The Significance of Hematuria in the Patient with Ruptured Abdominal Aortic Aneurysm

Masaki WAKAMATSU and Masakazu KURO

(Key words: abdominal aortic aneurysm, aortocaval fistula, hematuria)

Aortocaval fistula (ACF) is a rare complication of abdominal aortic aneurysm and often remains undiagnosed until the aneurysm is opened. Major complications from repair of ACF are congestive heart failure due to fluid overload, pulmonary embolization and shock from massive hemorrhage[1,2]. The anesthetic management includes a number of critical aspect, since a delay in the treatment may lead to potentially lethal disorders. To demonstrate that hematuria is an important sign of ACF, we present a case urgently operated on for ruptured iliac aneurysm, in which ACF had not been diagnosed before operation.

Case Report

A 66-year-old man had been well until 22 hr before admission, when he noted sudden low back pain followed by hematuria. He initially consulted a urologist with these complaints and fell into pre-shock state during the examination. Rupture of right common iliac aneurysm was suspected on computed tomogram. Immediately, he was transferred to our hospital and the emergency operation was scheduled. On his arrival in the operating room, blood pressure was 80/52 mmHg and pulse rate 126 beats·min^{-1}. There was a large, pulsatile mass in the abdomen with no continuous bruit audible over it. His extremities were pale and cold, suggesting poor peripheral circulation. In particular, the right lower extremity was markedly swollen and mottled with a bluish discoloration to the groin level. EKG showed sinus tachycardia, but there was no apparent sign of congestive heart failure on physical examination or chest X-ray films. Grossly bloody urine was drained through a Foley catheter. Abnormal laboratory values were as follows: WBC; 23800 /μl, BUN; 22 mg·dl^{-1} and serum creatinine; 2.2 mg·dl^{-1}. The presence of metabolic acidosis was confirmed (pH 7.346, BE -7.1). No anemia was noticed (RBC 505 $\times$ 10^4/μl, Hb 16.7 g·dl^{-1}). Before induction of anesthesia, the radial artery and the internal jugular vein were cannulated for monitoring systemic arterial pressure and central venous pressure, respectively. In a patient with ruptured abdominal aortic aneurysm, hypotension may be easily facilitated either by positive pressure ventilation or by muscle relaxation of the abdomen. Thus laparotomy was started under spontaneous respiration following subcutaneous infiltration of lidocaine (1%, 30 ml) into the incision site and intravenous administration of fentanyl (200 mcg). When the proximal portion of the aorta to the aneurysm was able to be manually manipulated to cope with bleeding, the trachea was intubated with succinylcholine. The anesthesia was maintained with fentanyl (total dose; 15 mcg·kg^{-1}) and 50% nitrous oxide in oxygen, supplemented by diazepam, halothane and pancuronium as required. Aortic cross clamp resulted in no

Department of Anesthesia, National Cardiovascular Center, Osaka, Japan

Address reprint requests to Dr. Wakamatsu: Department of Anesthesia, National Cardiovascular Center, 5-7-1, Fujishiro-dai, Suita, Osaka, 565 Japan

J Anesth 4:188–190, 1990

significant increase in blood pressure. Laparotomy revealed no gross sign of ruptured aneurysm in the abdominal cavity. However, marked swollen ureters and congested pelvic veins were noticed. The aneurysm was opened, and the removal of the thrombi from the aneurysmal sac was followed by unexpected profuse venous bleeding. It was soon confirmed that this bleeding was coming from the inferior vena cava (IVC) through a large opening of the aneurysmal sac. An approximately 3 cm long aortocaval fistula (ACF) was located between the aneurysm and the IVC at the confluence of the common iliac veins. Massive hemorrhage was managed to control by digital compression of the ACF, balloon catheters inserted into the IVC above and below the ACF, and autotransfusion of the shed blood. Our autotransfusion device consists of a modified cardiotomy suction apparatus, reservoir and infusion pump, with no provision for either cell washing or hemoconcentration. Maximum retransfusion capacity of this device was approximately 700 $ml \cdot min^{-1}$. It took about an hour to close the ACF directly from the inside of the aneurysm. During this period two autotransfusion devices were necessary to operate at their full speed to maintain hemodynamic stability, and 30000 ml of shed blood was retransfused. The aneurysm was subsequently reconstructed with a woven double velour Y graft. The anesthesia time was 475 min. Total blood volume of autotransfusion was 34000 ml, while 1400 ml of homologous banked blood was transfused intraoperatively.

Postoperatively, hemolysis, elevation of transaminases and impaired renal function were noted transiently, but all of these abnormalities returned to normal in a few days. The patient discharged from the hospital 26 days after the operation.

Discussion

The incidence of ACF has been estimated to be 1% of all patients with abdominal aortic aneurysm (AAA) and about 4% in ruptured AAA[1]. The most common symptoms and physical findings include a pulsatile abdominal mass, continuous bruit, abdominal or back pain and high output heart failure with marked edema of the legs. But typical findings are recognized in about only half of the cases[1,3]. In this case, the ACF was occluded by the thrombotic mass, hence no continuous bruit was present on physical examination. The significance of hematuria in the diagnosis of ACF has been emphasized by Brewster et al.[4] and Salo et al.[5] who found hematuria in all their cases of ACF. Hematuria seems to be caused by the rupture of dilated veins in the ureters and the bladder. The ACF increases venous pressure in the hypogastric venous system and causes venous congestion of the retroperitoneal tissues. These distended and fragile veins rupture and lead to hematuria or rectal bleeding which is also one of signs of pelvic venous hypertension.

Understanding of the pathophysiology of ACF provides a useful guide to the anesthetic management. Patients with ACF will require careful hemodynamic monitoring because they are susceptible to fluid overload after fistula closure. A Swan-Ganz catheter can be helpful in fluid therapy during and after surgery[6]. It is also important for anesthetist to note that sudden death can ensue from pulmonary embolization of aneurysmal contents via the ACF during dissection of the aneurysm[1]. Bleeding from the fistula may be massive and thus the use of autotransfusion, if available, is advisable. In this case, failure to appreciate the significance of hematuria was probably responsible for intraoperative overwhelming hemorrhage. If the presence of ACF is diagnosed before operation, anesthetic management as well as surgical repair can be performed more appropriately.

In summary, ACF secondary to ruptured AAA requires special anesthetic considerations. The preoperative checking for hematuria in patients suffering from AAA is important to all anesthetists, since hematuria suggests the presence of ACF.

(Received Jul. 31, 1989, accepted for publication Dec. 4, 1989)

References

1. Baker WH, Sharzer LA, Ehrenhaft JL: Aortocaval fistula as a complication of abdominal aortic aneurysms. Surgery 72:933–938, 1972
2. Reckless JPD, McColl I, Taylor GW: Aortocaval fistulae: an uncommon complication of abdominal aortic aneurysms. Br J Surg 59:461–462, 1972
3. Gourdin FW, Salam AA, Smith III RB, Perdue GD: Aortocaval fistulas due to ruptured infrarenal aortic aneurysms: experience with six cases. South Med J 75:913–916, 1982
4. Brewster DC, Ottinger LW, Darling RC: Hematuria as a sign of aorto-caval fistula. Ann Surg 186:766–771, 1977
5. Salo JA, Verkkala K, Ketonen P, Perhoniemi V, Harjola PT: Diagnosis and treatment of spontaneous aorto-caval fistula. J Cardiovasc Surg 28:180–183, 1987
6. Clowes AW, DePalma RG, Botti RE, Cohen A, Dauchot PJ: Management of aortocaval fistula due to abdominal aortic aneurysm. Am J Surg 137:807–809, 1979