Multidirectional Instability in a Neglected Elbow Dislocation Managed with Circumferential Ligament Reconstruction. A Case Report*

Instabilidade multidirecional em uma luxação negligenciada do cotovelo gerenciada com reconstrução do ligamento circunferencial. Um relato de caso

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Abstract

Neglected elbow dislocation is an uncommon condition and its treatment remains challenging. We present a case of a middle-aged woman presenting with neglected elbow dislocation and multi-direction instability in whom open reduction of the elbow joint and circumferential ligamentous reconstruction with a *gracilis* tendon graft was done. The functional outcome assessed with the Mayo elbow performance index was excellent. This circumferential technique is undoubtedly a viable technique and the indications can be extended to even manage a neglected dislocation. This procedure reduces the need or diminishes the duration of external fixation requirement and thereby encourages early mobilization.

Keywords
- elbow joint
- joint dislocation
- joint instability
- ligaments, articular

Resumo

A luxação negligenciada do cotovelo é uma condição incomum e seu tratamento permanece desafiador. Apresentamos o caso de uma mulher de meia-idade que apresentou luxação negligenciada do cotovelo e instabilidade multidirecional, na qual foi realizada redução aberta da articulação do cotovelo e reconstrução ligamentar circunferencial com enxerto de tendão *gracilis*. O resultado funcional avaliado com o índice de desempenho do cotovelo de Mayo foi excelente. Essa técnica circunferencial é, sem dúvida, uma técnica viável e as indicações podem ser estendidas para gerenciar até mesmo um deslocamento negligenciado. Este procedimento reduz a necessidade ou diminui a duração da exigência de fixação externa e, assim, incentiva a mobilização precoce.

Palavras-chave
- articulação do cotovelo
- luxação articular
- instabilidade articular
- ligamentos articulares

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Introduction

Elbow dislocations are the second commonest dislocations in the upper limb, after the shoulder, and simple elbow dislocations have good prognoses with closed reduction. However, neglected elbow dislocations, although uncommon, are a challenge to treat and the treatment options include open reduction, ligament repair/reconstruction, external fixator application and elbow arthroplasty, considering the duration of the injury and joint status. Although technically demanding, a single staged procedure to reduce and reconstruct the neglected dislocated elbow would be ideal to allow early return to functions and avoid instability.

In the present article, we describe a patient who presented with a 3-month-old neglected posteromedial dislocation with multidirectional/global instability, treated with open reduction and collateral ligament reconstruction with *gracilis* autograft using the circumferential ligament reconstruction technique.[1]

Case Report

A 30-year-old woman, homemaker, presented with complaints of right elbow pain and instability after a history of a road traffic accidental fall 3 months before and injury to her right upper limb. She initially was diagnosed with right distal radius fracture, for which she underwent open reduction and plate fixation. However, she persisted with pain in the right elbow after 3 months and came to us. The elbow was lax with multidirectional instability associated with pain and click. Her elbow radiographs revealed a posteromedial elbow dislocation without fractures (►**Fig. 1**). Computer tomography (CT) and magnetic resonance imaging (MRI) noted dislocation with injury to the lateral ulnar collateral ligament (LUCL) complex and no signs of arthrosis. After consent, she was taken up for open reduction and ligament reconstruction.

Under general anesthesia, at first the *Gracilis* tendon was harvested from the lower limb. Next, the patient was positioned in lateral decubitus position with the arm supported on a sideboard. The surgical technique of reduction is similar to the one mentioned by Morrey[2] and, for ligament reconstruction, the single loop technique of van Riet et al.[1] was adopted with certain modifications (►**Figs. 2** and **3**). Under tourniquet control, a universal posterior midline incision was made on the elbow and fasciocutaneous flaps were elevated on either side. The ulnar nerve was protected and, by elevating the flexor carpi ulnaris muscle, the medial epicondyle and the sublime tubercle of the ulna were exposed. On the radial side, the lateral epicondyle and the supinator crest were exposed through the Kocher approach. After releasing the scarred and tight collaterals, the anterior and posterior capsule from the humeral side, we were able to reduce the joint. The articular surface was healthy but instable. To provide stability to the reduced joint, we proceeded to reconstruct the posterior bundle of the LUCL and the anterior bundle of the medial collateral ligament (MCL). First, a guidewire was passed in the distal humerus intercondylar region through the axis of rotation and overdrilled with a 4.5mm drill bit. Two drill holes were made in the proximal ulna at the supinator crest and at the sublime tubercle directed distally and obliquely piercing the opposite cortices. A whip stich was applied at the leading end and an Endobutton (Smith & Nephew, London, UK) was anchored on the trailing end of *gracilis* graft using Ethibond no.5 suture material (Ethicon Inc., Sommerville, NJ, EUA). The leading end of the graft was passed through the tunnel in the supinator crest and the graft was advanced through the distal humerus tunnel from the lateral to the medial side which formed the LUCL. Here, the graft was tensioned and fixed by inserting an interference screw in the humeral tunnel maintaining the elbow in pronation. Now the graft brought out through the medial side of the humeral tunnel was passed and fixed in the ulnar tunnel at the sublime tubercle with another interference screw maintaining the elbow in flexion. Free range of motion and stability was satisfactory. The excess graft was excised, and the skin was closed in layers. The elbow was immobilized with an above-elbow splint for 3 weeks and started on elbow range of motion with an arm sling continued for 6 weeks. The patient had no complications related to nerve and wound healing. Within 6 weeks, she was able to achieve a motion of 10° to 130° of motion. At the 1-year follow-up, functional outcome

