



## Pseudoaneurysm of the Thyrocervical Trunk of the Subclavian Artery after Osteosynthesis of a Mid-Shaft Clavicular Fracture

**Luciano A Rossi\*, Nicolas Atala, Hugo Barros, Ignacio Tanoira and Maximiliano Ranalletta**

Department of Orthopedics and Traumatology, Prof. Dr. Carlos E. Ottolenghi, Italian Hospital of Buenos Aires, Buenos Aires, Argentina

### Abstract

Plate fixation of displaced midshaft clavicular fractures leads to lower nonunion rates, better functional outcomes, improved cosmesis, and greater patient satisfaction compared with non operative treatment. Although high success rates of plate fixation of displaced clavicle fractures have been shown, reported complications of plate fixation include implant failure, infections, implant prominence, poor cosmesis, non unions and refracture as a result of removal of the plate. Vascular complications associated with clavicle fixation are rare but hazardous. We report a case of a 25 years old life guard who sustained a pseudoaneurysm of the thyrocervical trunk of the left subclavian artery after plate fixation of a midshaft fracture of the clavicle a potentially dangerous complication that was not previously reported in the literature.

### Introduction

Clavicular fractures are common injuries and account for approximately 2.6% to 5% of all fractures in adults. Middle-third fractures are the most common type, of which 48% are displaced and 19% are comminuted [1,2]. Plate fixation of displaced midshaft clavicular fractures leads to lower nonunion rates, better functional outcomes, improved cosmesis, and greater patient satisfaction compared with non operative treatment [3-6]. Although high success rates of plate fixation of displaced clavicle fractures have been shown, reported complications of plate fixation include implant failure, infections, implant prominence, poor cosmesis, non unions and refracture as a result of removal of the plate [7,8]. Neurovascular complications have also been reported [9-11]. Although vascular complications associated with clavicle fixation are rare, they may be limb and even life threatening [12]. Pseudoaneurysm of the thyrocervical trunk has never been reported. We wish to report a case of a 25 years old life guard who sustained a pseudoaneurysm of the thyrocervical trunk of the left subclavian artery after plate fixation of a midshaft fracture of the clavicle.

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#### \*Correspondence:

*Luciano Andrés Rossi, Department of Orthopedics and Traumatology, Prof. Dr. Carlos E. Ottolenghi, Italian Hospital of Buenos Aires, Buenos Aires, Peron 4190 (C1199ABB) Buenos Aires, Argentina, E-mail: luciano.rossi@hospitalitaliano.org.ar*

**Received Date:** 21 Feb 2019

**Accepted Date:** 15 Mar 2019

**Published Date:** 20 Mar 2019

#### Citation:

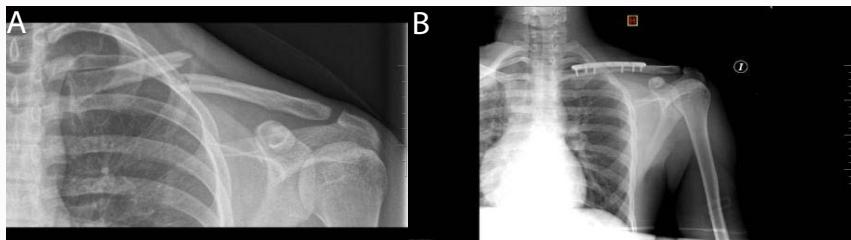
*Rossi LA, Atala N, Barros H, Tanoira I, Ranalletta M. Pseudoaneurysm of the Thyrocervical Trunk of the Subclavian Artery after Osteosynthesis of a Mid-Shaft Clavicular Fracture. Clin Surg. 2019; 4: 2373.*

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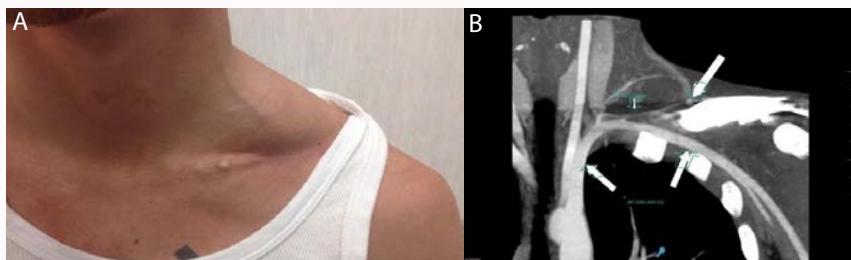
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### Case Presentation

