An Autopsy Case of an Elderly Hemodialysis Patient Complicated with Chronic DIC Caused by Aortic Aneurysms

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(Received for Publication: January 27, 2006)

Abstract
A 78-year-old male was admitted to our hospital because of general edema and renal failure with serum creatinine 5.8 mg/dl.

Fourteen years previously, he was diagnosed as suffering from hypertension and renal insufficiency. Six years ago, thoracoabdominal aortic aneurysms were detected but only supportively treated at the patient’s request. On admission, thrombocytopenia (7.4 × 10⁴/μl) and coagulopathy with Fbg 123 mg/dl and FDP 35.5 μg/l were found, which were assumed to be caused by chronic liver disease suggested by the ultrasound image. Diuretics were administered intravenously, which resulted in improvement of general edema with elevation of serum creatinine. Since renal function deteriorated, hemodialysis was initiated on the 35th day of hospitalization. On the 47th day, the patient suddenly complained of abdominal pain and hypotension followed by cardiopulmonary arrest and death. An autopsy showed aortic dissection and intrapericardial hematoma at the base of the heart. Therefore, the cause of death was thought to be cardiac tamponade following acute aortic dissection. The liver was unremarkable. Thrombocytopenia and coagulopathy, which the patient had since his admission, were attributed to chronic DIC caused by aortic aneurysms. Chronic DIC should be considered in elderly hemodialysis patients who develop thrombocytopenia.

Key words
Chronic DIC, Hemodialysis, Aortic aneurysm

Introduction
In Japan 248,166 patients had received chronic dialysis therapy as of Dec. 31, 2004. The number of patients had increased by 10,456 from the previous year. The population of the patients with maintenance in Japan has increased in an almost constant straight line fashion in the few years since monitoring of its use was started. The average age at which dialysis treatment began has increased to 65.7 years.

The causes of death in dialysis patients are: cardiac failure (25.1%), infection (18.8%), cerebrovascular disease (10.6%). In fact, cardiovascular complications are the major causes ¹. Recently, more cases complicated with aortic aneurysms have been reported with the advancing age of the dialysis patients ². We recently experienced an elderly patient who died of acute aortic dissection with cardiac tamponade during the introduction of maintenance hemodialysis. We assumed that there was a

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Disseminated intravascular coagulation (DIC) caused by aortic aneurysm occurring in the background.

Case Report

Case: 78-year-old, male.

Chief complaint: generalized edema.

Past medical history: Partial gastrectomy for gastric ulcer at age 68 years, angina pectoris at age 70 years, detection of thoracoabdominal aortic aneurysms at age 71. Initially, surgery was recommended for the aortic aneurysm, but he was conservatively followed up at the patient’s request.

Family history: unremarkable.

History of present illness: The patient was found to have hypertension at the age of 64 and diagnosed at age 66 with chronic renal failure (creatinine 2.9 mg/dl at that time). A family physician gave him antihypertensives and diuretics but renal dysfunction was progressing. He was then admitted to our hospital because of anorexia and the development of generalized edema.

Physical examination on admission: Height 169.0 cm.; Body weight 67.3 kg; Body temperature 35.5°C; Blood pressure 134/56 mm Hg; Pulse rate 88/minute (regular); and Cognizant and alert. Marked generalized edema, otherwise unremarkable.

Laboratory data on admission (Table 1): Urinary RBC (−), urinary protein (−). Blood cell count showed anemia of Hgb 10.0 g/dl, Hct 30.1% and Platelet count was low at 7.4×10⁴/μl. Evaluation of coagulation showed prolonged PT (INR) of 1.27 and APTT of 44.5 sec. Low level of Fbg of 123 mg/dl and FDP was increased to 35.5 μg/ml. Chemistry profile revealed marked renal dysfunction with creatinine of 5.9 mg/dl and UN of 83.9 mg/dl and T-chol was decreased to 117 mg/dl. The 24 hour creatinine clearance was decreased to 3.8 ml/min. Serological tests showed no abnormalities, including no infectious diseases; Wassermann test and viral hepatitis test were all negative.

Radiological findings on admission: Chest plain x-ray showed cardiomegaly and pleural effusion.

