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Case report

Blunt innominate artery trauma requiring repair and carotid ligation

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ABSTRACT

Traumatic dissection of the innominate artery is a rare clinical entity. Management of a patient with motorsensory compromise and dissection extending to the subclavian and right common carotid arteries is quite rare and can be quite involved. Here we present such a case and discuss the unique peri-operative decision-making in the context of what is reported in the literature. Restoration of motorsensory function is critical and in this case, requiring a multi-disciplinary team.

Case report

A 50 year-old man working at heights in heavy industry fell 15 ft and was pinned between a crane and rail car. Initial transfer to a peripheral center diagnosed a small left pneumothorax and multiple rib fractures. After approximately one hour, the right hand became painful, the limb dusky, and pulses were absent. Upon arrival at our trauma center, the patient was insensate to the level of the antecubital fossa with minimal motor function and no demonstrable pulses in the right upper extremity, by palpation or handheld Doppler, from the brachial artery to the palmar arch. Aside from an initial transient loss of consciousness reported by EMS, we received the patient with no central neurological deficit.

CT angiogram demonstrated occlusion of the distal innominate artery, right common carotid and right subclavian arteries (Fig. 1). Flow reconstituted within the distal brachial artery with weak ulnar artery filling. Importantly, the right carotid bifurcation was patent with retrograde filling of the internal carotid artery by the external carotid artery.

The patient was reassessed in the trauma bay. Plastic surgery ruled out secondary brachial plexus injury and cardiac surgery assessed for possible joint operative intervention. Within one hour, the patient had complete restoration of motor and neurologic function. Consequently, a discussion was undertaken regarding treatment of a traumatic dissection for a patient that was now minimally symptomatic and continuing to improve. Aware the clinical picture might represent a dynamic dissection flap, we decided to place the patient on intravenous heparin in our intensive care unit, with the plan that any deterioration would necessitate emergent operation. Our surgical options considered at that time were (extra-anatomic) extrathoracic bypass or median sternotomy with inline revascularization, the latter being preferred given our patient's age and relative fitness for surgery.

By early morning the patient was experiencing significant right arm pain, new onset paraesthesias, and no longer had demonstrable pulses. He remained centrally neurologically intact. Urgent repeat CTA included the complete Circle of Willis and demonstrated the additional findings of absent flow within the entire brachial and internal carotid arteries (Fig. 2). It was suspected the

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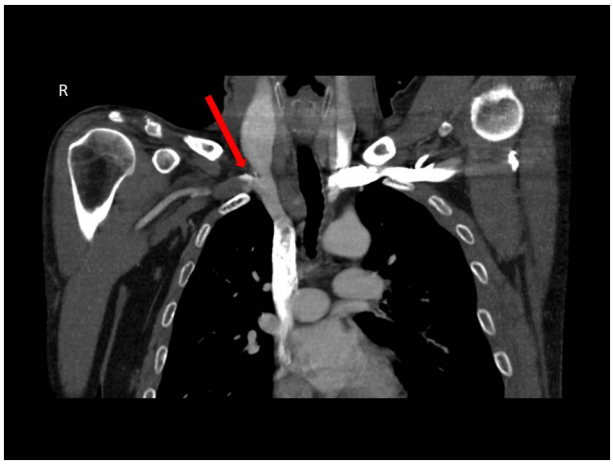

Fig. 1. CTA showing distal innominate artery occlusion.

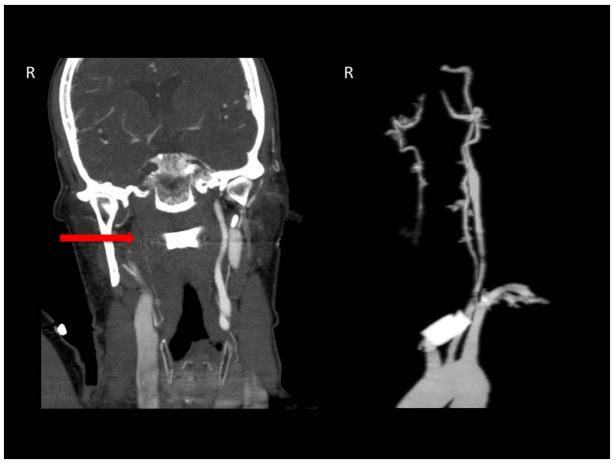

Fig. 2. CTA showing right common and internal carotid artery occlusion (arrow, left panel; 3D right panel).

patient had thromboembolized overnight, and importantly, the clinical exam clearly demonstrated development of a forearm compartment syndrome.

Urgently operative management involved a multidisciplinary team consisting of plastic, cardiac, and vascular surgery. Plastic surgery performed release of the volar and dorsal forearm, carpal tunnel, thenar and first dorsal interosseous compartments. One vascular team worked with cardiac surgery performing the sternotomy and axillary access, while another performed brachial, radial, and ulnar thrombectomies in an attempt to restore flow (Fig. 3). At the level of the innominate artery, there was clearly an intramural thrombus and visible dissection flap, which was tacked down proximally. For security, however, an innominate-axillary artery bypass was performed with 8 mm externally supported polytetrafluoroethylene graft. Finally, to prevent possible embolic stroke, the decision was made to ligate the right common carotid artery since repair of the dissection flap and restoration of vigorous inflow might cause a stroke by propelling thrombus intracranially through a patent Circle of Willis.

Post-operatively the patient did well, awaking neurologically intact with complete right arm motorsensory function. He did suffer a small watershed lacunar infarct in the intensive care unit on post-operative day (POD) 3, with facial droop and upper extremity paresis that had resolved by discharge home on POD 11. He has been seen in clinic with excellent results (Fig. 4).

Discussion

Innominate artery lesions are rare. In the trauma literature, civilian series have determined innominate artery injuries account for 0–3% of recognized arterial trauma [1]. This is, however, the second most commonly affected great vessel after the isthmus of the aorta and injury can present with a range of symptoms. Innominate injuries have a high morbidity and mortality, in part due to their inaccessibility, associated injuries, potential for cerebrovascular hypoperfusion and stroke, and relative inexperience of most surgeons dealing with these injuries. In-hospital mortality rate varies between 5 and 43% [2].

In 1985, Brewster et al. evaluated a 20 year operative series of 71 cases, determining direct repair via median sternotomy with