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CLINICAL REPORT

Bilateral clavicle fracture external fixation

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Summary Fractures of the middle third of the clavicle are frequent and their conservative treatment ends in bone union in nearly 95% of cases. Surgical treatment is unanimously indicated with open fractures or in cases of cutaneous damage, neurovascular complications, and impaction of the shoulder stump syndromes. We report herein a case of bilateral fractures of the clavicle that required double stabilization with an external fixator following major cutaneous damage appearing after the initial conservative management. The intraoperative discovery of *Propionibacterium acnes* infection and bone union obtained within the classical time frame, with a satisfactory functional result, all retrospectively proved the soundness of this indication.
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Introduction

Fractures of the middle third of the clavicle are among the most frequent fractures in adults, with an incidence of 5—10% in young patients [1—3]. However, bilateral involvement is reported more rarely [4—7]. Most of these fractures heal after orthopaedic treatment with satisfactory functional results. Atrophic nonunion has a less than 5% incidence: the predictive factors of nonunion are female gender, advanced age, severe comminution, and major displacement of the fracture locus [8].

In addition, the indications for osteosynthesis are open fractures or the possibility of cutaneous opening caused by a bone splinter, impaction syndromes of the should stump, bilateral fractures, existence of an associated neurovascular lesion, and intolerance of the orthopaedic treatment [9,10].

Through one case of bilateral fracture of the clavicles, we confirm the requirement for osteosynthesis and report our experience in indirect stabilization using an external fixator, required in suspected cases of underlying infection.

Observation

A 58-year-old female patient, victim of a traffic accident with lateral collision and multiple rollovers, was brought to the emergency department of our institution for thoracic and pelvic injury. Other than a treated depressive syndrome, she had no medical or surgical history.

Questioning the patient and clinical examination revealed a brief loss of consciousness. A linear, superficial

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Figure 1 Type 2B2 bilateral fracture of the clavicles according to the Robinson classification [3].

cutaneous lesion was found on the anterior side of the thorax, suggesting a high-energy injury from the seatbelt.

The central and peripheral nerve examination was normal, palpation of the spinal axis and the abdomen was without pain. On the other hand, gentle mobilization of the two shoulders found pain located in the root of the limb. Similarly, partial functional painful impotence of the hips was identified. The respiratory rate was 20 breaths/min with O_2 saturation at 99% without oxygen therapy.

A conventional radiological examination confirmed a bilateral comminution fracture, with little displacement, of both clavicles, with a third fragment: a type 2B2 fracture according to the Robinson classification (Fig. 1) [3]. Cutaneous inspection at the locus of the fractures showed only diffuse hematoma.

Whole-body CT with contrast injection revealed a type A2 stable pelvic fracture according to the Tile classification and bilateral pulmonary contusion with no pleural effusion [11].

Despite the surgical team's recommendations, the patient refused any surgical intervention on the clavicle fractures and simple elbow-to-body immobilization was put in place. Standing was forbidden because of the pelvic fracture. Symptomatic antalgic treatment, preventive heparin therapy, and strict recommendations concerning surveillance of the skin were delivered.

During the follow-up consultation two weeks after injury, the skin at the two fracture loci appeared inflammatory, particularly on the right where it was clinically endangered by a bone splint with an aspect of subcutaneous bullous detachment measuring 1 cm^2. The X-ray work-up showed secondary displacement of the medial diaphyseal fragment of the right fracture.

Surgical treatment was accepted by the patient given the poor clinical progression.

A bilateral approach to the fracture loci with partial excision of the fractured bone edges and multiple bacterium samples were taken during the surgical procedure. An external fixator (Hoffman IITM, Stryker) was used for osteosynthesis: two medial bicortical pins were viewed and positioned in a horizontal anteroposterior direction or slightly ascending when the two lateral pins were implanted more vertically in the craniocaudal direction. A wide spatula was systematically inserted in contact with the clavicle to protect the cervical vessels and the pleural dome when the medial pins were put in place. Once the drainage was in place, the different planes were sutured without tension.

Two bacteriological samples out of three taken on the right clavicle were positive for *Propionibacterium acnes* after 18 days of culture. An oral double antibiotic therapy

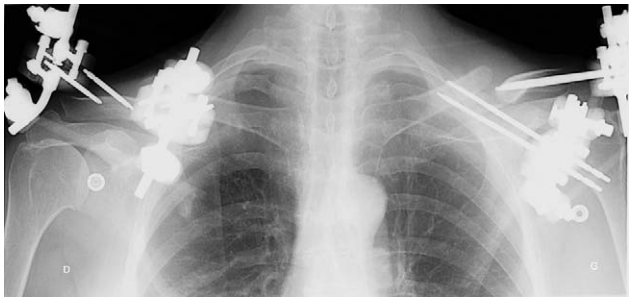

Figure 2 Radiographic follow-up at the 3rd postoperative week.

Figure 3 Clinical examination at the 3rd postoperative week with good local tolerance of the external fixator.

with Fucidin and penicillin A was initiated for 6 weeks, associated with local and biological monitoring (CBC, CRP).

At 3 weeks postoperative, tolerance of the external fixator was good because of twice daily local disinfection (Figs. 2 and 3).

At the 2nd month postoperative, the two external fixators were removed in consultation. The fractures were considered clinically healed (Fig. 4A and B).

At 8 months, the active mobility of both shoulders was satisfactory: active anterior elevation, 170°; external rotation elbow to body, 70°; internal rotation, T12. The DASH score was 5 points (Fig. 5A and B).

Discussion

Although clavicle fractures account for 5—10% of fractures in adults, atrophic nonunion is rare [1—3]. Nonsurgical treatment is based on partial immobilization with an elbow-to-body sling or placing retropulsion rings for 3—6 weeks.

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