

Maxillary Artery Embolization in Patient with Penetrating Trauma to Face: Case Report

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Abstract: Some cases of penetrating trauma to the face can result in asymptomatic injuries, especially vascular trauma. This paper reports the case of a young patient with penetrating facial trauma and a vascular injury diagnosed using an imaging exam. Endovascular treatment was performed involving embolization of the left maxillary artery.

Keywords: Maxillary Artery, External Causes, Embolization, Injuries and Lesions, Facial Trauma

Introduction

In penetrating trauma to the face, the majority of cases have severe symptoms (bleeding, organ trauma, airway trauma and compressive hematomas), requiring an immediate surgical intervention. However, some cases may have asymptomatic injuries, especially vascular trauma. In such cases, imaging exams (arteriography and angiotomography) can assist in the identification of injuries not observed during the clinical assessment.

Analyzing 119 patients with penetrating trauma to the cervical region and 20 patients with facial trauma, North et al. (1986) found that 50% of those with facial trauma had altered arteriographic findings, whereas only 11% of those with cervical trauma had such findings, demonstrating a greater incidence of vascular injuries in cases of facial trauma. Evaluating 400 arteriograms of patients with facial or cervical trauma, Sclafani & Sclafani (1996) found that that majority (68.8%) of the 131 vascular injuries occurred when the perforation was in the face or zone III of the neck; the most affected vessels were the internal carotid artery (30.53%), vertebral artery (26.71%), external carotid artery (11.45%) and maxillary artery (8.39%).

The therapeutic approach to these injuries consists of two options: endovascular treatment or open surgery. Most authors opt for the endovascular approach due to the lower morbidity and mortality rates, the difficulty in gaining access to the structures in open surgery, the smaller number of complications and the more favorable postoperative period. Thus, open surgery is generally restricted to complicated cases with hemodynamic instability refractory to treatment, uncontrolled active bleeding and damage to adjacent structures that require surgical repair (Bell et al., 2010; Cohen et al., 2008; Kansagra et al., 2014; Richardson et al., 1988).

With endovascular treatment, embolization can be performed with liquid agents (Onyx and N-butyl cyanoacrylate) or a metallic coil. In a study conducted at a trauma center of a hospital in the United States, 10 patients with firearm injuries to the face or neck were submitted to endovascular treatment, three of which had maxillary artery injuries and were successfully treated using embolization with N-butyl cyanoacrylate (Yevich et al., 2014).

In this paper, we report a case of penetrating trauma to the face treated with embolization of the maxillary artery.

Case Report

A 21-year-old male was the victim of perforations in the left zygomatic region and left arm due to a firearm incident occurring one hour earlier and was brought to the emergency ward of the tertiary hospital in the state of São Paulo, Brazil. Upon admission, the patient was treated using the Advanced Trauma Life Support protocol and was hemodynamically stable (BP: 150 x 100 mmHg; HR: 78 bpm; O₂Sat: 99% in AA), with a projectile entry wound in the left zygomatic region of approximately 1.5 cm on its largest axis, blood oozing, no observation of an exit wound, non-pulsing hematoma in the region of the perforation and difficulty opening the oral cavity; projectile entry wound on lateral face of left upper limb of approximately 1.5 cm at its largest diameter, without active bleeding, radial and brachial pulses present and good perfusion in ipsilateral hand.

In the emergency room, the patient had stable heart monitoring, complaining of pain in the left upper limb and face, with difficulty opening the oral cavity. Analgesia, 750 mL of crystalloid solution, anti-tetanic prophylaxis and antibiotic therapy (clindamycin + gentamycin) were administered.



