

CHRONIC ELBOW DISLOCATION

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SUMMARY

Chronic Elbow Dislocation is a rare and severely disabling condition that usually occurs after a not-recognized or undertreated fracture dislocation of the elbow. The suggested treatment depends on several factors including delay of diagnosis and treatment, joint surface integrity, quality of the primary and secondary stabilizers of the elbow.

The aim of this article is to review our experience with chronic elbow dislocation in order to provide a flow chart for the suggested treatment.

Keywords: chronic elbow dislocation, radial head transfer, ligament reconstruction

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Introduction

Chronic Elbow Dislocation is a rare and severely disabling condition that has been defined by Marinelli *et al.* as a persistent and static dislocation where the elbow has been dislocated or subluxated for more than 2/3 weeks and can only be reduced surgically (Marinelli *et al.*, 2016). The incidence of the chronic elbow dislocation is not reported in the literature. Some studies have reported that nearly one-third of patients with a previous simple dislocation of the elbow, treated with conservative management, had long-term symptoms of instability, such as recurring pain, clicking, catching

ZASTARZAŁE ZWICHNIĘCIE ŁOKCIA

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STRESZCZENIE

Zastarzałe zwichnięcie łokcia jest rzadkim stanem i ciężko upośledzającym funkcję stawu, który zwykle występuje po nierozpoznanym lub nieleczonym zwichnięciu łokcia. Sugerowane leczenie zależy od kilku czynników, w tym od opóźnienia postawienia diagnozy, dotychczasowego leczenia, integralności powierzchni stawowych, jakości pierwotnych i wtórnych stabilizatorów stawu łokciowego.

Celem tego artykułu jest dokonanie przeglądu własnego doświadczenia z zastarzałym zwichnięciem łokcia w celu opracowania algorytmu leczenia.

Słowa kluczowe: zastarzałe zwichnięcie łokcia, rekonstrukcja więzadła

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or subluxation within the range of motion. These symptoms are due to recurrent instabilities where the elbow is reduced, but it dislocates or subluxates when subjected to physiological stressed. Several forms of elbow instability have been reported in the literature (O’Driscoll *et al.*, 1992; O’Driscoll *et al.*, 2001). Differently from these more common forms of elbow instability, in chronic elbow dislocation the elbow is statically subluxated or dislocated. In our second referral shoulder and elbow unit, the rate of chronic elbow dislocation is approximately 2–3% of the elbow surgeries, performed each year.

Aim

The aim of this paper is to report our experience with chronic elbow dislocation of the elbow with emphasis on decision making process.

Material and methods

A review of cases of chronic elbow dislocation was performed to propose a possible flowchart for treatment of such complication. A retrospective analysis of 15 cases of chronic elbow dislocation was performed starting from 2010. All the patients had a minimum of 12 months follow up. An analysis of the potential causes that determined this complication was performed, along with the analysis of the outcomes.

Results

In our cohort of patients Chronic Elbow dislocation occurred because of:

- Misdiagnosed/undertreated terrible triad (elbow dislocation + radial head fracture + coronoid fracture).
- Elbow dislocations without significant bony involvement but with a severe damage to soft tissue envelop including medial and lateral collateral ligament, flexor-pronator tendon unit and extensor-supinator tendon unit. A concomitant partial or complete lesion of the triceps tendon can also contribute to the pathogenesis of chronic elbow dislocation.
- Failed prior treatment for a terrible triad. A prior surgical treatment for a terrible triad can failed for several reasons including inadequate restoration of one of the major stabilizer of the elbow, aggressive postoperative rehabilitation, poor patients' compliance, obese habitus.
- Complex proximal ulna and radius fracture-dislocation.
- Aggressive open release of a prior stiff elbow.

In our experience the first scenario was the most common event that led to a chronic elbow dislocation. The terrible triad is a potential devastating condition that, when undertreated,

can cause a chronic elbow dislocation. It is a complex elbow condition that affects all the primary stabilizers of the elbow. When the severity of this condition is not well recognized at the time of trauma, the conservative treatment fails, and a spontaneous elbow dislocation occurs, even if the elbow is placed in a 90° cast. The elbow recurrent dislocation can be asymptomatic above all if the elbow is immobilized in the cast. For this reason, we advise to perform an early X-ray and close follow up, to detect the recurrent dislocation in any case of elbow dislocation regardless the treatment. In some rare circumstances the elbow dislocation remains undiagnosed until further examinations, which are usually required for persistent pain and stiffness.

