However, surgery and bowel resection may be needed for patients with bowel infarction, perforation, and

peritonitis. In the present case, small intestinal necrosis and peritonitis were detected by CT, and surgery was required. Pathologic examination showed the bowel to be edematous with mild inflammatory cell infiltrate, and the findings were consistent with acute ischemic change and not characteristic of Crohn's disease. The border line of ischemic change and non-ischemic change which was normal tissue was clear.

A growing body of evidence suggests the likelihood of a link between venous and arterial thrombosis. The two vascular complications share several risk factors, such as age, obesity, diabetes mellitus, hypertension, hypertriglyceridemia, and metabolic syndrome. Moreover, there are many examples of conditions that can lead to both venous and arterial thromboses, such as activated protein C (APC) resistance, protein C or S deficiency, antiphospholipid antibody syndrome, hyperhomocysteinemia, malignancies, infections, and the use of hormonal treatment. A potential association between venous thromboembolism (VTE) and atherosclerosis was described.²⁷⁾ Patients who sustain a retinal vein thrombosis commonly have associated cardiovascular risk factors,²⁸⁾ and the causes of mortality on follow-up are usually arterial vascular events.²⁹⁾ Asymptomatic atherosclerosis is unlikely to constitute a risk factor for venous thromboembolic disorders. Whether patients developing symptomatic complications of atherosclerosis such as myocardial infarction or stroke are at a higher risk of VTE complications is controversial. While in the former of the two above-reported studies, the occurrence of cardiovascular and cerebrovascular events was significantly associated with the development of VTE,³⁰⁾ in the latter the opposite was seen.³¹⁾ Patients with inflammatory bowel disease (IBD) are at increased risk of developing thromboembolic complications. In fact, deep vein thrombosis and pulmonary embolisms are major causes of mortality in IBD. More than 60% of the vascular complications are peripheral venous thrombosis. Unusual sites of thrombosis include mesenteric, portal, and cerebral veins and the cardiac cavities. Arterial thrombosis is extremely uncommon. In severe disease, thrombocytosis and increased concentrations of many clotting factors that behave as acute phase proteins lead to a procoagulatory state. The majority of patients with IBD and thromboembolic events show active disease.³²⁾ Our patient had no past history of IBD and no evidence of IBD on admission. There is a reported association between autoimmune skin disorder and activation of the coagulation system,³³⁾ and this is thought to have induced a hypercoagulable state in our patient. Another possible reason was elevating of platelet activation by severity of atopic dermatitis existed.³⁴⁾ Daniel, *et al.* also reported platelet activation is observed in allergic disease, especially atopic dermatitis and atopic disorder is risk of VTE. They suggested an overlap between allergy and cardiovascular and hemostatic systems.³⁵⁾ It is suspected that our patient had chronic inflammation, as demonstrated by the high IgE level, due to severe atopic dermatitis. As a result, he had bacteremia, and his reaction with inflammation worsened. He did not have severe systolic dysfunction. However, with the additional effect of regional hypokinesia, the hypercoagulable state in this patient led to LVT. Other factors playing a

role in the development of LVT include hypovolemia and malnutrition, increasing the susceptibility to infection, and deficiency of coagulation factors such as protein S and C. Protein C and S fell to normal after 6 months and low level of these proteins on admission is considered by sepsis. There were no other findings on physical examination, blood test, and imaging that suspected of malignancy or autoimmune disorder except for atopic dermatitis.

Conclusion

We encountered a rare case of LVT with SMVT associated with atopic dermatitis. Atopic dermatitis that has potential risk factors of thrombus with sepsis could provoke thrombophilic state. Atopic dermatitis is common disease, but continuous medical care is essential.

Disclosure

Conflicts of Interest: The authors state that they have no conflict of interest.

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