Fig. 1 (A,B) Plane radiograph of the affected joint showing a neglected posterior-medial dislocation of the elbow; (C,D) Computed tomography (CT) images of the dislocated elbow revealing a dislocated elbow with no obvious fractures.

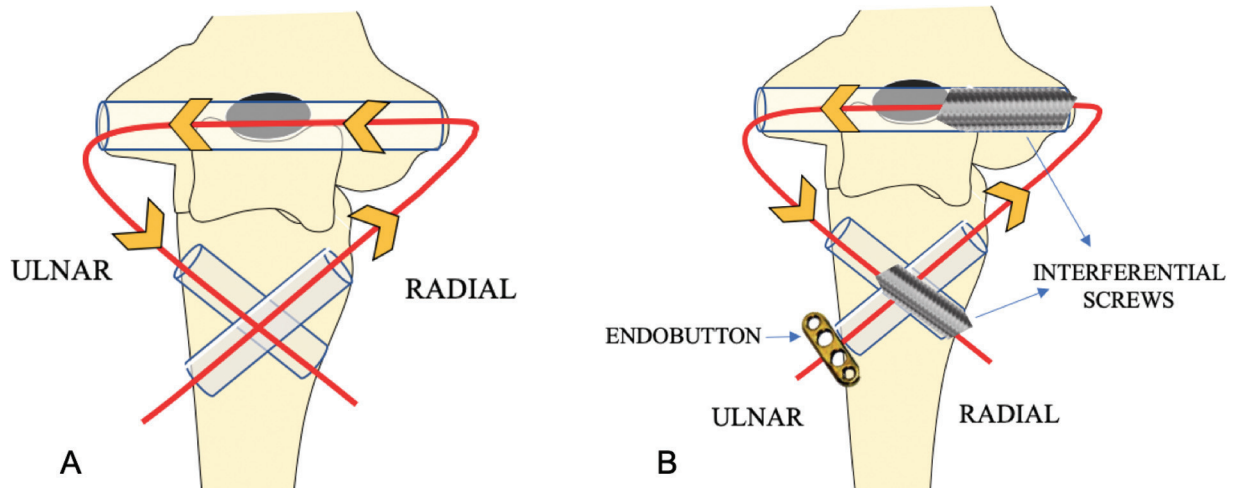

Fig. 2 Graphical representation of the surgical technique for the single loop reconstruction of the medial and lateral ligamentous complex of the elbow. A - Three bone tunnels were created, one at the distal humerus and two at the proximal ulna at the sublime tubercle and supinator crest. The graft is tunneled through the supinator crest and advanced through humeral tunnel to reconstruct the posterior bundle of the LUCL and returned to the tunnel in the sublime tubercle to form the anterior bundle of the MCL. B- The trailing end of the graft on the ulna is fixed by an Endobutton (Smith & Nephew, London, UK); The LUCL at the humeral tunnel and the MCL in the ulnar tunnel at the sublime tubercle was fixed and tensioned with interference screws. (LUCL- Lateral ulnar collateral ligament, MCL- Medial collateral ligament)

