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Case Report

Metacarpal stress fracture in amateur tennis player – an uncommon fracture☆

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ABSTRACT

Most stress fractures occur in the lower limbs and are rarely observed in the upper limbs. The second metacarpal is the longest of all the metacarpals and has the largest base, articulating with the trapezium, trapezoid, capitate, and third metacarpal. In athletes, stress fractures in non-weight bearing joints are uncommon. Therefore, the shaft of the second metacarpal bone undergoes a higher load – the maximum tension at the base of the second metacarpal is amplified when the hand grasps a tool such as a tennis racquet.

Fratura por estresse do metacarpo em tenista amador – uma fratura incomum

Palavras-chave:
Fraturas de estresse
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Ressonância magnética

RESUMO

A maioria das fraturas por estresse ocorre nos membros inferiores, raramente nos superiores. O segundo metacarpo é o mais longo e com a base mais larga, articula-se com o trapézio, trapezoide, capitato e terceiro metacarpo. As fraturas por estresse em atletas são incomuns nas articulações sem carga. Portanto, a diáfise do segundo metacarpo sofre carga elevada – a tensão máxima na base do segundo metacarpo é amplificada quando a mão agarra uma ferramenta tal como uma raquete.

☆ Work developed at Hospital São Camilo, São Paulo, SP, Brazil.

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Introduction

Most stress fractures occur in the lower limbs, and are rarely observed in the upper limbs.[1–5] The second metacarpal is the longest, with a wider base, articulates with the trapezium, trapezoid, capitate, and third metacarpal.[1,2] Stress fractures in athletes are uncommon in non-weight bearing joints.[4]

Therefore, the second metacarpal shaft receives a higher load – maximum tension on the base of the second metacarpal is amplified when the hand grips a tool such as a racquet.[2] Knudson et al.[6] demonstrated that the mechanic force on the base of the index finger increases the impact of a *forehand* of tennis.

We demonstrated a case of stress fracture of the second metacarpal in a tennis player caused by the Eastern grip, a situation that was reported only once, according to Balius et al.[2]

Case report

A 27-year-old patient had pain on the right hand for a month. He reported that he had played tennis one hour a week for three weeks, is right-handed, made *backhand* with both hands and Eastern grip (Fig. 1), with a 4 3/8 racquet handle. He reported having pain when serving, and mainly in the forehand movement.

On physical examination pain was present at palpation. He denied having undergone previous surgery, trauma and pain during crossfit exercises. Right hand radiographs showed no changes (Fig. 2). Magnetic resonance imaging (MRI) showed light bone edema in the second metacarpal shaft with periosteal reaction and two lines of hyposignal suggested stress fracture (Figs. 3–5).

The patient underwent treatment with cast immobilization for a month, without physical therapy, he returned to tennis practice after a two-month treatment, with new grip.

Discussion

The second metacarpal has an increased risk of injury when undergoing excess use, wrong technique or inadequate equipment. Waninger et al.[5] informed that the change in the grip technique from Western to Eastern was beneficial to the symptomatic patients who would like to go back to tennis playing.[1,5] To Balius et al.[2] the increase in training intensity, mainly of the forehand, is fundamental in the production of this type of injury, the type of grip is an important factor, but it is not indispensable.[2,5]

The tennis player's wrist and hand, through which the force is transmitted to the racket, are the recipients of a great amount of strength. The repeated movement of the end of the racquet against the palm of the hand can actually be quite traumatic, fracturing one of the carpal bones. Hand injuries in tennis players often occur due to inadequate grip or poor forehand technique; they are advised to seek the help of a teacher.[3]

Generally, radiographs and bone scintigraphy combined with the clinical examination allow the diagnosis of stress fractures.[1] From the radiological findings, it is difficult to differentiate stress fracture from other sclerotic lesions such as osteomyelitis, osteoid osteoma and

Fig. 1 – Eastern grip used by the patient.

Fig. 2 – Right hand anteroposterior radiograph of the normal patient.

