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# Aortocaval Fistula by Luetic Abdominal Aortic Aneurysm

## -Report of a case-

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A 53-year-old male patient was operated on because of a spontaneous abdominal aortic aneurysm with aortocaval fistula. The fistula was successfully closed and bifurcated woven Dacron graft was used to replace the aneurysm. The patient had with characteristic signs and symptoms of aortic aneurysm with arteriovenous fistula. Proper diagnosis and prompt surgical repair of aortocaval fistula saved the patient. The use of rapid infusion system provided stable hemodynamics during the operation.

**Key Word:** Aortocaval fistula

## INTRODUCTION

Aortocaval fistula is rare but a well-recognized complication of abdominal aortic aneurysm. It occurs with a frequency of 1% of operative cases of abdominal aortic aneurysm. Patients manifest signs and symptoms related to the rupture of aneurysm or the large arteriovenous fistula. The diagnosis depends on the clinical finding and imaging studies such as CT or aortography. Surgical correction is the only means for the survival of patient, but the surgical mortality is still high(about 36%). We experienced a case of abdominal aortic aneurysm complicated with aortocaval fistula. The patient underwent corrective surgery and recovered well.

## CASE

53-year-old male patient was admitted with the complaint of back pain which was aggrevated for 10 days before admission. Pulsating mass was palpable in the periumbilical area. On the past medical history, the patient had been treated for syphilis 7 years ago. Since 5 years ago, he has been treated for hypertension. Five months before admission, he suffered from intermittent lower back pain radiating to both groins. The patient had the physical theraphy at private clinic, but without improvement. Then, the pulsating mass developed in his abdomen and claudication developed recently.

Physical examination on admission showed soft pulsating mass in periumblical area with length and diameter 10 and 8 cm respectively. Harsh bruit with continuous murmur was

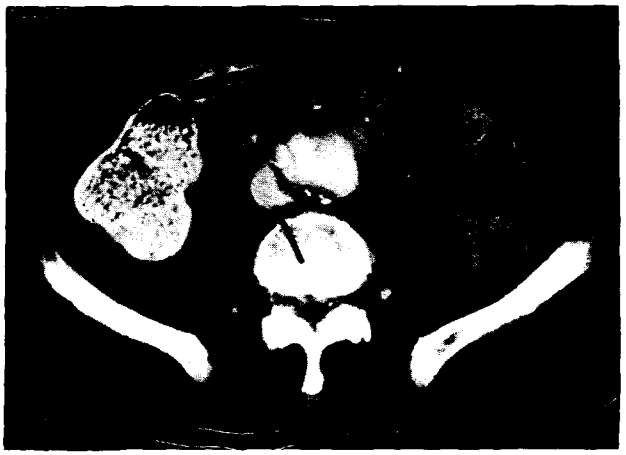

**Fig. 1.** CT finding. This photo shows ruptured aoric aneurysm and early contrast filling of inferior vena cava. (Arrow indicates IVC.)

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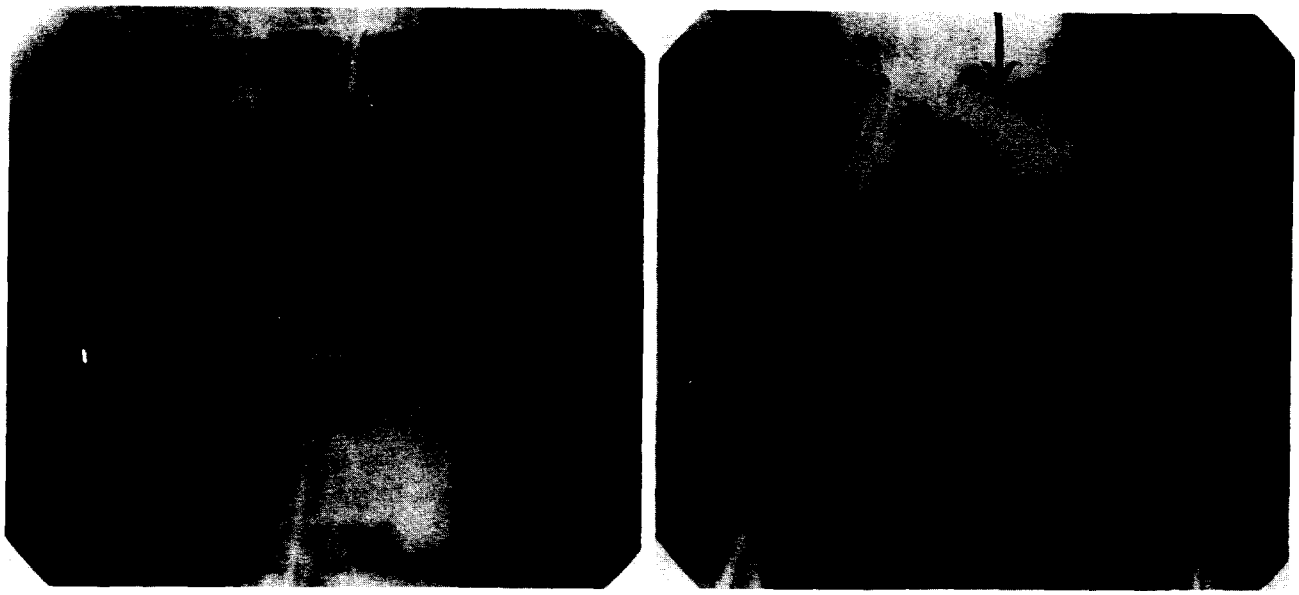