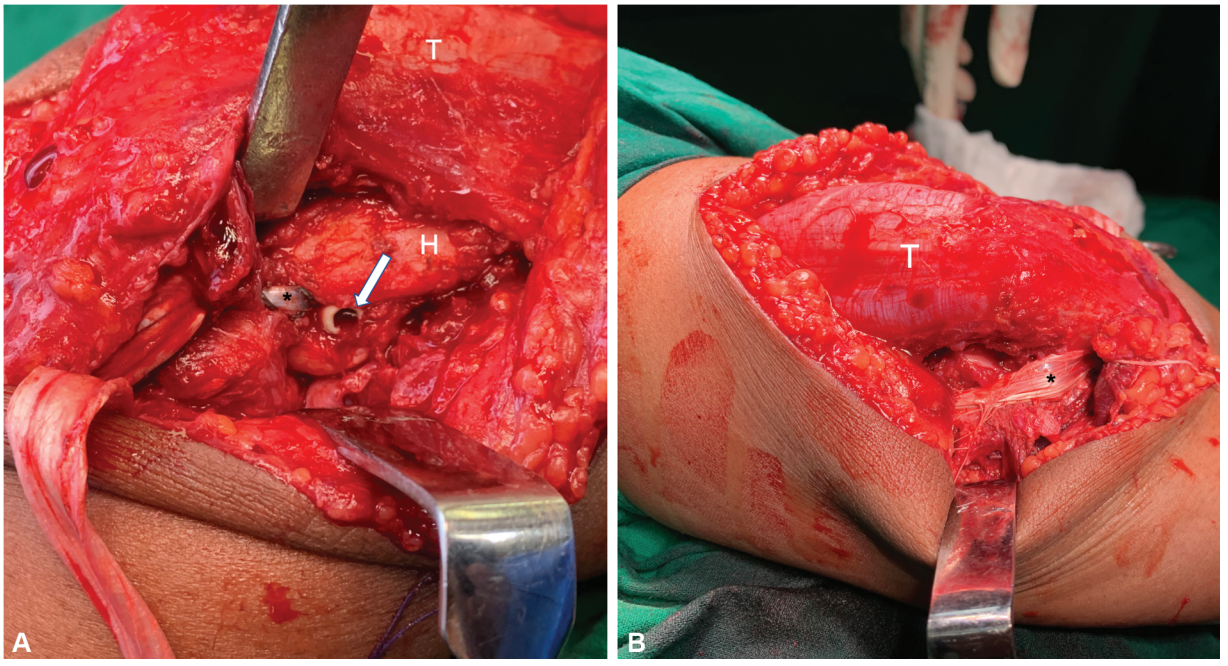

Fig. 3 Intraoperative images of the elbow placed in lateral decubitus position. A- Position of the interference screw at the footprint of the lateral ulnar collateral ligamentous complex on the distal humerus along with the tensioned graft. B- Tensioned medial collateral ligament graft passing from the distal humerus footprint to the sublime tubercle of the ulna. (T- triceps, H- Humerus, * - Gracilis graft)

was assessed based on the Mayo elbow performance index,[3] which considers parameters of pain, motion, stability and functions. She fared excellently and the radiographs showed a congruent elbow (►**Fig. 4**).

Discussion

The stability of elbow joint is provided by the ulnohumeral and the radiocapitellar joints in addition to the LUCL and MCL. The anterior bundle of the MCL plays a pivotal role providing stability to valgus stress,[4] and the LUCL provides posterolateral stability. Most simple elbow dislocations heal well after reduction without any intervention and appropriate mobilization.[5] Chronically instable or missed dislocated elbow is a result of improperly treated radial head, coronoid or ligaments injuries.[6] The symptoms vary from mild to severe instability limiting upper limb activities, recurrent/-fixed subluxation or dislocation. These can cause painful clicking, snapping, clunking or elbow locking.[3] If neglected, it may lead to ulnohumeral arthritis. Closed reduction becomes difficult because of fibrosis in the ulnohumeral articulation, contractures of the triceps and collateral

