

Shoulder without a Clavicle: Movement and Function after Total Claviclectomy: A Case Report

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Learning Point of the Article:

Despite complete removal of the clavicle, good shoulder function can be achieved with appropriate soft-tissue repair and rehabilitation.

Abstract

Introduction: Total claviclectomy is a rare surgical procedure performed as a last resort for unresolving chronic osteomyelitis, tumors, or non-union causing complications. The clavicle plays an important role in shoulder girdle stability, and its complete removal is traditionally associated with functional compromise. We report a case of chronic osteomyelitis of the clavicle which required total claviclectomy, assessing the 2-year functional and clinical outcomes.

Case Report: A 50-year-old male sustained a left clavicle fracture following a road traffic accident. The fracture was initially managed conservatively on a clavicle brace. However, as union was not progressing well, the fracture was fixed with a plate and screws. Two months postoperatively, he developed wound infection and chronic osteomyelitis, resistant to multiple debridements and antibiotics. Imaging confirmed cortical destruction and sequestration along the clavicle. The patient underwent total claviclectomy with implant removal and FiberTape coracoclavicular reconstruction. Post-operative recovery was uneventful, and he followed a structured rehabilitation program. At 2-year follow-up, he reported near-complete functional recovery with full range of motion, American Shoulder and Elbow Surgeons score of 88, and Disabilities of the Arm, Shoulder, and Hand score of 40.8.

Conclusion: Functional outcomes following total claviclectomy can be excellent with meticulous soft-tissue reconstruction and rehabilitation. This case highlights that even after complete clavicular excision, shoulder function may remain satisfactory in the long term.

Keywords: Total claviclectomy, osteomyelitis, shoulder function, coracoclavicular reconstruction.

Introduction

The clavicle serves as the only bony link between the upper limb and the axial skeleton. It functions as a strut that maintains the shoulder girdle in its normal position. This anatomical configuration allows for the full range of motion (ROM) and strength required for activities involving the upper limb. Biomechanically, the clavicle transmits forces from the upper

limb to the trunk and acts as a rigid support for the muscles that control the shoulder and arm [1,2,3].

The clavicle also protects vital neurovascular structures in the cervico-axillary canal, including the brachial plexus and subclavian vessels. Its double curvature and subcutaneous position make it prone to fractures, yet this unique shape also contributes to both stability and flexibility [2]. The clavicle's

Author's Photo Gallery



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Figure 1: Postop x-ray following ORIF of the left clavicle.

dual curvature allows it to absorb and dissipate axial and torsional loads, while its articulations provide both mobility and strength to the shoulder girdle [2].

Given these critical roles, a total claviclectomy could theoretically cause major biomechanical disruption [4,5,6]. The absence of the clavicle eliminates the strut mechanism that maintains scapular position, potentially leading to scapular droop, protraction, reduced shoulder elevation, weakness in abduction, and overall reduction in upper limb power [1,2,3]. Loss of clavicular support may also impair the force coupling of the deltoid and trapezius, resulting in inefficient shoulder mechanics and cosmetic deformity.

However, limited literature suggests that compensatory muscular adaptations and soft-tissue reconstructions can partially restore shoulder mechanics [6,7,8]. Despite the anatomical disadvantage, some patients maintain near-normal



Figure 2: 2 month post-op x-ray showing osteomyelitis of the left clavicle with implant loosening, cortical destruction, and non-union.

function and minimal pain, demonstrating the remarkable adaptability of the shoulder complex. This case report adds to the growing evidence that excellent functional outcomes are possible following total claviclectomy, which provided that the soft-tissue envelope and dynamic stabilizers are preserved.

Case Report

A 50-year-old male with no comorbidities presented to our department with polytrauma after a road traffic accident. He was diagnosed with a fracture of the middle third of his left clavicle, subdural hemorrhage, and a Monteggia fracture of the left forearm. The subdural hemorrhage was conservatively treated, the Monteggia fracture was fixed with plate and screws, and his clavicle fracture was treated conservatively with a clavicle brace and arm pouch. However, as satisfactory reduction and union of the clavicle was not found after 1 month, he was taken up for fixation of the clavicle with plate and screws (Fig. 1).

