Trauma Case Reports 39 (2022) 100636

Contents lists available at ScienceDirect

Trauma Case Reports

journal homepage: www.elsevier.com/locate/tcr

Case Report

Elbow heterotopic ossification after distal biceps tendon repair presenting as median nerve neuropathy: A case report

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ARTICLE INFO

Keywords:
Elbow
Distal biceps
Heterotopic ossification
Median nerve

ABSTRACT

Ruptures of the distal attachment of the biceps brachii are rare injuries that typically occur in the dominant arm of men between the third and fourth decade of life. Surgical repair is indicated in active patients. Complications of surgical repair include neurovascular injury, heterotopic ossification, wound infection, elbow stiffness and re-rupture. Heterotopic ossification of the elbow is a rare complication of distal biceps tendon repair operations. It may be entirely asymptomatic or present with symptoms and signs such as swelling, erythema, pain, palpable mass, vascular and nerve compression or joint movement restriction. We present a case of heterotopic ossification presenting as median nerve neuropathy after distal biceps tendon repair using a limited volar single incision.

Introduction

Ruptures of the distal attachment of the biceps brachii are rare injuries, reported at a rate of 1.2 per 100,000 patients. They typically occur in the dominant arm of men between the third and fourth decade of life [1]. Surgical repair is indicated in active patients in order to restore strength and endurance in both supination and flexion of the elbow [1]. Complications of surgical repair include neurovascular injury, heterotopic ossification, wound infection, elbow stiffness and re-rupture [2]. Heterotopic ossification of the elbow may be entirely asymptomatic or present with symptoms and signs such as swelling, erythema, pain, palpable mass, vascular and nerve compression or joint movement restriction. [2] We present a case of heterotopic ossification presenting as median nerve neuropathy after distal biceps tendon repair using a limited volar single incision.

Report of the case

A 55-year-old male presented with a rupture of the distal biceps insertion of his left upper extremity (dominant) after excessive eccentric tension during lifting a heavy weight. He was treated surgically with repositioning of the tendon on the radial tubercle through an osseous tunnel on the proximal cortex of the radius, utilizing a limited volar incision centered over the bicipital tubercle. Following an uneventful postoperative course, he was discharged on the 2nd postoperative day and protected motion of the elbow with a hinged brace was initiated. Four weeks postoperatively the patient complained of pain and numbness on the volar surface of the

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https://doi.org/10.1016/j.tcr.2022.100636
Accepted 17 March 2022
Available online 21 March 2022

thumb and index finger. Clinical examination revealed hypoesthesia of the thumb and index finger. Motor deficits were not identified and there was no restriction in the range of motion of elbow and forearm. A palpable mass on the proximal forearm was also evident. On plain radiographs swelling of soft tissues was detected and further imaging with MRI was performed two weeks later to investigate this palpable mass (Fig. 1). The possibility of heterotopic ossification was confirmed and a CT scan was performed for better visualization of the lesion margins and planning of the excision operation (Fig. 1). Elbow range of motion remained normal and the patient was under close follow-up in order to identify any improvement or deterioration of median nerve function.

Six months after the initial operation no improvement of patient's symptoms was detected and resection of the heterotopic ossification was scheduled. The patient underwent preoperative radiotherapy, the day before the operation, with a dose of 700 cGy. The heterotopic ossification was approached through a volar incision. The vascular structures were identified and protected with meticulous dissection of the surrounding tissues, as well as the median and radial nerve. The median nerve was in contact and stretched out by the heterotopic ossification mass. A clear visualization of the heterotopic ossification mass was achieved and removed, en block. Full resection of the mass was confirmed with radiographs (Fig. 2).

On the first postoperative day the patient reported recession of the pain and numbness. The patient was discharged on the 2nd postoperative day. Improvement of hypoesthesia was soon identified. There were no wound complications and the sutures were removed after 2 weeks. At 6 weeks follow-up the patient's hypoesthesia had resolved completely. One year after the operation the patient reported no complaints and had returned to his pre-injury activity level. Two years post-operative radiographs revealed no relapse of heterotopic ossification (Fig. 2) and the patient had unrestricted range of motion of the elbow.