Computed tomography without contrast was performed of the skull, face, facial sinuses, mandible and mastoids, revealing a firearm injury with an entry wound in the left side of the face (Figure 1). Multiple projectile fragments were observed in the malar region of the left side of the face, passing through the masseter, lodged in the parotid gland, causing comminuted fracture of the ramus of the mandible on this side and the formation of a local acute hematoma (26 x 21 x 23 mm in the largest axes) with an approximate volume of 6.5 cm³. Other multiple projectile fragments in the deep posterior cervical planes on the left side and lodged adjacent to the posterior arches of C1 and C2, adjacent to the spinous process of C2, fracturing the left transverse process of C2 and making direct contact with the vertebral artery on this side, suggesting thermal injury of the artery and the need for diagnostic investigation with computed angiotomography.



Figure 1. Computed tomogram showing projectile fragments.

Arterial angiotomography of the neck (Figure 2) revealed a firearm injury with an entry wound on the left side of the face, with multiple projectile fragments in the malar region, passing through the masseter, lodged in the parotid gland and causing comminuted fracture of the ramus of the mandible on this side. At the same level, the left external carotid artery was amputated (height of parotid), causing active extravasation of contrast medium in the arterial phase, with the formation of an acute intra-parotid hematoma measuring approximately 6.5 cm³. No detectable opacification of the proximal segments of the superficial temporal, transverse facial or zygomatic-orbital branches of the injured left carotid artery; possible thrombosis due to thermal injury. Distal segment of these branches opacified by

contrast. Metallic firearm projectile at height of left transverse foramen of C2, with probable extrinsic compression of vertebral artery and luminal reduction of the artery at this level, difficult to quantify due to metallic artifacts, suggesting partial thrombosis related to thermal injury.

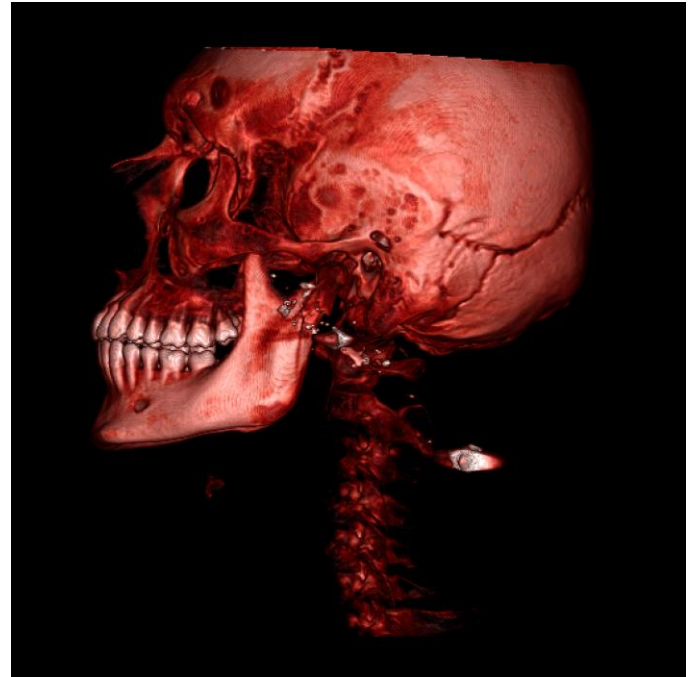


Figure 2. 3D reconstruction of angiotomography showing projectile fragments.

After surgery for the removal of the projectile from the left upper limb, arteriography was performed on the second day of hospitalization for embolization of the left maxillary artery through puncture of the right femoral artery with selective catheterization of the left maxillary artery. During the procedure, occlusion of the left vertebral artery was found in the middle third near the projectile topography, along with pervious left external carotid artery, with image suggestive of extravasation of contrast in one of the branches (maxillary artery) (Figure 3). Release of the *Axiom Prime* coils (EV3) 3x6 mm, 3x8 mm and 4x8 mm was performed (Figure 4). Procedure performed without complications.

After seven days of hospitalization, the patient was hemodynamically stable, with no neurological deficits, no active bleeding or hematomas, with reduced opening of the oral cavity. The patient was discharged and is currently in outpatient follow-up.

