

Surgical Management of Clavicle Fractures

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Abstract

Original Research Article

Fractures of the clavicle are frequently encountered in trauma practice. Although orthopedic treatment is generally considered to be the preferred option, surgical treatment remains a limited option, depending on a number of criteria, including the type of fracture, the site, associated lesions, failure of initial treatment and the occurrence of complications. Our work brings together a series of 24 cases of clavicle fracture collected in the orthopaedic traumatology department (A), IbnTofail Hospital, CHU Mohamed6-Marrakech, between January 2013 and December 2017. The files interpreted from the archive of the traumatology department of CHU IBNO TOFAIL MARRAKECH. Our results were as follows: the age range varied between 17 and 67 years, the average age was 41.79 years with a male predominance (88%).66% of our patients were victims of MVA, the most frequent type of fracture was Type 2B1: 13 cases (55%) (ROBINSON classification), the type of osteosynthesis most used was the screwed plate in 75% of cases, with complications: 2 cases of pseudarthrosis and 2 cases of superinfection.

Keywords: Clavicle -osteosynthesis-complications.

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I. INTRODUCTION

Fractures of the clavicle are frequently encountered in trauma practice. The clavicle is a superficial bone linking the trunk to the upper limb, and is a fundamental element in the biomechanics of the shoulder. All these features have led to the interest of various studies of traumas affecting this bone. Indeed, recent studies have shown that certain types of fracture frequently have functional repercussions and a high rate of pseudarthrosis, which could justify surgical treatment. While orthopaedic treatment is generally considered to be the preferred option, the indications for surgical treatment remain limited, depending on a number of criteria, including fracture type, site, associated lesions, failure of initial treatment and occurrence of complications. In view of the above, the aim of our study is to clarify the benefits of surgery in the treatment of this type of fracture, and then to compare the results obtained with those described in the literature.

II. MATERIAL AND METHODS

Our work brings together a series of 24 cases of clavicle fracture collected at the orthopedic traumatology department (A), IbnTofail Hospital, CHU Mohamed6-Marrakech, between January 2013 and December 2017.

Inclusion Criteria:

Adult subjects with a clavicle fracture who had undergone surgical treatment and were followed up at the consultation by clinical and radiological examination.

Exclusion Criteria:

Incomplete or untraceable files. Patients discharged against medical advice. Clavicle fractures in subjects under 15 years of age. Orthopedically treated clavicle fractures.

III. RESULTS

1. Epidemiological Data:

- The mean age was 41.79 years.
- The sex ratio was 7 M/F.

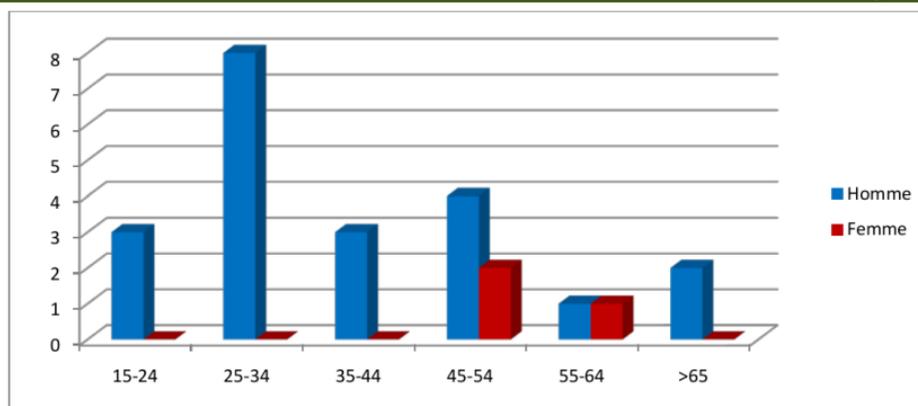


Diagram: Age and gender distribution

- Left side in 75% of cases
- 67% of cases had a direct clavicle fracture mechanism
- Road accident

