

Medial clavicle fracture associated with arterial bleeding in the pectoralis major muscle

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Section: Musculoskeletal system

Area of Interest: Arteries / Aorta Thorax Trauma

Imaging Technique: CT

Imaging Technique: CT-Angiography

Case Type: Clinical Cases

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Patient: 83 years, male

Clinical History:

An 83-year-old man who takes Rivaroxaban presented at the emergency department after a bicycle accident. There was a hematoma around the medial clavicle and antalgic dysfunction of the left shoulder. Rapid expansion of the hematoma prompted an urgent Computed Tomography Angiography (CTA) of the thorax.

Imaging Findings:

Conventional radiography showed a comminuted, extra-articular fracture at the sternal end of the left clavicle. Non-contrast CT revealed an associated hematoma in the pectoralis major muscle and sternocleidomastoid muscle adjacent to the fracture site (Figures 1a, 1b). Subsequent CTA demonstrated a small focus of iodine contrast extravasation in the pectoralis major muscle (Figures 2a, 2b), in keeping with an arterial bleeding of one of the pectoral branches of the thoracoacromial artery. Significant volume increase of the hematoma was also causing progressive compression of the jugular vein.

Discussion:

The majority of chest traumas are blunt injuries, which are related to chest wall injuries (e.g. fracture, hematoma) and pulmonary injury (e.g. pneumothorax, lung contusion), increasing patient morbidity and mortality[1]. The absence of bony thoracic injuries does not exclude other serious chest injuries such as a thoracic wall haemorrhage [2].

The clavicle connects the upper extremity to the trunk and protects the adjacent axillary and subclavicular neurovascular structures and lung apices. Vascular injuries are mostly seen with penetrating traumas, but rarely also occur in blunt traumas.

Clavicle fractures can be classified by the Allman classification. Fractures of the medial third are least frequent (2.6%), but are associated with chest trauma in up to 49% of cases and have the highest risk of associated neurovascular injuries. They are mostly seen in high-impact trauma[3,4]. The frequency of neurovascular injuries resulting from clavicle fractures is unknown, but the review of *Mouzopoulos et al.* discovered that 50% of subclavian artery injuries are found when the proximal clavicle is dislocated superiorly by traction of the sternocleidomastoid [5].

The typical presentation of a thoracic wall haemorrhage is a rapid-expanding mass as shown in multiple cases by Florescu *et al.* (2022) [6], typically within minutes to hours; however, delayed bleeding can occur after more than 24 hours [2,7]. In our patient, it was essential to be alert for this complication: arterial bleeding under anticoagulation has a high mortality rate. Thus, urgent imaging is needed. Chest CT angiography is the imaging tool of choice for stable patients, whereas catheter angiography is mandatory in unstable patients[6]. On CT, the location of the active bleeding point is typically seen as a small focus of iodine contrast extravasation in the arterial phase with dissemination in a delayed phase (e.g. after 65 seconds).

Thoracic wall arterial bleeding can either be treated by open exploration or by endovascular embolization[8]. Endovascular embolization has been proven successful in numerous cases for treatment of active bleeding[8–10]. Our patient was also successfully treated by selective embolization of a pectoral branch of the thoracoacromial artery.

In conclusion, rapid-progressive swelling of the thoracic wall should prompt additional imaging, even in absence of thoracic fractures. CTA is preferred imaging modality in stable patients. Medial clavicular fractures are associated with high-impact trauma and concomitant injuries. To our best knowledge, no previous case depicting bleeding of a thoracoacromial vessel following blunt trauma has been published.

Written informed patient consent for publication has been obtained.

Differential Diagnosis List: Arterial haemorrhage, Venous haemorrhage, Post-traumatic hematoma, Pectoralis major ruptur, Medial clavicular fracture complicated by arterial bleeding in the pectoralis major muscle, Subcutaneous emphysema

Final Diagnosis: Medial clavicular fracture complicated by arterial bleeding in the pectoralis major muscle

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Figure 1

a



Description: 3D volume rendering derived from CT scan of the thorax. Description: Comminuted extra-articular fracture at the sternal end of the left clavicle with anterior and slight superior displacement.

Origin: © Department of Radiology, AZ Sint-Maarten Mechelen, East-Flanders, Belgium, 2023

b



Description: Transverse CT scan of the thorax in soft tissue window, at baseline. Description: Medial clavicular fracture with associated hematoma in the sternocleidomastoid muscle (asterisk) and pectoralis major (arrow) adjacent to the fracture site. **Origin:** © Department of Radiology, AZ Sint-Maarten Mechelen, East-Flanders, Belgium, 2023

Figure 2

a



Description: Transverse CT-angiography of the thorax in soft tissue window, arterial phase, 3 hours after baseline. Description: A small foci of arterial bleeding is seen in the pectoralis major muscle (arrow). **Origin:** © Department of Radiology, AZ Sint-Maarten Mechelen, East-Flanders, Belgium, 2023

b



Description: Transverse CT-angiography of the thorax in soft tissue, venous phase (± 65 seconds), 3 hours after baseline. Description: Notice dissemination of the bleeding compared to the arterial phase (arrow). Additionally, it is crucial to take note of the considerable increase in volume of the pectoralis major hematoma (asterisk) in comparison to the baseline CT scan. **Origin:** © Department of Radiology, AZ Sint-Maarten Mechelen, East-Flanders, Belgium, 2023