Hospital course: After admission, diuretics were administered intravenously and edema gradually subsided. As the patient had a long history of hypertension and urinary findings were negative, nephrosclerosis was considered as a cause of renal failure. Chronic liver disease was suggested by the ultrasound findings and low serum cholesterol level. Thus, we thought thrombocytopenia and hypocoagulability was derived from hepatic cirrhosis, in spite of negative hepatic viral infection. The patient had anemia and high levels of tumor markers (CEA 15.9 ng/ml, CA19-9 85.1 U/ml). Therefore, an upper GI endoscopic examination was performed for further evaluation on the 16th day. A portion of the gastric mucosa was biopsied, but hemostasis after biopsy was difficult and clipping was needed at the biopsy site. Following that, the anemia still ad-
vanced. Five days after biopsy, the patient was endoscopically followed up, and was found to have a large hematoma near the biopsy site (Fig. 2). On the 35th day, serum creatinine rose to 7.52 mg/dl and UN 102.7 mg/dl. Therefore, hemodialysis was initiated followed by maintenance hemodialysis three times a week. Hemodialysis could be performed stably, but the complications of hematoma at the inguinal region after inserting a catheter for hemodialysis and bleeding tendency were troublesome. On the afternoon of the 47th day, the patient had a sudden onset of abdominal pain and his blood pressure dropped to 80/ mmHg. Initially, rupture of the aortic aneurysm was suspected and a CT scan was performed but was unremarkable. He died with cardiopulmonary arrest but its cause was unclear.

**Autopsy findings (Table 2):** The autopsy was performed at 6 hours 22 minutes post mortem. The liver weighed 1030 grams, was slightly congested, but there was no evidence of chronic liver disease or hepatic cirrhosis. At the base of the heart, there was a new aortic dissection, suggesting that cardiac tamponade was caused by the hemorrhage from this site into the pericardial cavity (Fig. 3). Major portions of the vascular system showed marked atherosclerosis, thoracoabdominal aortic aneurysms, aneurysms at the right femoral artery and left common iliac artery, and aortic dissection at the bilateral com-

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**Fig. 1** A: Chest CT scan showing an aortic aneurysm measuring 4.5 cm. in diameter at the abdominal aorta. 
B: Abdominal CT scan showing an aortic aneurysm measuring 4.5 cm. in diameter at the abdominal aorta.

**Fig. 2** A: 4 days after biopsy, a large hematoma is seen at the site of the gastric mucosal biopsy. 
B: 14 days after biopsy, the hematoma has disappeared.
mon iliac and internal iliac arteries (Fig. 4). Therefore, the cause of death was considered to be due to cardiac tamponade caused by acute aortic dissection. The cause of a series of bleeding tendencies such as thrombocytopenia and hypocoagulability since admission, hematoma after gastric biopsy, and hematoma after catheter insertion at the inguinal region, were thought to be due to chronic DIC caused by aortic aneurysms.

**Discussion**

Our patient appeared to have chronic DIC caused by an aortic aneurysm (local DIC), but an ante mortem diagnosis could not be made. On admission, thrombocytopenia (7.4×10⁴/µl) and coagulopathy (Fbg 123 mg/dl, FDP 35.5 µg/l) were noted. However, we thought that they were due to chronic liver disease, especially hepatic cirrhosis, because abdominal ultrasound showed an obtuse angled edge of the liver and intrahepatic heterogeneity. Bleeding tendencies were troublesome, such as difficulty with hemostasis after an upper GI endoscopic biopsy, hematoma at the same biopsy site, and hematoma after insertion of a dialysis catheter at the inguinal region, but we attributed the cause of these series of bleeding tendencies to hepatic cirrhosis. However, autopsy revealed that the liver had no cirrhotic changes and the diagnosis of chronic DIC due to an aortic aneurysm was made post mortem.

DIC was scored according to the following criteria: FDP level of 35.5 µg/ml, 2 points; platelet count of 74,000/µl, 2 points; plasma fibrinogen concentration of 123 mg/dl, 1 point; PT(INR) of 1.27, 1 point; clinical findings of a bleeding tendency, 1 point. This gave a total of 7 points, which fulfilled the criteria for DIC. Autopsy findings showed no other diseases, such as a malignant tumor or infectious disease, that could cause DIC except for aortic aneurysms.

DIC in association with an aneurysm was first reported by Fine *et al*. in 1967. Since then, studies have shown that 5.7% of aortic aneurysms were associated with DIC. The mechanism by which DIC occurs with an aneurysm is thought to be due to decreased anti-thrombotic factor due to whirlpools or stagnation of the blood flow, vascular intimal damage at the site of the aneurysm, and