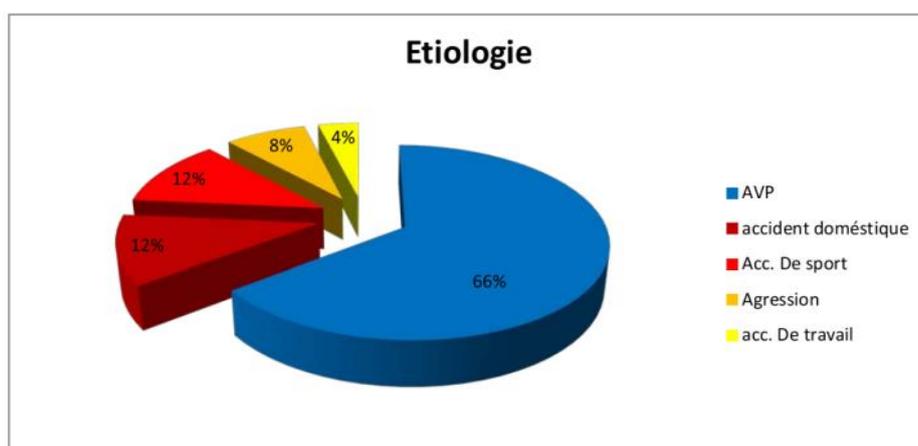


Diagramme: Répartition selon le mécanisme

2. Functional Signs

- Reason for consultation: pain + functional impotence in 100% of cases

3. Physical Signs

The clavicular region was swollen with deformation of the bony reliefs protruding under the skin, i.e. 100% of cases, with 2 cases of threatened skin opening, i.e. 8%.

4. Radiological study

- All our patients (100%) underwent radiography of the traumatized shoulder, with a frontal view.
- CT: In our series, only one patient (4%) underwent a CT scan.
- Angiography: Angiography can be used as an emergency treatment for vascular damage.

5. Anatomopathological study:

We adopted the ROBINSON classification in our study, based on the nature (simple/comminuted),

location (medial/medial/ lateral) and displacement of the fracture.

17 out of 24 patients presented a fracture of the middle third, i.e. a percentage of 72%, § 7 presented a fracture of the lateral third, i.e. a percentage of 28%, No case of fracture of the medial third was found.

Associated injuries: 2 cases of cranial trauma with no notion of loss of consciousness. 1 case of facial fracture. 1 case of contralateral tibial plateau fracture. 1 case of fracture of the homolateral humeral palette. 1 case of femoral neck fracture. 1 case of elbow dislocation; vascular lesion =0

6. Treatment:

- Anesthesia: All our patients were operated on under general anesthesia.

6.1 Approach:

In our series, all patients benefited from an anterior approach via a horizontal subclavicular skin incision.



Clavicular approach traced with marker

6.2 Osteosynthesis:

In our series, the surgical choice was restricted to: Screw-plate osteosynthesis in 18 cases (75%), with:

S-plate in 10 cases, i.e. 42%; third-tube plate in 8 cases, i.e. 33%; cable-anchoring in 6 cases, i.e. 25% of our patients.



Screw-on S-plate



1 /3 tube plate



Embrogage haubanage

6.3 Post-operative care: immobilization with a simple sling or elbow wrap

- Local: all patients received local care of the surgical scar. § General: all patients received antibiotic prophylaxis with protected amoxicillin.
- Rehabilitation: all our patients underwent rehabilitation sessions, assisted by a physiotherapist at a rate of 2 sessions per week for 6 weeks.
- Complications:
- Infection: only 1 case of superficial skin superinfection

- Skin necrosis 0
- Vasculo-nervous lesions =0
- 2 cases of pseudarthrosis

IV. DISCUSSION

- Clavicle fractures occur more frequently in young adults. This is probably related to the high level of sporting and professional activity in this age group [1].
- Male gender still predominates in all studies
- MVA remains the main cause in all series

- Physical examination: Skin opening: We have noted the extreme rarity of this lesion, as highlighted in a few studies.
- In our work, we note: A single case of threatened skin opening No case of skin opening.
- Nerve damage: BARBIER [1] and DELLA SANTA [2] report that immediate damage to the brachial plexus through direct compression of the fracture fragment is exceptional, and must be rapidly reduced with internal osteosynthesis.
- Vascular injury: blood pressure should be measured in both upper limbs, and if in doubt, an emergency arteriogram is warranted.

