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Authors

Ali, Mohamed R
Norcross, E Douglas
Brothers, Thomas E

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Iliac and femoral artery occlusion by thromboemboli from an abdominal aortic aneurysm in the setting of blunt abdominal trauma

Mohamed R. Ali, Jr., MD, E. Douglas Norcross, MD, and Thomas E. Brothers, MD, *Charleston, S.C.*

The abdominal aorta is injured infrequently in blunt trauma to the abdomen. When injury does occur, aortic rupture, dissection, and traumatic aneurysm most commonly result. An aneurysmal abdominal aorta would appear to be at increased risk for injury from blunt abdominal trauma. This case report appears to be the first description of iliac and femoral artery occlusion by thromboemboli dislodged from an atherosclerotic abdominal aortic aneurysm at the time of a motor vehicle accident. We believe that this peripheral embolization was caused by direct compression of the abdominal aortic aneurysm by a seatbelt. (J Vasc Surg 1998;27:545-8.)

Mural thrombi within an abdominal aortic aneurysm (AAA) are a frequent source of peripheral thromboemboli. Although injury to the abdominal aorta from blunt trauma occurs infrequently, we report a case of occlusion of the left external iliac and right common femoral arteries by thromboemboli from an AAA resulting from a seatbelt injury to the abdomen.

CASE REPORT

An 82-year-old man was the restrained driver in a single motor vehicle, head-on impact with a tree that caused severe damage to the automobile. The patient was alert and oriented at the scene, and his condition was hemodynamically stable during transport to the level I trauma center at the Medical University of South Carolina. On arrival, the patient reported severe pain in the right lower extremity that had started at the scene of the accident.

The patient's medical history showed hypothyroidism, pneumonia, hypertension, coronary artery disease, and chronic renal insufficiency from bilateral renal artery stenosis. The patient had undergone two coronary artery bypass grafting procedures and was under the care of a physician for a 4 cm infrarenal AAA.

At admission, physical examination showed a thin man

in obvious pain from his injuries; the right lower extremity was in particular pain. Blood pressure was 137/73 mm Hg; heart rate was 91 beats/min; respiratory rate was 16 breaths/min, and blood oxygen saturation was 97% with 2 L of oxygen administered through a nasal cannula. The patient had multiple facial lacerations. He had clear and equal breath sounds. Examination of the heart revealed an irregular rhythm without murmurs, rubs, or gallops. Electrocardiogram revealed a sinus rhythm with first-degree atrioventricular block and premature ventricular complexes. Abdominal examination revealed a pulsatile mass immediately superior to the umbilicus consistent with the known AAA. The right lower extremity was mottled and cool without palpable femoral or distal pulses. No motor or sensory function was seen in the right lower extremity distal to the inguinal ligament. The left lower extremity was not as cool as the right side. The left side had intact motor and sensory function and pedal arterial flow that could be detected with Doppler ultrasound.

The patient underwent emergency arteriography that revealed occlusion of the left external iliac artery 2 cm distal to its origin (Fig. 1) and occlusion of the right common femoral artery near its midpoint (Fig. 2). Total occlusion of the right renal artery with critical stenosis of the left renal artery was seen on the arteriogram. These findings were consistent with atherosclerosis, although the possibility of superimposed acute thromboembolic occlusion could not be excluded. An abdominal computed tomographic scan (Fig. 3) with intravenous bolus infusion of contrast material was obtained to assess the need for abdominal exploration as an alternative to transfemoral balloon catheter thromboembolotomy. This examination revealed a 4.2 cm calcified infrarenal AAA and a large mesenteric hematoma containing contrast material.

Because of concern that the AAA was leaking, the

From the Sections of Trauma and Vascular Surgery, Medical University of South Carolina.

Reprint requests: E. Douglas Norcross, MD, Department of Surgery, MUSC Medical Center, 171 Ashley Ave., Charleston, SC 29425.

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Fig. 1. Anterior-posterior digital subtraction angiogram of pelvic vessels demonstrates an abdominal aortic aneurysm and thromboembolic occlusion of the proximal left external iliac artery.



Fig. 2. Magnified anterior-posterior digital subtraction angiogram of pelvic vessels demonstrates thromboembolic occlusion of the right common femoral artery.

patient was taken to the operating room for immediate abdominal exploration within six and a half hours after the accident. Findings included a large mesenteric hematoma that was clearly distinct from the AAA. This hematoma was explored, and several small bleeding vessels were ligated. A small tear of the liver capsule also was present and necessitated no treatment. The aneurysm was intact without evidence of a leak.

In consideration of the patient's overall unstable condition, the decision was made to restore perfusion to the legs but not repair the aneurysm. The common femoral arteries were approached through bilateral groin incisions. Arteriotomies were performed, and balloon thromboembolotomy catheters were used to restore perfusion. Emboli with the consistency of chronic mural thrombi were extracted. Four-compartment fasciotomies of the right leg were performed. At the end of the procedure, adequate Doppler signals were heard bilaterally over the dorsalis pedis and posterior tibial arteries.