Discussion

Several surgical techniques have been described for distal biceps tendon repair, such as bone tunnels, suture anchors, screws or buttons in order to fix the biceps tendon to the radial tuberosity. All fixation techniques are effective and biomechanically sound. [3] Surgical approaches for distal biceps tendon repair include the double-incision or the single-incision, minimal or extensile, with both being effective for tendon reposition [2].

Heterotopic ossification is the abnormal formation of mature lamellar bone within extraskeletal soft tissues, and commonly it develops around the elbow joint [4].Its pathophysiological mechanisms are multifactorial and completely understood. [5] Due to the self-limited course and localized appearance of elbow heterotopic ossification, its incidence is probably underreported. [6] Its clinical presentation varies from asymptomatic incidental radiographic findings to devastating clinical conditions, such as radioulnar synostosis, that dramatically affect the patient's quality of life. [2]

In large clinical studies regarding distal biceps tendon repair, heterotopic ossification has been reported at significantly low rates, especially when the one-incision technique is utilized. [6,7] In a recent review, [2] that provided data about the complications following distal biceps repair by fixation method, HO incidence was similar for most fixation techniques: cortical button (6,1%), interference screw (5.8%), suture anchors (5.4%), bone tunnel (4.9%). The incidence of HO was lower when button and screw fixation was utilized (1,5%). This study also confirmed that the incidence of HO is higher with the double incision technique. Additionally, radioulnar synostosis appeared to occur exclusively when the double-incision approach was used. These findings are consistent with the meta-analysis of Amin et al. [8], that included 87 publications about distal biceps tendon repair. However, it needs to be considered that radiographic evaluation is not routinely carried out in all patients that undergo distal biceps tendon repair and it is reserved for symptomatic patients. Consequently, lower rates of HO might be reported in distal biceps tendon repair.

Accurate bone tunnel formation and meticulous removal of bone drillings during the tendon repair operation can contribute significantly to the prevention of symptomatic HO development. Regarding the management of HO, options include pharmacological treatment with NSAIDs and biphosphonates, physical therapy and radiation therapy. [9] Surgical intervention is indicated in cases of HO that cause clinical impairment, such as pain, range of motion restriction and neurovascular compromise. The surgery aims to the resection of the heterotopic bone tissue in order to regain motion or alleviate any other clinical symptoms or signs.

Post-operative or pre-operative external beam radiation therapy, with a single dose of 700 cGy, has shown efficacy in elbow HO

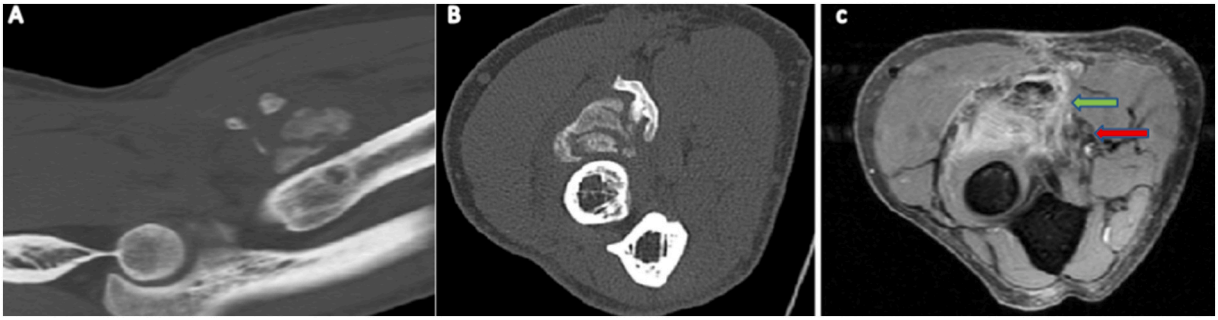

Fig. 1. Preoperative CT scan of the elbow demonstrating the heterotopic ossification on sagittal (a) and coronal (b) plane. Preoperative MRI(c) demostrating the heterotopic ossification (green arrow) in close contact to the median nerve (red arrow). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