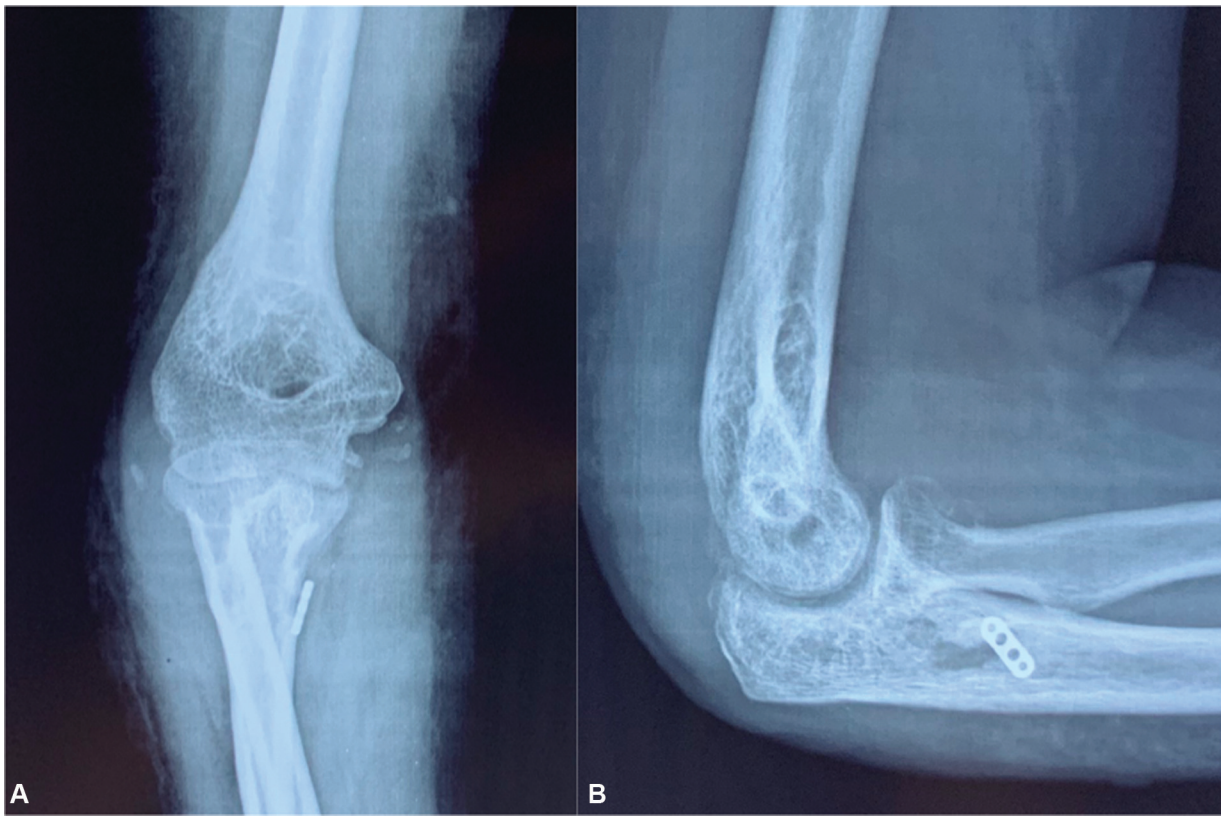

Fig. 4 (A,B) Follow-up radiographs showing a reduced and a congruent elbow joint with no signs of arthrosis.

ligaments and possible heterotropic ossifications.[7,8] If reduction requires release of soft tissues, collateral ligaments reconstruction is definitely warranted.[6] Results are better with open reduction within between 3 and 6 months after the dislocation, failing which arthroplasty should be considered.[8] Such neglected dislocation needs open reduction and hinged external fixators allowing capsuloligamentous structures to heal or form a stable scar. Chronic LUCL and MCL injuries with instabilities may be reconstructed using palmaris longus, plantaris and triceps fascia grafts.[9–11]

In his work, van Riet et al[1] has demonstrated a technique using a single *gracilis* tendon, which is again divided into two types, single loop or double loops based on the numbers of reconstructed bundles of the LUCL and MCL.[1] The modification to this design, known as "box-loop" design, is described without the use of hardware.[12] An in vitro study done to compare the "box-loop" technique with conventional LUCL and MCL reconstruction found that both had equal stability; however, the former technique had a superior biomechanical profile with respect to graft stiffness.[13] We used the single loop technique to replace critical structures. Although the original technique recommends early mobilization for 1 a week, we immobilized for 3 weeks for ligament healing. Most of the literature describes the use of the circumferential graft technique in chronic instability secondary to various types of injuries, but according to our knowledge, this technique has not been used for a neglected elbow dislocation. The circumferential graft technique is a viable method in treating chronic elbow instabilities with a single graft. Its indications can be extended to treat even neglected elbow dislocation and it reduces the need or diminishes the duration of external fixator requirement, provided the graft is tensioned appropriately.

Statement of Informed Consent

The patient was informed that data concerning the case would be submitted for publication and the patient agreed.

Conflict of Interests

The authors have no conflict of interests to declare.

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