

Isthmus of a Horseshoe Kidney Overlying a Ruptured Abdominal Aortic Aneurysm: A Case Report

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Horseshoe kidney is a rare congenital anomaly showing various degrees of fusion and accessory blood supply. Coexistence of horseshoe kidney and aortic aneurysm therefore presents a technical challenge to vascular surgeons. We report an 83-year-old woman with a ruptured abdominal aortic aneurysm associated with horseshoe kidney. Preoperative computed tomography (CT) showed discontinuity of the aneurysm wall in relation to the isthmus of the horseshoe kidney, and rupture of the aneurysm into the retroperitoneal space. The aneurysm was exposed via a transperitoneal approach, and grafting was performed successfully together with division of the isthmus of the horseshoe kidney. Renal function showed no impairment postoperatively. (Ann Thorac Cardiovasc Surg 2006; 12: 149–51)

Key words: horseshoe kidney, rupture, abdominal aortic aneurysm

Introduction

Horseshoe kidney is a renal fusion anomaly estimated to be present in 0.25% of the population,^{1,2)} while abdominal aortic aneurysm occurs in 2% of the elderly.³⁾ Combined occurrence of both is rare, reportedly observed once in 710 autopsies.⁴⁾ A total of 176 patients with coexisting abdominal aortic aneurysm and horseshoe kidney had been described by 2001, with 134 having no symptoms and 42 having rupture of the aneurysm.⁵⁾ We report a case of aneurysm rupture where the bleeding point was covered by the isthmus of the horseshoe kidney.

Case Report

An 83-year-old woman who had lost consciousness in the bathroom was taken to the emergency department of our hospital. She had a history of hypertension and cerebral infarction. Consciousness remained clouded and systolic blood pressure was maintained at 60-80 mmHg with

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an intravenous volume infusion. Abdominal pain, and examination of the abdomen revealed a pulsating aneurysm. Peripheral arterial pulses were normal. After blood transfusion and volume infusion, her circulatory state became stable with a systolic blood pressure of 120 mmHg and a heart rate of 100. Abdominal computed tomography (CT) demonstrated an infrarenal abdominal aortic aneurysm with a diameter of 75 mm that had ruptured retroperitoneally, together with a horseshoe kidney, with its isthmus overlying the bleeding point (Figs. 1-3). The patient was taken immediately to the operating room.

The abdomen was opened by median incision. No continued bleeding was found. A large retroperitoneal hematoma was present overlying the aneurysm, extending toward the right. After placement of tape around the infrarenal abdominal aorta superior to the isthmus and around the right and left common iliac arteries, we dissected the isthmus of the horseshoe kidney from the aneurysm. During dissection heavy bleeding began from the suspected point of rupture, but was controlled by pressing the isthmus against the aneurysm. Following systemic heparinization, the distal and proximal arteries were clamped and the horseshoe kidney was divided at the isthmus. After the aneurysm was opened, multiple lumbar arteries, the inferior mesenteric artery, and accessory branches of the renal arteries were occluded by

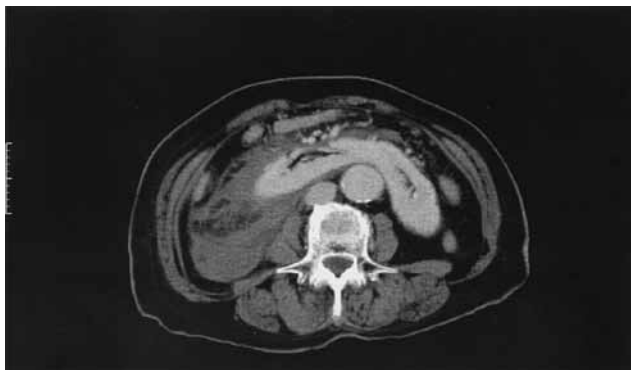


Fig. 1. Preoperative computed tomography showed a horseshoe kidney and a right retroperitoneal hematoma. Free space was present between the isthmus of the horseshoe kidney and the abdominal aorta.



Fig. 2. By computed tomography, no margin could be discerned between the isthmus of the horseshoe kidney and the abdominal aortic aneurysm. The bleeding point thus appeared to directly underlie the isthmus.

transfixation with polypropylene sutures, given the small size of the arteries and presence of good collateral flow. A 16×8 mm, Y-shaped knitted Dacron graft was attached end-to-end to the aorta by continuous suturing, and end-to-end anastomosis of the graft also was performed for the right and left common iliac arteries.

The trachea was extubated on postoperative day 1. Blood urea nitrogen and creatinine were within normal limits postoperatively. Three days after the operation, oral intake was permitted and the patient was transferred to the ward from the intensive care unit. She was discharged 4 weeks after surgery. CT on postoperative day 10 showed infarction of the lower portion of both kidneys, suggesting that at least one artery feeding the horseshoe kidney had been divided during the operation.

Discussion

In this patient, an abdominal aortic aneurysm ruptured with hemorrhage into the retroperitoneal space, but bleeding from the aneurysm ceased, even though the systolic blood pressure rose to 130 mmHg before the operation. CT and operative findings confirmed that the bleeding point was in the anterior wall of the aneurysm, underlying the isthmus. CT did not show a free space between the aneurysm and the isthmus, which should have been present if that part of the aneurysm were intact. At operation, we encountered difficulty in dissecting the aneurysm and the isthmus, since the isthmus was tightly adherent to the aneurysm. Instead of the usual easy dissection, bleeding occurred from the anterior wall of the aneurysm during surgical manipulation.

Stroosma et al.⁵⁾ analyzed 176 cases of coexisting aor-



Fig. 3. Computed tomography with contrast administration showed an infrarenal abdominal aortic aneurysm with a diameter of 75 mm; no thrombus was demonstrated in the aneurysm.

tic aneurysm and horseshoe kidney from reports found in a Medline search. Rupture had occurred in 41 and all patients underwent surgery via a transperitoneal approach. The mean number of renal arteries was 3.1 in the subgroup with rupture. Re-anastomosis was performed for renal arteries originating from the aneurysm in 8 of 31 patients with rupture and a renal arterial origin. Half of the 41 patients underwent separation of the renal isthmus. In the subgroup with rupture, 7 patients developed renal complications (17%), and 6 patients died (14%). In the emergency setting the transperitoneal approach, less frequent re-anastomosis of renal arteries arising from the aneurysm, and more frequent separation of the renal isthmus were preferred to a retroperitoneal approach without separation of the isthmus, since the need for rapid vascular control lowered the threshold for division of the renal arteries and isthmus. In our case, CT after the op-

eration disclosed areas of renal infarction, suggesting that at least one renal artery originating from the aneurysm had been divided during the operation. However, no infection or renal insufficiency resulted.

With helical CT as well as a combination of conventional CT and aortography, adequate preoperative diagnosis of abdominal aortic aneurysm accompanied by horseshoe kidney, as well as determination of vascular anatomy, are now easy. Such anatomy is important in determining the operative approach and procedure. Ideally, especially in an elective setting, a retroperitoneal approach to the abdominal aortic aneurysm without⁶⁾ separation of the renal isthmus recently has been advocated^{7,8)} as has re-anastomosis of as many accessory renal arteries as possible⁹⁾ when these are larger than 2 mm in diameter.⁷⁾

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