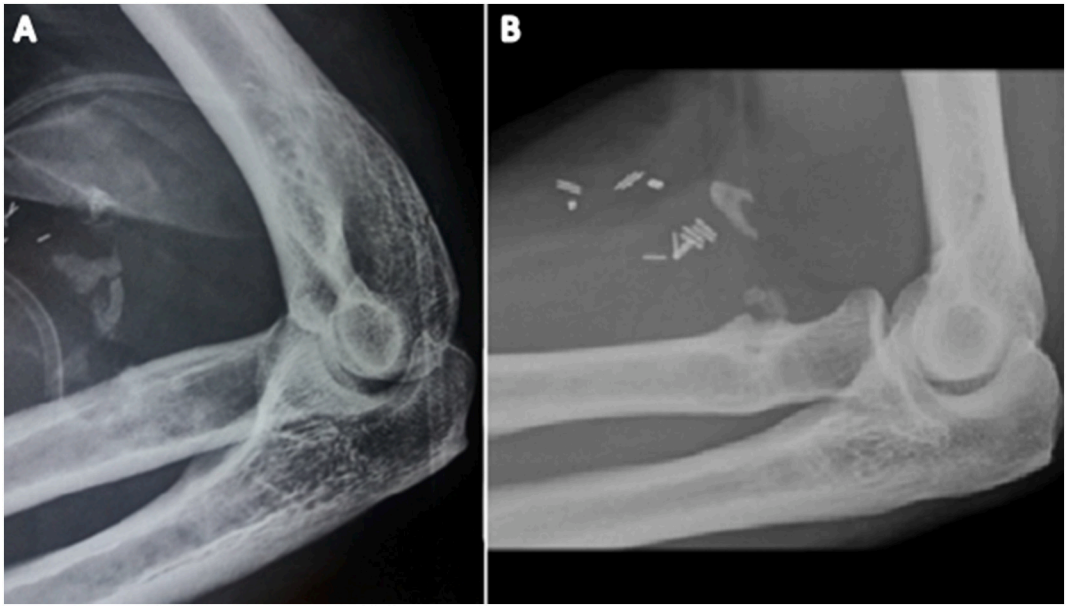

Fig. 2. Postoperative lateral radiograph of the elbow (a) confirming the heterotopic ossification resection. Two-year postoperative lateral radiograph (b) of the elbow did not demonstrate heterotopic ossification relapse.

prevention. [9] In our case, pre-operative radiotherapy was utilized, aiming to prevent HO recurrence. Pre-operative radiation therapy was utilized as it is more comfortable for the patient to be transferred to the radiation therapy department and receive treatment than in the immediate pos-operative period. Studies have demonstrated no difference between postoperative or preoperative radiotherapy in preventing HO progression. [10]

In our case, HO presented solely with median nerve neuropathy, which is a particularly rare clinical manifestation. We believe that this case offers valuable tips to the clinician regarding the management of this rare complication. Firstly, the HO might first declare itself as median nerve compression neuropathy and not as decreased ROM of the elbow. Consequently vigilance is required by the treating surgeon to early recognize this condition and formulate an action plan. The patients should also be informed about this rare complication during the consent process. Imaging with CT and MRI should be considered for diagnosis in symptomatic patients and preoperative planning. Thirdly, prompt excision of the HO along with local radiotherapy might result in complete recovery of the patient.

Symptomatic HO is a rare complication of distal biceps tendon repair, and median nerve neuropathy is one of is possible clinical manifestations. Imaging studies including plain radiographs, CT and MRI can provide accurate diagnosis. The combination of early diagnosis, preoperative radiotherapy and meticulous surgical resection of the lesion can lead to complete neurologic and functional recovery of the patient. Surgeons treating distal biceps tendon injuries should be aware of this entity and the treatment options available.

Informed consent

The patient was informed that data from the case would be submitted for publication, and provided consent.

Declaration of competing interest

All authors have nothing to disclose.

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