Magnetic Resonance in hand Sports Trauma

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Learning objectives

The purpose of this educational work is to demonstrate the role of MR imaging of high resolution in the most common traumatic conditions hand in athletes.

Background

Most sporting activities can lead to traumatic injuries in the upper limbs. The hand, especially the finger ligament structure, are the first elements in injury. Magnetic resonance imaging (MRI) has become the method of choice for assessment and evaluation of the pathology of stabilizing components of the interphalangeal joints (IP) and metacarpophalangeal (MCP) in athletes, thanks to the use of microscopic coils (BM ) that allow imaging with high resolution in a small field of view.

Imaging findings OR Procedure details

Fig 1. Anatomy of the proximal IP joint: a stabilizing element. A) Coronal STIR with BM. The yellow arrows show the lig. Collaterals. B) Sagittal 3D SPIR. The red arrow shows the volar plate is a fibrocartilaginous structure located on the volar aspect of the joint capsule whose role is to prevent joint hyperextension.

Fig 2. Anatomy of the tendons and the pulley system: 3D SPIR sequence (T1 with fat suppression) with BM provides an excellent anatomical detail of the tendon structures being able to perform multiplanar reconstructions also often help the diagnosis. A) Sagittal section showing with yellow arrow deep flexor tendon (TFP) across the superficial flexor tendon (TFS) marked with red arrow. The green arrow marking the complex is located on the dorsal extensor. B) The system of pulleys: osteofibróticos are channels that bind TF with the skeleton and stabilize to the bending of the fingers. Axial T2-weighted showing two bands of low signal intensity marked with red arrowhead (pulleys) surrounding the TF marked with a green asterisk.

Fig 3. Rupture of the lig. Radial collateral: volleyball player who suffers direct hit ball with hyperextension and adduction of the joint. A) Coronal DP flex surface coil showing capsular distention (red circle). B) Examination of the same joint with BM and SPIR sequence demonstrating the ligamentous injury (yellow arrow) and indemnity of the lig. Contralateral (red arrowhead).
Fig 4. Rupture of the lig. Ulnar Collateral: rugby suffered direct impact on 5th finger. Clinical signs of instability interphalangeal. The coronal and axial T2-weighted BM show made with ligament rupture with laceration of the joint capsule and synovial fluid extravasation (yellow arrow) observed an intact contralateral ligament (red arrowhead).

Fig 5. Stener lesion: Rupture of the lig. Ulnar collateral MCF of 1 out finger retraction: Patient rugby suffered direct trauma to the finger in hyperextension and abduction. SPIR coronal image shows rupture of the ulnar collateral in the distal retraction (red arrow). This allows the filing of the facia-adductor tendon insertion which would produce an incorrect wound healing and post-traumatic instability, LFO which is indicative of surgical treatment.

Fig 6. Avulsion fracture of the radial edge of the distal epiphysis of the 3rd MC: Patient handball goalkeeper suffered direct trauma with subsequent hyperextension pain, functional disability and ulnar instability. A) coronal SPIR where there is avulsion of the proximal insertion of the collateral (red arrow). Small fragment of bone (yellow arrow). B) STIR axial bone showing post-traumatic edema (green asterisk) and the avulsed area (red circle).

Fig 7. Chronic Mallet finger: Patient football goalkeeper with a history of avulsion of the distal insertion of TE (yellow arrow) sagittal STIR. The T2 coronal section shows osteochondral lesion of 1 mm (red arrowhead) and thickening of the lig. Ulnar collateral (green arrow).

Fig 8. Jersey Finger. Avulsion fracture TFP: Occurs after sudden hyperextension as when the fingers are flexed (t grip in sports like rugby and judo). SPIR sagittal images show avulsion of DP and the distal insertion of TFP at the base of the distal phalanx (red arrowhead), the TFP slightly retracted (yellow arrow) and linear fracture line in the distal metaphysis of the middle phalanx (green arrow) with associated bone enema.

Fig 9. Rotura of the pulley A2: Patient taekuondista. A) sign the "bent bow." SPIR sagittal section showing 6 mm gap between the TFP and the bone, normal value 1-2 mm. (Double yellow arrow), indirect sign of rupture of the A2 pulley. B) Axial section of the same patient shows A2 pulley rupture which there is heterogeneous and irregular (red arrowheads).

Images for this section:
Fig. 3: A) Coronal DP flex surface coil. B) SPIR sequence.
Fig. 4: coronal and axial T2-weighted BM
Fig. 5: A) coronal SPIR.
Fig. 7: Sagittal and Coronal STIR.
**Fig. 6:** A) Axial SPIR. B) Coronal STIR.
Conclusion

MR images achieved with microscopy coil made a great contribution in the diagnosis of traumatic pathology of the hand in athletes because they allow the evaluation and detection of acute and chronic injuries millimeter structures, such as stabilizing components of the joints of the finger, thanks to the high resolution give us a small field of view.

Personal Information

References