**Table 2. Autopsy Findings**

<table>
<thead>
<tr>
<th>Circulation system</th>
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<tr>
<td>Cardiac hypertrophy (480g)</td>
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<tr>
<td>Old myocardial infarction</td>
</tr>
<tr>
<td>Pericardial effusion(380ml,bloody)</td>
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<tr>
<td>Respiratory system</td>
</tr>
<tr>
<td>Pulmonary edema(lt.370g,rt.460 g)</td>
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<tr>
<td>Pleural effusion(lt.200ml,rt.300ml)</td>
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<tr>
<td>Digestive system</td>
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<tr>
<td>Liver 1030g(no evidence of hepatic cirrhosis)</td>
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<tr>
<td>Spleen 160g</td>
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<tr>
<td>Ascites 300ml</td>
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<tr>
<td>Urinary system</td>
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<tr>
<td>Atrophic kidney(lt.110g,rt.65g)</td>
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<td>Nephrosclerosis</td>
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<tr>
<td>Endocrine system</td>
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<tr>
<td>Adrenal gland(lt.5.2g,rt.6.7g)</td>
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**Fig. 3 A:** Aortic dissection and intrapericardial hematoma are seen at the base of the heart.
**B:** Aneurysms at the right femoral artery and left common iliac artery and dissection at the bilateral common iliac arteries and internal iliac arteries are seen.
activation of the platelet and coagulation system at the atheromatous area of the aneurysm.

As far as we could search, there were 3 cases reported in Japan in which chronic DIC associated aortic aneurysms developed in patients who underwent maintenance hemodialysis. Kurihara et al. reported 2 cases of chronic DIC caused by aortic aneurysm that developed in elderly patients with renal failure. In one of them continuous subcutaneous injection of heparin was useful. Nagata et al. (meeting abstract) reported that a 71-year-old female hemodialysis patient developed chronic DIC associated with a thoraco-abdominal aortic aneurysm. They reported that administration of oral camostat mesilate improved the bleeding tendency and therefore the usefulness of camostat mesilate in the treatment of chronic DIC.

The basics of treatment of chronic DIC are: treatment of the underlying disease; suppression of coagulation; and supplementation of consumed coagulation factors, fibrinolytic factors, and platelets, if they are at reduced levels. An aortic aneurysm is treated surgically, if possible. There have been 2 cases of chronic DIC reported in Japan in which chronic DIC associated with a thoraco-abdominal aortic aneurysm, in which the chief ingredient is heparan sulfate. Also, tranexamic acid, which is an anti fibrinolytic agent, can be used for the treatment of chronic DIC. Tranexamic acid inhibits thrombosis by inhibiting plasminogen from binding the thrombosis. Our patient refused surgery for the atheromatous area of the aneurysm.

The ages of hemodialysis patients rise year by year in Japan. Considering an increase in the number of diabetic patients, the increase of patients with complications of aortic aneurysm in the future is troubling. The possibility of chronic DIC should be considered in elderly hemodialysis patients who show thrombocytopenia.

Acknowledgements

We thank Mr. Toshini Okuhara and coworkers for enthusiastic support in the Department of Pathology, St. Marianna University School of Medicine, Yokohama City Seibu Hospital.

An abstract of this article was presented at the 531st meeting of the Japanese Society of Internal Medicine, Kanto Region in November, 2005.

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大動脈瘤による慢性 DIC を呈した高齢透析患者の 1 割検例

外山 勝英 1 近藤 聡 1 小関 晃子 1 今井 五郎 1
品川 俊人 2 木村健二郎 3

抄録
症例は 78 歳, 男性。64 歳で高血压を指摘され, 66 歳時には慢性腎不全（Cr2.9 mg/dl）と診断された。71 歳時に胸腹部大動脈瘤を指摘された。大動脈瘤は当初は手術を勧められていたが, 本人の希望もあり保存的に経過観察がなされていた。今回, 全身浮腫を主訴に当院入院。Cr5.9 mg/dl, UN83.9 mg/dl と著明な腎機能障害を認めた。血小板減少（7.4×10^4/μl）, 凝固異常（Fbg 123 mg/dl, FDP35.5 μg/l）もみられたが, 腹部超音波検査では肝辺縁は鈍化・肝内不均一像を認めたため, 血小板減少, 凝固異常の原因は慢性肝疾患によるものと考えていた。入院後, 利尿薬の静注投与を開始し浮腫は徐々に改善し, が腎機能障害はさらに進行し, 第 35 病日より血液透析を導入した。第 47 病日, 突然の腹痛と血圧低下を呈した後心肺停止となり永眠された。病理解剖では心基部に大動脈解離と心袋内血腫が認められ, 死因は急性大動脈解離による心タンポポネルと考えられた。なお, 肝臓に著変はみられなかった。本症例は入院時より血小板減少, 凝固異常を認めたが, 大動脈瘤に起因する慢性DIC によるものと考えられた。血小板減少を呈した高齢透析患者においては慢性DICの可能性を考慮すべきであろう。

索引用語
慢性DIC, 血液透析, 大動脈瘤

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