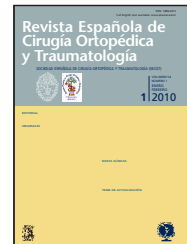


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CLINICAL NOTE

Capitate bone pseudoarthrosis. A case report

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KEYWORDS

Capitate bone;
Pseudoarthrosis;
Herbert-Whipple
screw;
Hand

Abstract

Purpose: The purpose of the study is to review the literature on the treatment of capitate bone fracture and pseudoarthrosis.

Materials and methods: We present the case of a capitate bone fracture that went undetected following trauma caused by forced hyperextension leading to posterior pseudoarthrosis.

Results: A satisfactory result was achieved by surgery with Herbert-Whipple screw fixation preceded by fracture site refreshment.

Conclusions: Hamate bone pseudoarthrosis is a rare cause of occult pain in the wrist. The pain's clinical history, numbness of the distal carpal arch, some radiographic findings and, especially, complementary CT- or MRI studies are elements that must be used to confirm an initial diagnosis.

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PALABRAS CLAVE

Hueso grande;
Seudoartrosis;
Tornillo Herbert-Whipple;
Mano

Seudoartrosis de hueso grande. A propósito de un caso

Resumen

Objetivos: A propósito de un caso de seudoartrosis de hueso grande, nos proponemos revisar la bibliografía sobre el tratamiento de este tipo de fracturas y de su seudoartrosis.

Material y métodos: Presentamos el caso de una fractura de hueso grande desapercibida tras traumatismo en hiperextensión, que originó una seudoartrosis posterior.

Resultados: Tras intervenirse quirúrgicamente mediante osteosíntesis con tornillo de Herbert-Whipple, previa cruentación del foco, se logró una curación satisfactoria.

Conclusiones: La seudoartrosis de hueso grande es una causa infrecuente de dolor oculto en la muñeca. La historia clínica del dolor, la tumefacción sobre el arco carpiano distal, en ocasiones las imágenes radiográficas y, especialmente, los estudios complementarios con TAC o RMN deben confirmar el diagnóstico.

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Introduction

Capitate pseudoarthrosis is an uncommon condition. Despite the clinical relevance of capitate bone fractures, medical literature contains little information about this type of lesion. A non-displaced capitate fracture may at first pass undetected by radiographic imaging.¹ A delay in the diagnosis of this fracture may lead to post-traumatic arthritis, avascular necrosis or pseudoarthrosis. In reference to a case of capitate pseudoarthrosis treated with osteosynthesis using a Herbert-Whipple screw, we decided to perform a literature review.

Case report

We present the case of a right-handed male patient 17 years of age who was examined to evaluate pain in the right wrist five months after a traumatic injury. He was initially

diagnosed with a capitate fracture and was treated with an immobilising forearm plaster cast during six weeks (fig. 1).

Examination revealed persistent pain over the dorsal midcarpal area and a slight limitation of mobility: dorsal flexion was 30°, palmar flexion 30°, and cubital and radial deviations were symmetrical with the contralateral side. CT and MRI imaging studies were ordered which showed that the fracture was aligned correctly, but had not consolidated (fig. 2).

Surgical intervention was proposed upon diagnosing capitate pseudoarthrosis. After an open examination of the pseudoarthrosis from the dorsal side and confirming that fragments were aligned correctly, osteosynthesis was performed with a non-cannulated Herbert-Whipple screw after curettage of the focus, without using a bone graft (fig. 3). Following the intervention, the patient was subjected to preventative immobilization with a posterior plaster cast during three weeks, after which he began rehabilitation therapy.



Figure 1 Anteroposterior profile radiography of the capitate pseudoarthrosis five months after the traumatic event.



Figure 2 CT in coronal and sagittal slices confirming proper fragment alignment.



Figure 3 Postsurgical result with a Herbert screw.

