Challenge in Acute Care Surgery Stab wound to the neck with neurological deficits

Matthew L. Forestiere, MD (matthew.forestiere@med.usc.edu)
Kazuhide Matsushima, MD (kazuhide.matsushima@med.usc.edu)
Demetrios Demetriades, MD, PhD (demetrios.demetriades@med.usc.edu)

Division of Acute Care Surgery, University of Southern California, Los Angeles, CA

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Corresponding Author
Kazuhide Matsushima, MD
Assistant Professor of Surgery
University of Southern California
LAC+USC Medical Center
2051 Marengo Street, Inpatient Tower (C),
C5L100, Los Angeles, CA 90033
E-mail: kazuhide.matsushima@med.usc.edu
An 18-year-old man presented to the emergency department as a trauma team activation with a single stab wound to zone II of the right neck about 15 minutes prior to arrival. According to emergency medical services (EMS) reports, there was active bleeding from the wound on their arrival and a large amount of blood loss at the scene. The blood loss was significantly diminished with manual pressure while in transport. The patient arrived to the emergency department with a prehospital provider holding pressure on his neck. His airway was patent and protected. The patient was phonating normally with no stridor. Breath sounds were present bilaterally. His heart was 60 beats per minute, and blood pressure was 120/78 mmHg. His Glasgow Coma Scale was 14 (E3 V5 M6). He was noted to have a 2cm stab wound to the right neck with a moderate sized hematoma that was not actively bleeding. On full exposure, there were no other stab wounds or injuries found. On secondary survey, he was noted to have significant weakness and decreased sensation of his left upper and lower extremities. He also had tongue deviation to the right. There were no other neurological deficits. The preliminary diagnosis was right carotid artery injury with ipsilateral acute brain ischemia.

WHAT WOULD YOU DO NEXT

1. Obtain an emergent computed topography (CT) of the head and CT angiography of the neck.
2. Take the patient emergently to the operating room for right neck exploration.
WHAT WE DID AND WHY

2. Take the patient emergently to the operating room for right neck exploration.

Given the patient had hard signs of vascular injury in the neck with major blood loss and significant neurological deficits, we took the patient emergently to the operating room. Upon arrival to the operating room, the patient coughed and his wound began to have pulsatile bleeding. We attempted digital compression but there was still significant bleeding. A Foley catheter balloon was placed into the wound and inflated to tamponade the bleeding (Figure 1). The patient was then intubated without complication.

The neck, chest, and bilateral groins down to knees were prepped. A right sternocleidomastoid incision was made and dissection carried down to the carotid sheath. The balloon was left in place while the sheath opened proximally for common carotid control. There was a single laceration to the jugular vein that was repaired. To obtain distal control, the balloon was let down and removed revealing brisk arterial bleeding from the carotid artery bifurcation. The hemorrhage was controlled with a finger while the internal and external carotid were dissected (Figure 2). There was noted to be brisk back bleeding of both vessels. The lacerated portion of the internal carotid was removed sharply and a reverse saphenous vein interposition graft was performed (Figure 3). There were no other injuries found and the neck was closed without a drain.

The patient was taken to the surgical intensive care unit and extubated. His neurological examination still showed tongue deviation to the right, an inability to smile on the right, but improving strength in his left extremities with normal sensation. A post-operative CT
angiography of the brain did not show any ischemic infarct or intracranial hemorrhage. The following morning, his strength and sensation were normal in all extremities. His tongue deviation and facial muscle paralysis resolved within 48 hours postoperatively. The patient recovered well and was discharged on postoperative day 5.

In patients with hard signs of vascular injury in the neck, classic teaching has been to proceed emergently to the operating room. Our patient had multiple hard signs of vascular injury, but the challenging question centers around his initial neurological examination. The management of carotid injuries presenting with neurological signs is controversial. There is concern that re-establishing blood flow in patients with a neurological deficit might convert an anemic infarction to a much worse hemorrhagic infarction. Some authors suggest that in the presence of neurological deficits, a CT of the brain should be performed and the decision for revascularization made on the presence or absence of an anemic infarct. Other authors suggest that in patients presenting within a few hours of injury to proceed with early re-establishment of blood flow, irrespective of neurological signs. There are reports of patients with neurological deficits with complete recovery after re-vascularization. In our case, we opted to omit a CT of the brain in order to avoid any delay in re-vascularization and deterioration of an evolving anemic infarct.
Figure legends

Figure 1
Temporary hemorrhage control with balloon tamponade of stab wound to the right neck

Figure 2
Vascular injury seen at the bifurcation of the internal and external arteries (arrow)

Figure 3
Final repair with reversed saphenous vein interposition graft on the internal carotid artery