**Fig. 2-1.** Preoperative Aortography. The aneurysm arises from infrarenal area and ends to aortic bifurcation. Early filling of inferior vena cava is also seen. (Thick arrow indicates fistula, and thin arrow indicates IVC.)
**Fig. 2-2.** Left common iliac artery is totally occluded, and left common iliac vein was visualized. (Arrow indicates left common iliac vein.)

**Fig. 3-1.** Postoperative Aortography. The graft is patent.
**Fig. 3-2.** Blood flow to both leg is also patent.

audible over the mass. No arterial pulsations were noted in the left leg including femoral artery whereas arterial pulsations were normal in the right leg. There was no ischemic sign in the left leg. Routine baseline laboratory tests revealed normal findings except mild leukocytosis. Serology test revealed weakly positive VDRL and ++ FTA-ABS. Chest and abdominal computed tomographic scans showed infrarenal abdominal aortic aneurysm which ended just proximal to the aortic bifurcation (7 cm in length)(Fig. 1). The left common iliac artery and right internal iliac artery were not visible.

Cardiac echocardiography revealed hyperdynamic cardiac status with ejection fraction over 80%. Aortography showed a infrarenal abdominal aortic aneurysm with filling of dye in the inferior vena cava from the lower portion of aneurysm (Fig. 2). With diagnosis as abdominal aortic aneurysm with aortocaval fistula, operation was performed. With the transperitoneal approach with long abdominal incision, the aorta was exposed just below the arise of renal arteries. Heparin was administered in dosage of 1 mg/kg. With the cross-clamps at infrarenal aorta and right external iliac artery, the aneurysm was opened. Sudden gush of blood from the aneurysm and fistula was aspirated and the hypovolemic hypotension was prevented with the use of rapid infusion system (RIS; Haemonatics. Inc. USA). Compressing the aortocaval fistula by finger, the fistula was closed by multiple interrupted pledgeted polypropylene sutures. After the excision of aneurysm, 16~8 mm bifurcation Dacron graft was implanted with the distal ends in left femoral artery and right common iliac artery. The graft was wrapped with the posterior peritoneum and mesentery. Aorta cross clamping time was 55 minutes. Postoperative course was uneventful. Histopathologic examination of aortic wall and tissue debris showed no fungal hypae nor atherosclerotic findings. Follow-up aortography performed on 7 days after operation showed patent graft (Fig. 3).

## DISCUSSION

Although spontaneous rupture of an abdomianl aortic aneurysm(AAA) into the inferior vena cava is rare, it accounts for 0.2 to 1.3% of atherosclerotic aortic aneurysm and for 3 to 4% of ruptured AAA1. In 1935, Lehman attempted the first surgical correction of aortocaval fistula by means of a quadruple ligation of the vascular limbs of the fistula, but the patient died[2]. In 1954, Cooley provided the first successful surgical repair of a spontaneous aortocaval fistula[3]. Although early reports indicated that traumatic fistulas were more prevalent[4], spontaneous fistulas are more common now, comprising 80% to 90% of all aortocaval fistulas[5] compared to 10 to 20% of traumatic cases. In about 90% of the spontaneous cases, the fistula results from erosion or rupture of an atherosclerotic infrareanl aortic aneurysm into the vena cava[6]. Far less common causes include rupture of aneurysm due to syphilis, bacterial infection, Marfan's syndrome, or Ehlers-Danlos syndrome[7]. The spontaneous aortocaval fistula develops most often at or immediately above the arterials bifurcation, and its formation is attributed to periaortic inflammation which causes adherence of the vessels, permitting development of an arteriovenous communication without extravasation[1].