Treatment of a chronic elbow dislocation requires early and aggressive surgery. The surgical strategy depends on several factors:

- Delayed of diagnosis.
- Articular joint integrity.
- Amount of residual coronoid and radial head.
- Quality and dimensions of the radial head and coronoid fragments.
- Presence of Heterotopic Ossification (HO).
- Patient's compliance and habitus.

Most of these factors are well addressed with a good quality CT scan, which is mandatory in all the cases (see flow chart in Figure 1). On the contrary an MRI is usually not requested since it does not add valuable information. LCL and MCL are in fact inevitably torn in case of chronic elbow dislocation.

A crucial factor in the decision-making process is the delayed of surgical treatment. In our experience after 3 to 4 weeks of delayed from trauma to surgery, a reconstruction other than a repair of the lateral elbow ligament complex and of the medial collateral elbow ligament is mandatory, especially in obese patients. A 3-to-4 mm thick semitendinosus allograft is our favorite choice.

The patient's habitus should also be considered. In general speaking, although not supported by scientific literature, we are more doubtful in treating obese patients and for

this reason we are clear and aggressive with these patients. According to our experience, obese patients are more prone to recurrent elbow instability and more frequently the outcomes can be disappointing with a history of multiple unsuccessful surgical treatments.

The Figure 1 shows the flow chart that we normally follow to treat patients affected by chronic elbow dislocation.

The first and more crucial factor in the decision-making process is the preservation of the articular joint surface. Usually, in case of long lasting dislocation of the elbow, an

and soft tissue stabilizers are not repaired or replaced, usually the elbow re-dislocates after pin removal or, even more frequently, the dislocation occurs after an early pin backing out or pin's breakage.

In case of delayed treatment but within 3 weeks after trauma, the elbow can be considered similar to a highly unstable acute elbow fracture dislocation. Our suggestion is an open repair of both medial and lateral collateral ligaments along with a repair of flexor and extensor tendon unit. Two 5 mm metallic anchors are our prefer choice.

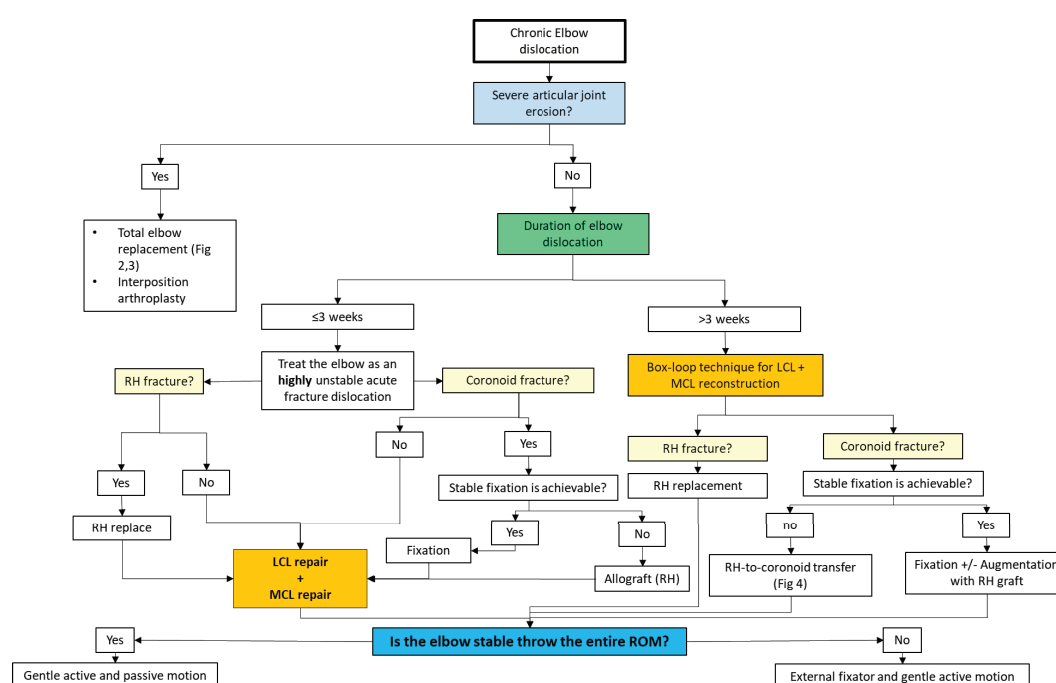


Figure 1. Treatment options for chronic elbow dislocations. RH-radial head.

erosion of the joint surface is well highlighted by the CT scan and an elbow replacement or, more rarely, an interposition arthroplasty is the only realistic choice (Figure 2).

