

**THORACIC OUTLET  
SYNDROME  
COMPLICATING A  
REVISION SURGERY OF  
CLAVICLE NONUNION****SYNDROME DE DEFILE  
THORACOBRACHIAL  
COMPLICANT UNE  
CHIRURGIE DE REPRISE  
D'UNE PSEUDARTHROSE  
DE LA CLAVICULE**

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**ABSTRACT**

A 58-year-old man underwent plate fixation of clavicle for displaced midschaft fracture. At 22 months of follow-up, we performed a removal of the clavicle plate. At this time, we found a clavicle nonunion preoperatively and we performed a new osteosynthesis with locked plate associated to the bone autograft. Three weeks later, he was admitted to the emergency department for the right upper limb edema with progressive hypoesthesia (C8-D1).

Conflit d'intérêt : Les auteurs ne déclarent aucun conflit d'intérêt en rapport avec la rédaction de cet article

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We diagnosed a thoracic outlet syndrom. We removed the clavicle plate and performed a costoclavicular decompression space. After rehabilitation, he improved his functional scores Quick DASH and Constant score respectively 60/100 and 74/100 at 17 months after the last surgery.

**Keywords :** Thoracic outlet syndrome, clavicle, fracture, nonunion

**RESUME**

Un homme de 58 ans a subi une ostéosynthèse par plaque pour une fracture déplacée du 1/3 moyen de la clavicle. Après 22 mois de recul, une ablation de la plaque a été réalisée. Une pseudarthrose de la clavicle a été découverte en peropératoire et une nouvelle ostéosynthèse par plaque verrouillée avec autogreffe osseuse fut entreprise. Trois semaines plus tard, il a été admis aux urgences pour une hypoesthésie progressive (C8-D1) et un œdème du membre supérieur droit. Le diagnostic de syndrome de défilé thoracobrahcial était alors posé et une ne ablation de la plaque claviculaire avec une décompression de l'espace costoclaviculaire furent réalisées. Après une rééducation fonctionnelle, les scores fonctionnels du patient étaient améliorés (Quick DASH et score de Constant) respectivement à 60/100 et 74/100 à 17 mois de recul.

**Mots-Clés:** syndrome de défilé thoracobrahcial, clavicle, fracture, pseudarthrose

**INTRODUCTION**

Thoracic outlet syndrome (TOS) is a rare complication of non operative treatment of

clavicle fracture(1). Current therapeutic trends is plate fixation when the clavicle fracture is displaced(2). Surgical treatment can lead often to the dramatic complications. Indeed, we report a case of TOS following surgical revision of clavicle nonunion discovered during a removal of clavicle plate procedure at 22 months after primary clavicle fixation.

## CASE PRESENTATION

A 58-year-old man, right-hand dominant, waiter, operated in 1998 for right Latarjet, presented after a fall on his right shoulder, a displaced clavicle midschaft fracture (Figure 1).

He underwent an osteosynthesis with a reconstruction plate with lag screws on the upper face of the clavicle. At 45 days' post operative control, a secondary displacement with a decline of three proximal screws of the plate without any concept of effort was noted (Figure 2).

The clinical and radiological control showed a consolidation. The prominence of the medial edge of the plate causing discomfort during his return to activities.



**Fig 1:** X-ray showing clavicle midshaft fracture with a bone screw his 1998 Latarjet



**Fig 2:** X-ray showing clavicle plate fixation with a secondary screw displaced at 6 weeks post operative.

A removal of the clavicle plate was performed at 22 months post-operative (Figure 3). At this time, was found a clavicle non-union. We performed a new osteosynthesis with locked plate associated with bone autograft after decortication (Figure 4). Two systematic bacteriological samples came back positive to *Propionibacterium acnes*. Specific antibiotic therapy was introduced for three months.



**Fig 3:** X-ray showing bone consolidation at 22 months after primary plate fixation



**Fig. 4:** post operative X-ray of revision surgery of clavicle nonunion by new plate fixation

Three weeks later, he was admitted to emergency department for the right upper limb oedema, with a progressive right hypoesthesia (C8-D1) without any concept of new trauma.

Chandelier's and Allen's tests were positive. Electromyogram was in favour of TOS with C8-D1 low syndrome.

The spinal Magnetic Resonance Imaging eliminated a cervical lesion and the Doppler Echo excluded thrombophlebitis of the upper limb and vascular compression. He underwent a removal of

the lock plate associated with an osteoplasty of the clavicle to decompress the costoclavicular space (Figure 5). Systematic bacteriological samples were negatives. It was therefore left in intentional pseudarthrosis (Figure 6).



**Fig. 5:** Post operative X-ray after removal of the second clavicle plate and osteoplasty to decompress the costoclavicular space



**Fig 6:** X-ray showing the clavicle aspect at the last follow-up (17 months).

He made also a rehabilitation of the upper right limb. He improved clinical and electric progressive symptomatology with an upper motor block around 50%. Six months after this third surgery, his Quick DASH score was 60/100 and the Constant's score 74/100 while the last follow-up at 17 months. These scores were 35/100 and 85/100 respectively in preoperative. He returned to his work.

## DISCUSSION

Fracture of the clavicle represent 5% of fractures of the adult of which 80% are

clavicle midshaft and more than half are displaced(3,4).

TOS following the clavicle midschaft fracture would be consecutive early compression by a hematoma under clavicle, a hypertrophic callus or nonunion practicing responsible for fracture instability of a compression of the nerve effects plexus in the costoclavicular space(5). In our case, the TOS is probably due to the compression of generous bone autograft and postoperative hematoma.

The incidence of pseudoarthrosis of clavicle significantly more important ( $p = 0.042$ ) in the non-surgical (15%) than in the treatment surgical of clavicle midschaft fracture (2.2%) (4).

The incidence of TOS depended on the studies. It was 13% in the Canadian Orthopaedic Trauma Society study(6), 7% and 4% according respectively to Ferran(7) and Bostman(8). There was no significant difference ( $p = 0.690$ ) in the occurrence of TOS between surgical and non-surgical treatment (12.9% versus 14%)(6).

The incidence of surgical infection was on average less than 10%(3,6,9). Propionibacterium acnes is most found(2). The association between TOS and clavicle pseudoarthrosis is found in certain studies especially after conservative treatment(10). In fact, Kitsis(11) in serie of 17 patients with late complications of clavicle fracture by trauma to high energy 12 patients had a neuro vascular syndrome. John G. Skedros(10) reported a case of TOS post operative after multiple surgical times that would be closer to our case but there was no pseudoarthrosis nor infection.

## CONCLUSION

The TOS after a plate fixation of clavicle midschaft fracture is a rare complication but serious. In fact, its treatment and its evolution can be unpredictable with poor results. While this fracture of clavicle is

the preserve of the young, active and often sports topic with major socio-professional implications.

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