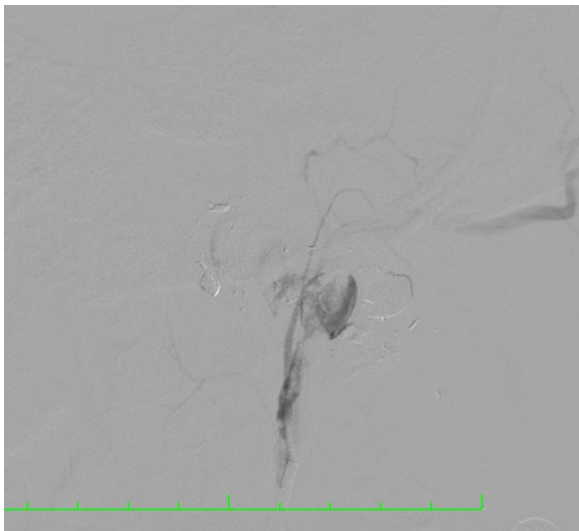


Figure 3. Arteriogram showing extravasation of contrast in left maxillary artery.

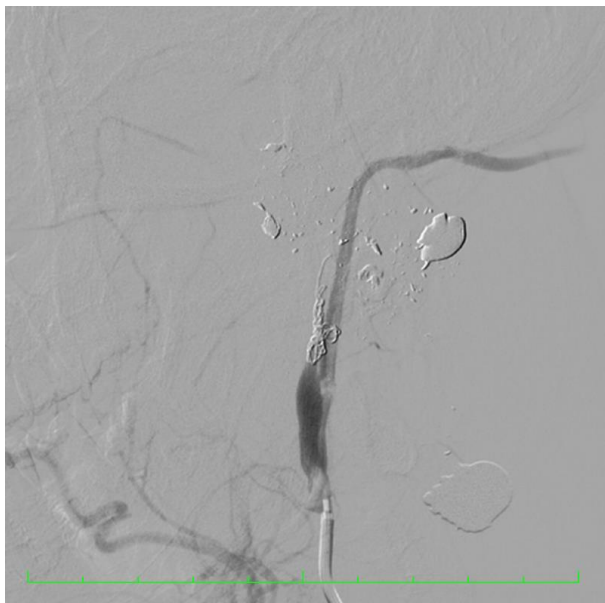


Figure 4. Embolization of artery with coil, without extravasation of contrast.

Discussion

During the clinical examination of penetrating facial trauma, some patients do not present signs suggestive of vascular trauma in the initial days but may develop sequelae or complications over time. Therefore, it is of considerable importance to perform arteriography in such cases (Berne et al., 2001), as the one reported herein.

In most cases, injuries can occur to blood vessels, such as the internal carotid artery, external carotid artery and its branches, jugular vein and vertebral artery. Some of these cases require an immediate surgical approach due mainly to bleeding with hemodynamic instability or injuries to organs adjacent to the vessels (Bell et al., 2010; Cohen et al.,

2008; Kansagra et al., 2014). However, whenever possible, the endovascular approach is the treatment of choice, as it is less invasive, is performed under local anesthesia, enables access to vessels that are technically difficult in open surgery, has a lower mortality rate and enables a neurological assessment during the procedure (Christensen et al., 2005; Duane et al., 2002; Richardson et al., 1988).

In the case reported herein, the patient had vascular trauma that was only evident through the imaging exam. After embolization of the maxillary artery, which is the final branch of the external carotid artery, the patient evolved without incident during hospitalization, receiving discharge for outpatient follow-up (Duane et al., 2002).

Conclusion

With the growing number of cases of penetrating trauma due to firearm projectiles, there is an increasing need for the healthcare team on duty to perform immediate endovascular treatment. This paper described a case of penetrating facial trauma with a vascular injury diagnosed through an imaging exam, followed by successful endovascular treatment involving embolization of the left maxillary artery.

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