If the articular joint surfaces are preserved, an open reduction is usually able to reduce the dislocated elbow. Unfortunately, in many cases the open reduction it is not enough to avoid recurrent dislocations, if the stabilizers of the elbow are not repaired or replaced. We do not recommend open/closed reduction and temporary stabilization with ulno-humeral pin placement, due to the high rate of failure and complications of this technique. If bony

Although in acute elbow instability the repair of the LCL is generally enough to guarantee a stable functional elbow, in these delayed cases we recommend a more aggressive conduct, by repairing both ligaments, medial and lateral. A double skin surgical approach, lateral and medial, is our favorite choice because it reduces the occurrence of complications related to extensive skin flaps, more common after a single posterior skin incision. It is important that the surgeon addresses associated fractures of the radial head and coronoid. However, differently from acute cases, in these delayed cases, our threshold



Figure 2. Chronic elbow dislocation after open release of a stiff elbow. (A,B) Extensive heterotopic ossification that required extensive open release. (C,D) Five months after open release. The X-ray shows a chronic elbow dislocation with extensive heterotopic ossification and (white arrow) severe erosion of the trochlea.

for radial head replacement is very low. An attempt to radial head fixation usually is not recommended. An anatomical replacement of the radial head has the great benefit to restore immediately some of the stability of the lateral compartment of the elbow (Chanlait *et al.*, 2012).

The coronoid should be fixed if a stable fixation is achievable. Otherwise an augment with radial head graft is recommended to reconstruct the coronoid. Every effort should be made in order to preserve or restore the stabilizing effect of the coronoid. For this reason, in case of comminute not fixable coronoid fragments, resorption

of the fragments or a weak fixation of the remnants of coronoid, we suggest a radial head-to-coronoid transfer, in case of concomitant radial head replacement. Alternatively, an allograft radial head can be used as well.

When the elbow is dislocated for more than 3 weeks, we recommend ligaments reconstruction rather than repair, using the box-loop technique (Finkbone *et al.*, 2015). Although this management of delayed chronic elbow dislocation can appear aggressive, we have learnt from our mistakes that, after 3 weeks, repairing the ligaments is not enough to guarantee a stable elbow through

the entire range of motion. In these cases, we recommend a single posterior skin approach. Using the box-loop technique, the surgeon needs to make a tunnel through the ulna; by direct visualization of both the medial and lateral border of the ulna and to do that it is much easier using a single posterior skin approach.

When the repair and/or replacement of the stabilizers of the elbow have been performed, the surgeon must check the stability of the elbow through the entire ROM. If a residual instability is detected, a hinged external fixator is a valuable option, especially in obese patients and longstanding dislocations. However, in our experience the use of a hinged brace positioning is very uncommon.

If the elbow is stable after the surgical treatment, a gentle active a passive (self-assisted) motion of the elbow is started immediately after surgery. A delayed in mobilization is required in case of any concern of skin healing or residual minor instability (2 to 3 weeks). In case of single posterior skin incision, a more careful mobilization is suggested, until a complete skin healing is reached. An elbow brace is not used in our practice.

In the last 7 years we have treated 15 patients affected by chronic elbow dislocation with a minimum of 12 months follow up. Three patients required a total elbow replacement (Figure 3), 12 a radial head replacement. A transfer of the radial head to the coronoid was performed in 6 cases (Figure 4). In one case a radial head allograft was used. LCL and MCL ligaments were repaired in 6 cases and reconstruct in 9. In two cases an autologous hamstring was used. In the remaining 7 cases allograft tendons were used (5 hamstrings, 1 flexor hallucis, 1 extensor hallucis).

All patients regained a functional arc of motion and a stable elbow. One case required a revision surgery for an overstuffed radial head replacement.

Discussion and conclusions

Chronic elbow dislocation is a severe condition that can affect the elbow. The fundamental message is to treat properly first the acute elbow dislocation avoiding such complication. An early x-ray (7 days) is mandatory in all fracture dislocations of the elbow to detect as soon as possible recurrent subluxation or dislocation of the elbow. A close follow up is especially suggested in obese patients.

Current treatments cannot be easily standardized. Deeply analyzing cases, studying different patients and deciding the best treatment for every one of them is the key to achieve better outcomes. An aggressive surgical treatment can provide satisfactory outcomes in the majority of the cases.