The patient's postoperative course was complicated by acute renal failure resulting from preexisting chronic renal insufficiency caused by bilateral renal artery stenosis; dialysis was performed. Serum total creatine kinase level was 34,881 IU/L on the first postoperative day. Urinalysis for myoglobin was normal at admission and for successive specimens. Flow in the pedal arteries

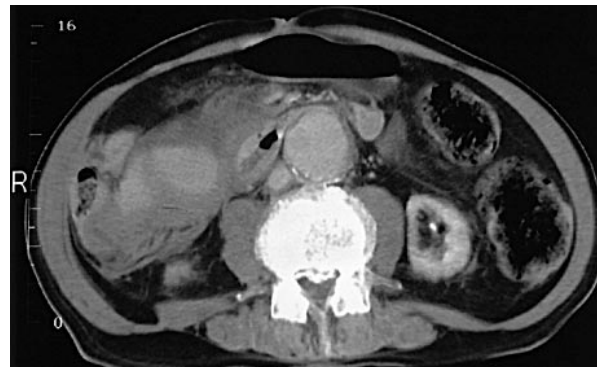


Fig. 3. Computed tomographic scan with intravenously administered contrast material at the level of the umbilicus. The possibility that the large mesenteric hematoma on the right is arising from disruption of the abdominal aortic aneurysm cannot be excluded.

remained intact. On the fifth postoperative day, the patient had acute myocardial infarction with cardiogenic shock and died the next day without evidence of disruption of the AAA.

DISCUSSION

In light of the operative findings, we believe this patient's acute vascular occlusion of the left external iliac and right common femoral arteries resulted from peripheral embolization of mural thrombus from an AAA. This patient had a calcified AAA that had been documented before the accident, and the acute occlusion of the right common femoral artery was temporally related to the blunt abdominal injury.

Acute thromboembolism associated with blunt injury has been reported. Hertzner¹ documented occlusion of the right popliteal artery by embolic debris from an atherosclerotic abdominal aorta after a seatbelt injury in a motor vehicle accident. Beless et al.² reported iliac artery occlusion caused by migration of plaque from an atherosclerotic abdominal aorta as a result of blunt trauma to the abdomen. Our case report appears to be the first description of occlusion of the external iliac and common femoral arteries by thromboemboli dislodged from an AAA in blunt trauma to the abdomen. We speculate that this may have been the result of direct abdominal compression caused by the patient's seatbelt.

Mural thrombi in the abdominal aorta have been implicated as a likely source of peripheral embolic events.³⁻⁶ In a study involving 39 patients with sudden occlusion of a distal artery, Williams et al.³ reported that 20 of these patients had mural thrombi of the abdominal aorta. These patients suffered a total of 36 separate embolic events, one third of which consisted of occlusion of the femoral arteries. Early reports by Nemir and Micozzi⁴ and Lord et al.⁵ described peripheral embolization in 13% and 29% of patients with abdominal aortic aneurysms. This prevalence is much higher than our institutional experience and the prevalence in most other reports. For example, more recent investigation by Baxter et al.⁶ demonstrated a low (5%) prevalence of peripheral embolization among patients with AAA.

Fortunately, injury to the abdominal aorta from blunt trauma is relatively infrequent.^{1,2,7} Among trauma deaths reported in one study, only 4.6% of nonpenetrating aortic injuries involved the abdominal aorta.² In a series of 1320 patients with blunt trauma, Killen⁸ described only one patient with abdominal aortic involvement. Lassonde and Laurendeau⁹ showed that 70% of blunt injuries to the abdominal aorta occurred as a result of motor vehicle accidents. Case reports have focused on aortic rupture, aortic dissection, and traumatic aneurysms resulting from blunt injury to the aorta.⁷

Peripheral embolization of debris from nonaneurysmal thoracic¹⁰ and abdominal¹ aortic segments after nonpenetrating trauma has been documented. Both reports described occlusion of the popliteal artery by thromboemboli originating in the aorta. These patients had cold, pale lower extremities with intact femoral pulses but absent pulses more distally. Popliteal arterial occlusion was confirmed in both instances at the time of surgical thromboemblectomy.

In contrast, our patient lacked femoral pulses, suggesting more proximal occlusion. In such situations, we believe that thorough assessment of the abdominal aorta, preferably by means of contrast-enhanced computed tomography, is mandatory to exclude the possibility of disruption of an AAA. In retrospect, our patient may have survived without abdominal exploration, but the expanding mesenteric hematoma in the vicinity of the aneurysm necessitated immediate investigation.

The contrast load required for the computed tomographic scan and the arteriogram likely contributed to the progression of this patient's renal failure. Potential alternative methods to obtain the necessary anatomic information to plan the revascularization and to rule out the possibility of aneurysm rupture include color-flow duplex ultrasonography and magnetic resonance imaging with time-of-flight angiography. However, duplex ultrasonography may provide a more limited examination than is desired, and the time and space constraints of magnetic resonance imaging limit its utility in the setting of severe trauma because of the requirement for immediate patient access.

In light of this patient's clinical presentation, radiographic and operative findings, and the presented data, it is likely that the occlusion of the external iliac and common femoral arteries resulted from distal embolization of the mural thrombus in the AAA. Physicians dealing with severely injured patients should remain aware of this possible source of acute lower extremity arterial occlusion in any injured patient with a concomitant abdominal aortic aneurysm.

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