Two months after the plating, the patient presented with pain and purulent discharge from the surgical wound over the left clavicle. Investigations revealed surgical-site infection with raised inflammatory markers, and he was managed with wound care and intravenous antibiotics. However, infection recurred, and he presented again after 2 months with a discharging sinus and pain.

Radiographs and computed tomography imaging revealed implant loosening, cortical destruction, and non-union of the clavicle with surrounding sclerosis suggesting chronic osteomyelitis (Fig. 2). It was decided to proceed with a total claviclectomy. The entire clavicle was excised, and wound debridement was performed.

Postoperatively, the patient was immobilized in an arm sling for 3 weeks, followed by supervised active/passive physiotherapy and strengthening exercises. Full range of shoulder movement was achieved immediately after the procedure. At 6 weeks, he



Figure 3: X-ray after total claviclectomy.



Figure 4: Range of movement of the left shoulder 2 years after total claviclectomy

successful infection eradication and good function. Smaller series show that while esthetic deformity and localized weakness may occur, most patients adapt well and regain satisfactory daily function at 1–10 years follow-up [11,12,13]. Very long-term reports (≥ 10 years) demonstrate minimal impairment due to muscular adaptation and strengthening [11,13].

Biomechanically, the clavicle maintains lateral shoulder positioning and transmits forces from the upper limb to the axial skeleton. Its removal disrupts deltoid–trapezius force coupling, causing scapular droop and reduced mechanical efficiency during elevation [1,2,3]. However, several studies emphasize that preserving or reconstructing the coracoclavicular/acromioclavicular

had near-complete pain relief and regained full shoulder movements. He returned to work as an electrician, with only mild difficulty performing overhead activities and lifting heavy objects. He also reported discomfort while sleeping on the operated side.

At 2-year follow-up (Fig. 3), his shoulder ROM was full and comparable to the contralateral side (Fig. 4). Functional assessment: American Shoulder and Elbow Surgeons 88, Disabilities of the Arm, Shoulder, and Hand (DASH) 40.8, QuickDASH 32.5 – indicating excellent functional recovery.

Discussion

Total claviclectomy is an uncommon but well-described salvage procedure for refractory pathology such as chronic osteomyelitis, primary bone tumors, non-union with implant failure, and vascular complications. Literature on outcomes is limited by small series and case reports, but several medium- to long-term studies offer insight into functional recovery [5,6,7,8,9].

Rubright et al. [8] reported satisfactory long-term function after claviclectomy, with preservation of motion and acceptable strength. Similarly, Oheim et al. [5] reported successful infection control and functional preservation at several years of follow-up. A recent systematic review by Smolle et al. [9] concluded that partial or total claviclectomy yields acceptable mid- to long-term outcomes with low complication rates.

Case series addressing claviclectomy for infection report favorable outcomes. Poitevin et al. [6] demonstrated predictable pain relief and infection control, with most patients returning to pre-operative activities. Liu et al. [10] also reported

stabilizers significantly reduces this functional loss [5,6,14].

Rehabilitation focusing on periscapular and deltoid strengthening helps compensate for clavicle loss, explaining why long-term shoulder function is often satisfactory [7,8,10].

Functional outcomes are generally good: Near-normal ROM, adequate strength for daily activities, and significant pain relief, although overhead labor may remain limited [6,7,8,9]. Total claviclectomy reliably eradicates infection when combined with thorough debridement and appropriate antibiotics [5,6,10].

Limitations of current literature include small sample sizes, heterogeneous indications, and inconsistent outcome measures. Future multicentric prospective studies using standardized instruments are required to better define predictors of outcome and optimal surgical strategies.

Conclusion

Total claviclectomy can provide excellent pain relief and functional outcomes in patients with chronic osteomyelitis unresponsive to conventional management. With structured rehabilitation, shoulder mechanics can be well preserved despite the absence of the clavicle.

Clinical Message

Total claviclectomy, though a radical procedure, can result in excellent functional recovery when combined with coracoclavicular reconstruction and early rehabilitation.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

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