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CASE REPORT

Martina Lohman · Leena Kivisaari · Esa K. Partio

Stress reaction in the carpal bones caused by breakdancing

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Abstract Stress reactions in the bones of the lower extremities are a common finding on magnetic resonance (MR) imaging. The primary finding in the bone marrow is nonspecific edema without any visible fracture line that may even mimic tumor or infection. Continuing stress may eventually lead to a stress fracture. We present the case of a stress reaction related to breakdancing in a less typical localization, in the triquetral bone in the wrist.

Keywords Carpal bones · Fractures, stress · Hand injuries · Magnetic resonance imaging · Injuries, sports

Introduction

The acrobatic movements in breakdancing are different from the movements in typical dances. Various types of even severe trauma caused by breakdancing have previously been described in the medical literature. As breakdancing is relatively common among teenagers and young adults it is important for physicians to know about its possible sequelae. We describe the case of an osseous stress reaction in the carpal bones caused by breakdancing.

M. Lohman (✉)
Department of Radiology, University of Michigan,
2307 TC/ 0326, 1500 East Medical Center Drive,
Ann Arbor, MI 48109–0326, USA
E-mail: martina.lohman@fimnet.fi
Tel.: +1-734-6478137
Fax: +1-734-9369723

L. Kivisaari
Department of Radiology, University of Helsinki,
Helsinki, Finland

E. K. Partio
Department of Orthopedics and Traumatology,
Dextra Hospital and University of Helsinki, Finland

Case report

A17-year old boy presented with right-sided wrist pain of several months' duration. He was healthy and denied any other joint problem. He could not remember any specific trauma. He did not participate in any classical sports but he was an active breakdancer.

On palpation the wrist was diffusely tender without any specific area of more severe pain. No clinical signs of instability were found, no swelling or signs of tendinitis. The conventional X-ray images (AP, oblique, and lateral) of the wrist were normal.

Because of the prolonged anamnesis and the tenderness on palpation, a magnetic resonance study of the wrist was ordered. The study was performed using a 1.5-T Magnet (Siemens Vision) and a local flexible coil. The following sequences were obtained: T2FS coronal FSE, T1 coronal SE, T1 sagittal SE, T2 axial FSE.

On MR diffuse edema without any fracture line was seen within the triquetral bone (Fig. 1), most obviously on the fluid-sensitive T2FS coronal sequence. No ligamentous abnormality could be detected. The tendons and tendon sheaths of the wrist were unremarkable. No synovitis or erosions suggesting inflammatory arthritis could be seen. The findings within the triquetral bone were considered a nonspecific finding probably related to stress. All other bones of the wrist were normal.

The orthopedic surgeon (E.P.) ordered the patient to rest and stop breakdancing until the symptoms disappeared. After a few months the patient was almost painless and started to breakdance again. The symptoms quickly reappeared and a follow-up MR study (6 months after the first) was ordered. Now, in addition to the triquetral bone, edema was also seen in the lunate and capitate bones (Fig. 2).

Discussion

Originally originating from the gangs in New York, breakdancing is now popular even outside the boundaries of the US. Our breakdancer lives far away from New York, in Scandinavia.

In breakdance acrobatics, spinning movements are often performed with the weight not on the feet, but on the hands and arms, or even on one single hand and arm. These positions may be maintained static for several seconds.

Although case reports and letters to the editor regarding injuries caused by breakdancing have been published, no actual studies of injuries related to

Fig. 1 Profound edema is seen within the left triquetral bone (*arrow*). T2-weighted FSE with fat saturation

Fig. 2 On the follow-up study edema is seen in the left triquetral, lunate, and capite bones (*arrows*). T2-weighted FSE with fat saturation

breakdancing can be found. Almost all of the injuries described are in men, reflecting the fact that few women breakdance.

Trauma described as related to or caused by breakdancing runs the gamut literally from head to foot: spinal fractures or subluxation [1, 2, 3, 4, 5], spinal cord injury [6], back swelling and spinal bursitis [3, 7, 8], subdural hematomas [9], various forms of genitourethral trauma [10, 11, 12], skin problems due to friction [12, 13], pulmonary embolus due to thrombosis in upper extremities [14], pneumothorax [15], problems related to the infrapatellar bursa [12], and various fractures in the lower extremities [12, 16]. Breakdancing can also be a cause of chronic avulsion of the anterior superior iliac spine [17].

Reported trauma to the upper extremity includes one humeral fracture [18], one fracture in the radius, and one in the ulna [12]. Specifically related to breakdancing [19], a fracture of the ulnar corner of the base of the proximal phalanx of the thumb, associated with a partial rupture of the superficial part of the ulnar collateral ligament, has been described. One case report describes a distal ulnar growth plate lesion [20]. To our knowledge, stress reactions in the triquetrum caused by breakdancing have not been described.

In non-weight-bearing bones stress fractures are uncommon. Certain sports such as gymnastics or diving may, however, cause stress reactions due to abnormal weight-bearing of the upper extremity. These stress fractures are usually located distal to the elbow [21]. The wrist pain in our patient had started, and was also worsened, in a breakdance position with all the weight of the body placed on the dorsally flexed wrist and hand.

With repetitive overloading, the osteoclastic activity within the bone exceeds that of the osteoblastic, resulting in bone weakening, microfractures, and eventually a stress fracture [22]. Stress reactions can be diagnosed at an early stage, before the development of a fracture line, using either MR or bone scans [23]. Tumors and infection should be remembered as a possible differential diagnosis.

As stress reactions first present on MR studies with only edema [24] it is important to include fluid-sensitive sequences in the study schema. T2-weighted sequences and STIR sequences show fluid well as increased signal intensity. However, in adults normal bone marrow has a relatively high signal intensity on both T1- and T2-weighted sequences because it contains a high concentration of fat. As this may obscure the visualization of high signal intensity caused by pathologic fluid and edema on T2-weighted sequences, fat saturation techniques should be added to the T2-weighted sequences.

The bright high signal intensity may sometimes, in the acute stage, obscure a thin fracture line on T2-weighted- and STIR sequences. The fracture line may be better visualized on a T1-weighted sequence, which for this reason should be included in the study protocol. A chronic fracture line is more sclerotic, and hence low in signal intensity, on both T1- and T2-weighted sequences.

Conclusions

Clinical and MR findings consistent with stress reactions in atypical locations can be caused by the acrobatic positions in breakdancing causing stress to the normally non-weight-bearing upper extremities.

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