Pleuropulmonary complications are rare;

- Pathological findings:
- robinson's classification is the one adopted in our study.
- In our series, the most common site of fracture was the middle third (72%), in line with the literature [3].

Treatment:

- Anesthesia and positioning: General anesthesia is most often used, as locoregional anesthesia does not always provide sufficient analgesia for the clavicle due to its proximal position.
- The patient can be positioned supine or, better still, in a half-seated position.

- Surgical approach: the skin incision is generally horizontal, following the direction of the clavicle, either opposite, above or below it [4].
- Treatment: treatment of clavicle fractures is mainly orthopedic.
- Indications: according to location
- 1/3 medial: Surgical treatment is indicated if mediastinal structures are at risk due to displacement [5].
- 1/3 lateral: surgical treatment of lateral fractures is based on fracture segment stability, displacement, and patient age; stage 3B1 remains the preferred indication for surgical treatment [5]
- Middle 1/3: surgical indications: skin threat, significant overlap greater than 2 cm, pneumothorax or associated vasculo-nervous lesion, associated sternoclavicular dislocation, associated scapular neck fracture [6].

Osteosynthesis:

For the outer quarter:

- screw-hook plate/J-plate (risk of infection, skin lesions due to the relatively prominent plate, fixation failures, shoulder stiffness, arthrosis and clavicle fractures proximal to the plate).
- Pinning: risk of migration
- Pinning and bracing: 7 cases performed in our training course
- Osteosynthesis: internal quarter

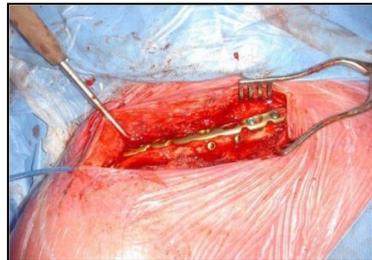


Hook plate



Wire-rope bracing

- Screw plate / lacing
- Pins: high risk
- Osteosynthesis: middle quarter
- Plates can be pre-molded in an "S" shape
- DCP 3.5 plates are of interest, as they provide satisfactory rigidity and allow compression of the fracture site.
- LCP 3.5 plates can also be used, particularly on porotic bones or comminuted fractures
- Reconstruction plates can also be used, offering a good anatomical fit with the clavicle and enabling faster consolidation than with DCP plates.
- In our series, middle-third fractures were treated with screw plates in 18 cases (75%), with S-plates in 10 cases (42%) and third-tube plates in 8 cases (33%).



- Other types of osteosynthesis: Knowles pins, Hagie pins and then the Rockwood pin and the minimally invasive titanium nail [7].



External fixator

- Evolution: immediate complications
- Vasculo-nervous complications are rare
- Infections: rare, but can be serious
- Late complications Pseudarthrosis
- Iterative fractures: these are rare, but there is no reason to believe that a consolidated clavicle remains fragile, as the trauma responsible for the iterative fracture is always present.

Table: Incidence of infection according to studies

Authors	Case number	Infection case	Percentage
ESKOLA [8]	23	3	13
MARK WEEBER [9]	15	1	7
CHH-HWA CHAEN [10]	11	1	9
MALL [11]	12	0	0
Notre étude	24	1	8

Compared with surgical treatment, orthopedic treatment has low rates of pseudarthrosis according to studies by NEER [12] and ROWE [13].

Table: Percentage of pseudarthrosis according to studies

AUTEURS	- % pseudarthrosis after surgical treatment	- % pseudarthrosis after orthopedic treatment
NEER [12]	3,9	0,1
ROWE [13]	3,7	0,8
CHHH-HWA CHEN [10]	8	No studied
ESKOLA [8]	5	No studied
NOTRE SERIE	8	No studied

V. CONCLUSION

- Fractures of the clavicle are a frequent occurrence
- Of young, active subjects.
- Treatment is mainly orthopedic, but surgery may be necessary in certain cases.
- The importance of prevention

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