



## Acute Occlusion of the Abdominal Aorta Associated with Lower Limb Paralysis

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Acute occlusion of the infrarenal abdominal aorta is caused by embolism at the aortic bifurcation (saddle embolus), acute thrombosis of a severely atherosclerotic distal aorta, or following aortic dissection. Although rare, it constitutes a vascular emergency associated with extremely high morbidity and mortality rates [1]. Affected patients generally manifest diffuse atheromatous disease such as coronary artery disease, cerebrovascular accidents and peripheral artery disease. The clinical presentation is variable and includes signs of lower limb ischemia, abdominal complaints due to coexistent intestinal ischemia and neurologic symptoms of the lower extremities. The latter may range from leg pain, paraesthesias to numbness and complete paralysis [2,3]. It is for this reason that the diagnosis may be delayed due to initial referral to a neurologist or an orthopedic surgeon. We report three patients with acute aortic occlusion in whom the time surgery was unduly prolonged, resulting in a fatal outcome.

### Patient Descriptions

#### Patient 1

A 66 year old diabetic man was admitted with a hypoglycemic attack. He had undergone coronary artery bypass surgery 2 weeks previously. Discharged 6 days post-operatively, he presented 2 days later (at another hospital) complaining of generalized weakness. New-onset atrial fibrillation was observed, and the patient was started on digoxin and amiodarone. Anticoagulant

therapy, however, was not instituted. Due to a leukocytosis of 23,000/ $\mu$ l, ciprofloxacin was administered empirically.

On admission, heparin infusion was begun. A few hours later the patient's temperature spiked. A deep venous thrombosis of his right forearm was diagnosed. The next day he complained of a feeling of numbness of his lower extremities. Physical examination revealed a sensory level at lumbar spinal cord segment one (L1). Femoral pulses were non-palpable. The sensory deficit rapidly progressed to full paraplegia. Duplex sonography demonstrated no signal over the femoral arteries. Echocardiography was not performed. After 12 hours the patient was taken to surgery. At operation, a white-appearing intraaortic mass (6 x 3 x 3 cm) which straddled the aortic bifurcation and extended to just below the renal arteries was found. Embolectomy of this "saddle" embolus was performed. Postoperatively, although the dorsalis pedis was palpable bilaterally, progressive ischemia of the right leg developed. The patient's condition deteriorated rapidly with the onset of multiorgan failure. He died a week after surgery.

#### Patient 2

A 66 year old man was admitted because of the sudden onset of severe bilateral leg pain and increasing weakness of both lower limbs. He had had a myocardial infarct and a right hemiparetic stroke 7 and 3 years, respectively, prior to his current admission. By the time he was

examined in the emergency room (several hours after the onset of symptoms) he was unable to walk. On examination, his legs were pale with a bluish mottled appearance and an extremely slow capillary filling. The patient was paraplegic and no femoral pulses were palpable. Computerized tomography angiography showed an intraaortic right lateral filling defect extending from the level of the celiac trunk to the bifurcation. Seven hours after presenting to the Emergency Department the patient was submitted to surgery. During the operation ventricular fibrillation developed which did not respond to resuscitative measures.

#### Patient 3

A 64 year old man was admitted because of bilateral paraesthesia of his feet and ankle pain that had progressively increased in intensity over the preceding 4 days. A week previously he had been discharged after having suffered a myocardial infarct. The patient was a known heavy smoker (40 pack-years) and had undergone an aortic aneurysmectomy and aortofemoral bypass 6 years before. He had also had a stroke resulting in a left hemiparesis 4 years prior to his current admission. On examination both feet were cold, more so on the right. Femoral pulses were absent. Surgery revealed the graft to be totally occluded. A right axillo-profunda femoris bypass was performed. Twenty-four hours after surgery, conduction disturbances and shock developed, leading to a fatal outcome.

## Comment

Concurring with the literature, the dominant feature of our three cases of acute aortic occlusion involved increasing neurologic deficit of the lower extremities. This usually began with paraesthesias and/or a feeling of numbness which rapidly progressed to paralysis. The cause of this syndrome is thought to be either ischemic spinal cord damage or ischemia of the cauda equina and sacral nerve roots and ganglia. The combination of absent femoral pulses (found in most patients including ours) and decreased sensory or motor function of the lower limbs should immediately alert the physician to the diagnosis. Unnecessary and time-consuming neurologic and/or orthopedic consultations can thus be avoided.

The role of preoperative aortography is controversial [3]. Since time is of the essence, current policy does not favor its performance. If doubt exists regarding the diagnosis, it can be rapidly confirmed by deep Doppler examination or CT angiography. At operation, the minimal intervention aimed at reestablishing perfu-

sion to the lower extremities (inclusive of endovascular techniques) should be undertaken. This usually entails a transfemoral embolectomy, aortic thrombectomy or an axillofemoral bypass.

As well exemplified by our cases, patients who develop acute aortic occlusion generally show signs of diffuse atheromatous disease. Occlusion thus occurs in the setting of a severe underlying atherosclerotic aorta accompanied by a low flow state due to cardiac dysfunction, conduction disturbances and/or a hypercoagulable state. Whether a mural thrombus was the source of the saddle embolus in patient 1 is an open question since echocardiography was not performed prior to surgery. In patient 2, the occlusion was most likely due to acute thrombosis superimposed on the severely atherosclerotic distal aorta.

Because patient prognosis is time-dependent, early recognition, prompt diagnosis, institution of supportive care and immediate surgical intervention are all essential elements of management. Thrombolytic therapy may be a good alter-

native. The time to surgery of our patients ranged from at least 7 hours to more than 4 days. Even with optimal management, mortality rates remain high.

In summary, apart from the signs of acute limb ischemia, acute aortic occlusion may be associated with lower limb paralysis. Not infrequently, this is the dominant clinical feature.

## References

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*Human subtlety will never devise an invention more beautiful, more simple or more direct than does Nature, because in her inventions, nothing is lacking and nothing is superfluous*

Leonardo da Vinci (1452-1519), Italian painter, engineer, musician and scientist

## Capsule

### Judging individual contributions

An established and unsurprising characteristic of people working within teams is that each individual believes that he or she makes a disproportionately large contribution to the group output, so that the summed estimates are greater than the whole. These self-appraisals can be tempered if individuals are encouraged to regard what other team members do, and this shift in perceptions is thought to be conducive to group harmony and satisfaction. Caruso et al. looked more closely at whether structural heterogeneity within teams might influence perceptions and feelings in other-regarding situations. In studies gauging the self-contribution estimates of the co-authors of 150 published papers (and their enjoyment of those collaborations) and experimentally manipulating the perceived and objective

contributions to group projects, they found that workers who believed that they had done more (and those who actually had done more) were less satisfied, relative to those who had done less, when asked to consider the contributions of their teammates, in part because they became more aware of inequalities when taking a broader perspective. An additional finding is that this deleterious and unintended consequence of encouraging other-regarding behavior was largely mitigated in a competitive setting, where the allocation of rewards acknowledged individual rather than group performance, as exemplified in authorship order.

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