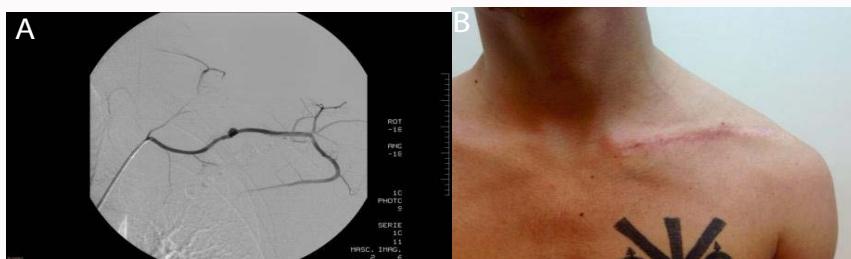
A 25-year-old life guard sustained a left fracture during a football match. The radiographs exposed a displaced midshaft clavicular fracture and surgical treatment was performed 4 days after the injury (Figure 1a). The patient was operated on in a beach-chair position under general anesthesia. Open reduction and internal plate fixation were performed. After reducing the fracture fragments, fixation was achieved with an eight-hole locked precontoured plate (Acumed (Oregon, USA)). The plate was applied to the bone with two cortical screws, one at each side of the fracture line. Subsequently, four locking screws completed the synthesis (Figure 1b). Postoperative rehabilitation protocol consisted of arm sling during the first two postoperative weeks, with sling removal four times a day to do pendulum exercises, allowing active elbow flexion-extension as tolerated. It was not permitted during the first three weeks to elevate the surgical arm above 90 degrees in any plane, and during the first six weeks it was not permitted to lift heavy weight. After week eight, full shoulder active ROM in all planes was allowed, with increase in strength intensity and functional training for gradual return to activities. Three months after surgery he presented with a slowly growing pulsatile mass in the supraclavicular fossa and pain in the left upper extremity (Figure 2a). Clinical examination showed a slightly swollen arm. No clinical signs of infection were evidenced. Pulses were present and symmetric. Passive and active shoulder's ranges of motion were normal. Suspecting a late onset vascular complication related to the surgery, the subclavian and axillary vessels were studied. A angio-computed tomography scan revealed a pseudoaneurysm



**Figure 1:** 22-year-old male patient with football trauma. **(A)** He presents a mid-shaft clavicular fracture. **(B)** Immediate postoperative radiographs. Reduction and osteosynthesis with an 8-hole precontoured locking plate using 6 screws, 3 lateral and 3 medial to focus.



**Figure 2:** **(A)** Clinical image of the hematoma in the supraclavicular fossa 3 month after surgery. **(B)** angio-computed tomography scan revealed a pseudoaneurysm of the thyrocervical trunk of the subclavian artery. *Narrow white arrows:* (subclavian artery). *Thick white arrow:* pseudoaneurysm of the thyrocervical trunk of the subclavian artery.



**Figure 3:** **(A)** Digital subtraction angiography of the left subclavian artery confirming the presence of a pseudoaneurysm of the thyrocervical trunk of the subclavian artery right above the fracture of the clavicle. **(B)** Clinical image 1 week after the embolization with the absence of hematoma.

of the thyrocervical trunk of the subclavian artery (Figure 2b). The patient was treated with an endovascular embolization with 5 nester coils (Figure 3a). The patient recovers completely and the mass was not present in the control one week after surgery (Figure 3b).

## Discussion

There have been multiple reported cases of vascular injuries from midshaft clavicle fractures [13-18]. These include arterial and venous lacerations and pseudoaneurysms [13-18]. Even death from vascular injury secondary to clavicle fracture has been reported [17,18]. However iatrogenic vascular injury from internal fixation of midshaft clavicle fractures is rare, with only a few reported cases from plate osteosynthesis [21-23]. Gregory reported a case of an axillary artery pseudoaneurysm 6 years after plate osteosynthesis for a clavicle nonunion [22]. There was occlusion of the brachial artery above the elbow. The pseudoaneurysm was bypassed using stent placed in the axillary artery via a femoral approach. The patient recovered completely. Johnson reported a case of left arm ischemia presenting 22 months after internal fixation of an acute fracture [10]. A pseudoaneurysm with occlusion of the brachial artery was found. Ligation of the subclavian artery followed by carotid-axillary bypass grafting resulted in a symptom-free left arm. Shackford

reported a case where a clavicular plate fixation screw had pierced the subclavian artery causing pseudoaneurysm development and brachial artery occlusion [12]. The patient underwent claviclectomy and interposition vein graft with autologous saphenous vein. Due to the intrinsic neurovascular relationship of structures surrounding the subclavian artery, surgical intervention carries a high risk of neurological and vascular injuries. Therefore, in our study, pseudoaneurysm was treated by endovascular surgical techniques, which have been recommended by several authors [23-25]. Specially, nester embolization coils that are made of platinum with spaced synthetic fibers and are supplied preloaded in a loading cartridge. Endovascular coils are a cost-effective treatment that reduces patient discomfort, morbidity, blood loss and operative time. Previous studies also demonstrated favorable results with the use of endovascular coils for the treatment of vascular injuries in other locations [23-25].

## Conclusion

Orthopedic surgeons should be aware of pseudoaneurysms of the subclavian vessels with plate osteosynthesis of clavicle fracture. Under the clinical suspicious of a possible vascular complication it is important to act with celerity. Endovascular surgical techniques are recommended for treatment of this complication.

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