Case Report : Multiple Stress Fractures (hamate, triquetrum, 2nd, 3rd, and 4th Metacarpal bones) in an Amateur Tennis Player

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Abstract—Background: upper extremity stress fractures are infrequent events in tennis sport. According to our literature, we have only identified 6 case reports of upper limb stress fractures among amateur or professional tennis players. To the best of our knowledge, this is the only case report where stress fractures occur in: hamate, triquetrum, 2nd, 4th, and 5th metacarpal bones simultaneously.

Case presentation: 27 years old lady, presented with acute burning pain at the base of her right thumb. There was not a history of direct trauma. Her symptoms start to appear after 3 days of playing tennis. Physical examination was negative for tenderness, swelling and erythema. The rheumatoid factor was elevated (20.3 iu/ml). the diagnosis of multiple stress fractures was made by the suggestive MRI findings.

Conclusion: Although stress fractures of the upper limbs are not common, it is of a great value to keep the clinical suspicion high towards it. Especially in amateur or professional athletes with persistent or worsening symptoms. The best modality to confirm such fractures is MRI.

Index Terms— Stress fractures, upper limb, upper extremity, tennis.

I. INTRODUCTION

Upper extremities stress fractures are considered rare incidences in the field of sports medicine [1-5]. Moreover, tennis is not believed to be a predisposing sport for such an injury in comparison to other sports [6,7]. According to literature, there are six case reports of stress fractures in tennis players: three in metacarpal bone (MCB), two in hamate, and one in scaphoid [8-13]. To the best of our knowledge, the case we are reporting is the only case in which the patient is presented with stress fractures in hamate, triquetrum, 2nd, 4th, and 5th MCB's simultaneously during playing tennis.

II. CASE REPORT:

A 27 years old lady presented to the emergency department with acute onset of pain in the base of her right thumb. The pain was burning in nature and was not aggravated by movement. She reported that she was engaged in tennis playing for 3 days before her symptoms appeared. She was trained for one hour per day and couched to handle the racquets by the Western grip. No direct trauma to her hand was reported during her training or after.

The physical examination was generally unremarkable since no swelling or erythema was detected. However, laboratory investigations revealed an elevated Rheumatoid factor (20.3 iu/ml). The diagnosis of multiple stress fractures was made upon MRI findings.

On radiological evaluation, x-ray was unremarkable (Figure 1 and 2). Whereas, MRI showed multiple areas of bone marrow edema at the base of the 2nd, 4th, 5th metacarpal bones as well as hamate and triquetrum bones (Figure 3 and 4).

Fig. 1. x Ray of ap wrist and hand shows query fracture over MCB and Carpal bones.

Fig. 2. Lateral view of wrist shows fracture over 3th 4th MCB.

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Fig. 3. MRI showed stress fracture over MCB and Carpal.

Fig. 4. MRI shows stress fracture over MCB with edema.

III. DISCUSSION

It is a fact that stress fractures primarily occur in the lower limbs. However, according to Balius R et al. the upper limbs stress fractures including humerus, ulna, scaphoid, metacarpals and phalanges are becoming more frequent [6].

The increase in training intensity and thus the repeated movement against the palm by the racquet can explain the mechanism of stress injuries to carpal bones in tennis players [6,8,9]. Nonetheless, the patient in our case report had a limited engagement (3 days only) in the sport before the injury developed.

In a more detailed manner, according to Balius R et al. case series, 2nd metacarpal bone was the most common site of stress fracture among all other metacarpals [6]. It was proposed that since the 2nd metacarpal bone is the longest of all metacarpals and its linkage to the 1st, 3rd metacarpals, trapezoid, trapezium and capitate by multiple strong ligaments, grasping a racquet or any other tool makes maximum tension at the base of 2nd metacarpal bone amplified [6].

The poor stroke technique and the type of grip could also be considered as predisposing factors to stress fractures [6,8,9]. In fact, it was first noticed by Lombardo that the Western grip might have a significant effect on the production of such injuries, and this was furtherly supported by Kuriyama and Bepalchuk et al. [10,14,15]. This, in part, can explain the susceptibility in our patient for her fractures.

The only laboratory abnormality we detected in our case

was the elevated rheumatoid factor (20.3 iu/ml). we did not find in our literature any study that could describe the association between elevated rheumatoid factor and the incidence of stress fractures. However, Nampei A et al. showed in his study that rheumatic arthritis (RA) patients are at a significant increased risk for stress fractures [16]. In despite of this fact, our patient is not confirmed to have RA, since the rheumatoid factor is not of a high specific value, and thus further investigations are needed [17].

IV. CONCLUSION

We have presented a case report of a young lady with multiple stress fractures in: hamate, triquetrum, 2nd, 3rd, and 4th Metacarpal bones. The modality on which our diagnosis relied upon was the MRI evaluation. The clinical suspicion of stress fractures should always be maintained in amateur and professional athletes, regardless of their initial x-rays. Especially, if their symptoms get progressively worse. Therefore, we recommend that the most effective investigation to confirm stress fracture is MRI.

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