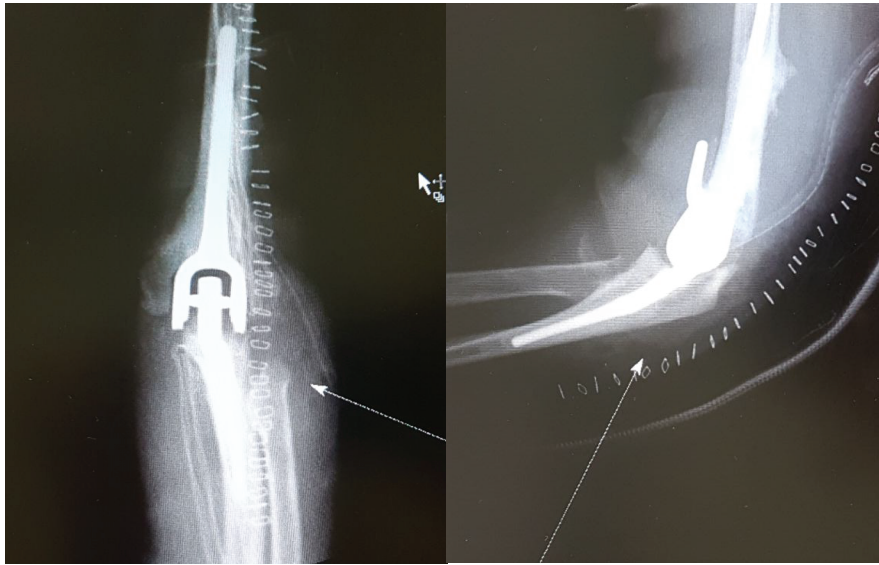


Figure 3. Post-operative X-Ray of a total elbow replacement, implanted in a chronic elbow dislocation (preoperative is shown in Figure 2).

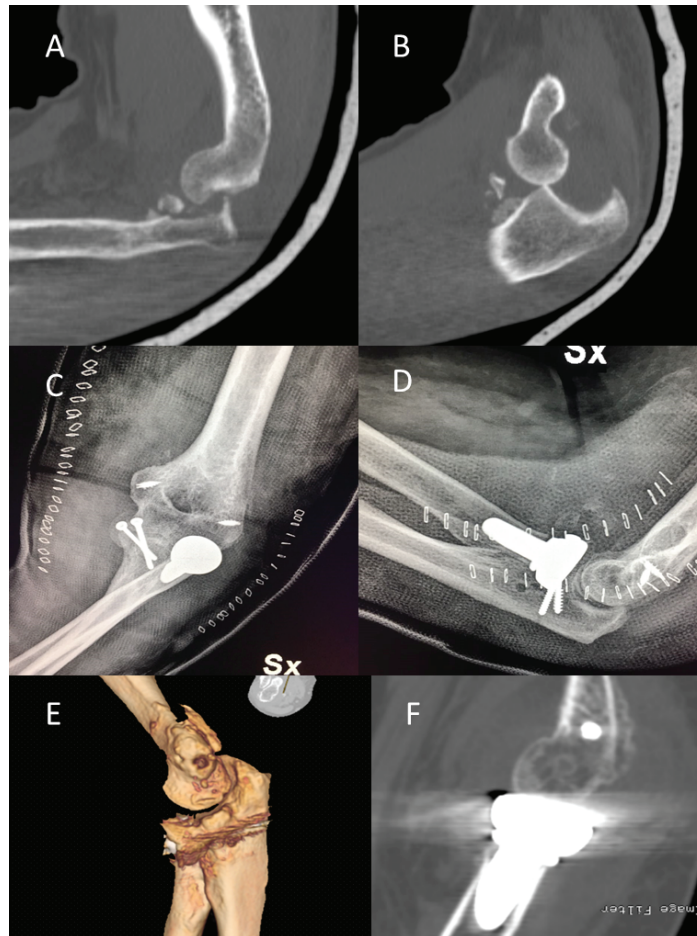


Figure 4. (A,B) Chronic elbow dislocation 6 weeks after a terrible triad injury. (C,D) The patient underwent radial head replacement, radial head-to-coronoid transfer, box-loop reconstruction of the LCL and MCL, repair of the extensor and flexor common tendons with 2, 5 mm metallic anchors. At one year of follow up the CT scan shows a well-integrated radial head graft (E), and the absence of posterolateral static subluxation (F).

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