Three months after the surgical intervention, the patient was given a clean bill of health with a pain-free extension of 45° and pain-free flexion of 60°. The patient currently remains asymptomatic eight years after the intervention.

Discussion

The incidence rate of capitate fracture is 1.3% of all carpal fractures;² 0.3% are isolated fractures and 0.6% correspond to carpal fracture dislocations. Of these last, the most well-known are transscaphoid-transcapitate fracture dislocations or scapho-capitate syndrome, and 0.4% are capitate fractures associated with multiple carpal fractures and palmar dislocations of the semilunar. Rand et al² studied eleven patients with acute capitate fracture and two with pseudoarthrosis out of a total of 978 patients treated for carpal fracture in the Mayo Clinic over a period of 13 years. The low incidence rate of this fracture is due to its anatomical location, since it is protected by the surrounding bones (third and fourth metacarpals, semilunar, scaphoids, hamatum and trapezoid),³ which lend it its stability.

Two mechanisms are involved in capitate fracture; the most frequent is falling on the palm with the wrist extended.⁴ Cadaver studies show that there is contact between the capitate and the dorsal surface of the distal radial epiphysis when the wrist is hyperextended.⁵ Another mechanism that must be considered, although it is uncommon, is direct trauma to the back of the wrist. Some authors describe a third mechanism,⁶ called scapho-capitate fracture syndrome,⁷ which follows a fall with the wrist flexed.

Treatment of acute non-displaced fracture of the capitate by immobilisation during six to eight weeks has shown good results.⁶ For displaced fractures, open reduction and internal fixation with a Herbert screw or Kirschner wires are indicated.⁸ However, in fractures that go undiagnosed and therefore without immobilisation, the proximal fragment of

the fracture tends to rotate with the wrist's flexions and extensions. This interrupts revascularisation of the distal fragment and favours the appearance of pseudoarthrosis.⁷ The treatment of choice for capitate pseudoarthrosis with displaced fragments is internal fixation with a spongy or cortico-spongy bone graft.⁹ Our case did not present this rotation, but once curettage of the area was performed, we opted to compress the fracture focus and the final result was optimal.

Yoshihara et al³ identified 12 cases with a mean age of 29 years (ranging from 13 to 54), and the mean diagnostic delay was 26 months (between four months and seven years). The pseudoarthrosis areas were proximal in three cases, medial in eight, and distal in one case. The treatment chosen in ten cases was an autologous spongy or cortico-spongy bone graft with or without internal fixation with a Herbert screw. In another two cases, conservative orthopaedic treatment was employed. Nine of the ten surgical cases achieved fracture consolidation, while pseudoarthrosis persisted in the other three cases. Mnamani et al⁶ also presented 12 reviewed cases of capitate pseudoarthrosis. Six received no treatment following the acute trauma since they were not correctly diagnosed. In another five cases, they were treated with immobilisation. The cause that led to the pseudoarthrosis is not clear, but triggers are thought to be the capitate bone's peculiar vascularisation and poor fracture revascularisation. Green and O'Brien¹⁰ found four cases of capitate pseudoarthrosis with avascular necrosis of the proximal fragment. After studying the vascularisation of the fragment, they found retrograde blood flow in the proximal fragment, which favours the appearance of avascular necrosis.

The difficulty of the initial diagnosis and its characteristic vascularisation are the two main motives for the appearance of capitate pseudoarthrosis following acute trauma. MRI and CT are useful tools for diagnosing this type of injury, particularly when radiography does not offer any information. For these reasons, when a patient reports persistent pain in

the dorsal carpal area, and when the initial radiographies can offer no diagnosis, we should consider using other imaging techniques such as CT and MRI for a suspected case of capitate fracture. In the case of pseudoarthrosis with correctly aligned bone fragments, osteosynthesis with a Herbert screw following curettage of the focus provided good results. In the event of rotation of the proximal fragment, using a bone graft offers a better guarantee of consolidation.

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