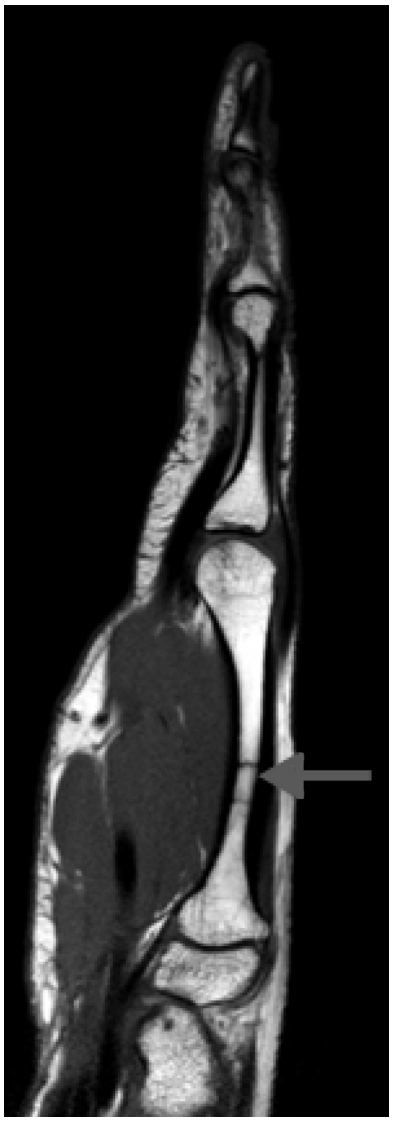

Fig. 3 – T1-weighted MRI in sagittal section demonstrates two lines of hyposignal in the second metacarpal shaft (gray arrow), consistent with stress fracture.

Fig. 4 – MRI in SPAIR in axial section demonstrates the swelling and bone edema on the second metacarpal shaft with periosteal reaction (white arrow).

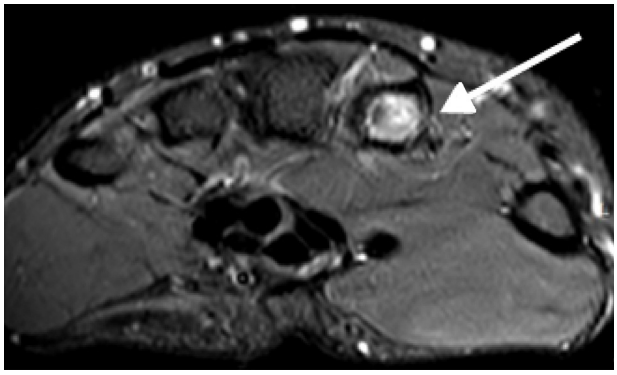

Fig. 5 – T2-weigthed MRI STIR in axial section demonstrates swelling and bone edema on the second metacarpal with periosteal reaction (white arrow).

osteosarcoma.[1,2] Bone scintigraphy is also not a decisive exam for stress fractures, since the increase in isotope activity is often observed in several other pathological conditions.[1]

Computed tomography is more accurate than conventional radiographs in detecting cortical thickening at the endosteal and periosteal sites, caused by new bone deposition, and may reveal the fracture. Umans and Kaye[7] demonstrated that MRI was excellent in demonstrating fracture lines, callus, bone marrow and soft tissue abnormalities associated with stress fractures.

The initial therapy strategy is based on rest from the sport, with gradual return. Previous reports report no pain between 6 and 12 weeks.[2]

Conflicts of interest

The authors declare no conflicts of interest.

REFERENCES

1. Bespalchuk A, Okada K, Nishida J, Takahashi S, Shimada Y, Itoi E. Stress fracture of the second metacarpal bone. Skeletal Radiol. 2004;33(9):537–40.

2. Balius R, Pedret C, Estruch A, Hernández G, Ruiz-Cotorro A, Mota J. Stress fractures of the metacarpal bones in adolescent tennis players: a case series. Am J Sports Med. 2010;38(6):1215–20.
3. Murakami Y. Stress fracture of the metacarpal in a adolescent tennis player. Am J Sports Med. 1988;16(4):419–20.
4. Muramatsu K, Kuriyama R. Stress fracture at the base of second metacarpal in a soft tennis player. Clin J Sport Med. 2005;15(4):279–80.
5. Waninger KN, Lombardo JA. Stress fracture of index metacarpal in an adolescent tennis player. Clin J Sport Med. 1995;5(1):63–6.
6. Knudson DV. Factors affecting force loading on the hand in the tennis forehand. J Sports Med Phys Fitness. 1991;31: 527–31.
7. Umans HR, Kaye JJ. Longitudinal stress fractures of the tibia: diagnosis by magnetic resonance imaging. Skeletal Radiol. 1996;25:319–24.