The pathophysiology of abdominal aortocaval fistula is the result of diversion of blood flow from arterial circuit to low resistance venous one. Arterial flow into the venous system causes an increase in venous volume, pressure, and venous blood returns with simultaneous fall in systemic resistance. Low systemic vascular resistance causes increased stroke volume, heart rate, and cardiac output. The initial loss of blood volume into high capacity venous system causes decreased heart size, but subsequent increased cardiac work causes cardiac hypertrophy and dilatation[8,9]. Concurrently, arterial flow of distal portion to the aortocaval fistula decreases as well as peripheral perfusion pressure. This condition leads to compensatory dastal vasoconstriction, reduced capillary pressure and, consequently, increase in total blood and intestinal compartment volumes, mediated by the renin-angiotensin system. Subsequently, chronic compensatory changes occur, resulting in the increased tissue perfusion. An arterial collateral network develops distal to the fistula. The redistribution of blood resulted from the formation of an arteriovenous fistula brings decreased renal tubular secretion and enhanced absorption of sodium and chloride. In addition, there is a decrease in glomerular filtration rate with consequent development of oliguria and azotemia. This is thought to be due to decreased renal arterial perfusion pressure and an increase in venous pressure, resulting in decreased renal blood flow and renal parenchymal perfusion. In rare occasion, an aortocaval fistula remains asymptomatic, and this is due to its small size or partial occlusion[10]. The severity of these symptoms is related to the size and duration of the shunt, to the patient's cardiovascular reserve, and, in the case of a spontaneous fistula, to the local manifestations of the aneurysm itself[11]. The clinical findings of an aortocaval fistula are those of a high-output cardiac state coupled with characteristics of tricupid insufficiency. Specific features include a reduction in diastolic pressure and pulse pressure widening. Tachycardia is invariable and can be abolished by compression and redistribution of flow through the fistula. Physical examination may show Corrigan's pulse, neck vein

distension, hepatomegaly, ascites, lower extremity edema. Especially, edematous lower extremity and pulsating superficial abdomianl veins appear in two thirds of the patients. In almost all patients, pulsating abdominal mass is found[6] and this is associated with a continuous harsh abdominal bruit, often with systolic accentuation in 73% to 83% of the patients[12,13]. Pain is severe in more than 80% of patients and is easily mistaken for such as pancreatitis, peptic ulcer disease. Radiation to the groin, testicle, thigh and lower legs may be also found. The intensity of pain is severe at onset, and tends to be less intense as the hemodynamic homeostasis worsened. The distal pulse is usually weak, but lower limb ischemia affects no more than 25% of subjects and is almost always mild[14]. With progression of venous hypertension, passive congestion of gastrointestinal and genitourinary tract mucosa can cause rectal bleeding and microscopic or gross hematuria in 17~23% of patients[10,15]. Venous congestion of kidney combined with decreased arterial perfusion frequently results in progressive renal failure, with worsening oliguria and azotemia despite adequate fluid replacement[16]. Diagnosis of an aortocaval fistula depends most often on recognition of its clinical feature. Classically, abdominal pulsating mass and lower back pain, high-output cardiac failure and shock provide strong suspicion of abdominal aortocaval fistula and its rupture. Abdominal physical examination may find abdominal bruit or thrill, but these could not always be found. If, patient's vital sign is not so good, abdominal ultrasound coupled with doppler may be helpful[17,18]. Currently, computed tomography (CT), helical CT and 3-dimensional magnetic resonance imaging scan can be helpful in diagnosing aortocaval fistula and even more so in localizing the fistula site[19,20,21]. Aortography continues to be the principal imaging modality for visualization of an aortocaval fistula. It detects the presence of fistula, its site, the presence of trombus and local vascular or renal abnormality that might influence the operative approach[22,23].

Surgical treatment is the best chance of survival for the patient, although mortality remains still high. The treatment of aortocaval fistula involves transaortic closure of the fistula and restoration of arterial continuity with a prosthetic graft. In operation, gradual clamping of the aorta should be the rule in stable patients to avoid significant hemodynamic changes associated with sudden clamping. During repair of aortocaval fistula, venous bleeding can be effectively controlled by digital compression on IVC and then the fistula can be repaired by suturing of ostium or by ligation of fistula. Others reported that hemostasis can be achieved by insertion of balloon-tipped catheter. But this may cause loss of time and blood, does not prevent dislodgement of aneurysmal debris into the IVC, and makes the suture of the fistula more difficult. Repair of the defect must be performed through an endoaneurysmal approach after accurate removal of the aneurysm. The mortality of aortocaval fistula repair is high, and the mortality rate ranges from 15% to 100%[14].

The operation of aortocaval fistula sometimes requires prompt transfusion of a large amount of blood in order to maintain stable hemodynamics. Rapid Infusion System(RIS) is very helpful in such cases. With separated two central lines, RIS can transfuse much more amount of blood within a short time which keeps the patient's hemodynamic stable. With this system, our patient had no episode of hypotension during the operation. In this case, the etiology of aortocaval fistula is not certain. However, because of positive serologic test for syphilis, we postulate that this case is luetic in origin. It is not well established whether further treatment of syphilis is needed or not. In the literature, luetic aortitis complicated with aortocaval fistula is very rare. We report our case with a review of literature.

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