[Imaging]

The Practical Uses of Ultrasound in a Clinical Setting to Diagnose Thrombosis of the Ulnar Artery

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A 43-year-old professional skateboarder presented to the sports medicine clinic with complaints of left wrist pain to the ulnar aspect. Two weeks prior to presentation, his wrist became suddenly painful with no specific trauma. He reported a history of falls over the years while skateboarding but none directly correlated to his onset of wrist pain. Radiographic results were negative for wrist or hand fracture. Physical examination yielded tenderness and mild swelling to the ulnar aspect of the wrist. Musculoskeletal ultrasound was used to assess tendon and ligament integrity, all of which was intact. Both radial and ulnar arteries were visualized, and ulnar artery thrombosis was incidentally diagnosed. He was advised to immediately proceed to the hospital, where an open arthrectomy was performed to the ulnar artery the following day. The patient was released from the hospital 2 days later and subsequently made a full recovery.

Keywords: musculoskeletal ultrasound; ulnar thrombosis

A case involving a skateboarder with wrist pain and a history of multiple falls is highly suspicious of a fracture, tendon or ligament damage, or muscle strain. Arterial thrombosis in the wrist is quite unusual for a relatively young and healthy athlete and would be lower on the differential diagnosis. The following is a clinical case that highlights the beneficial use of musculoskeletal ultrasound (MSKUS) in the sports medicine office for musculoskeletal injuries.

CASE

A 43-year-old nonsmoking, healthy, professional skateboarder presented to the sports medicine clinic with a 2-week history of ulnar wrist pain. He reported a history of multiple falls to his hands and wrists through the years. There was mild localized swelling to the ulnar aspect of the hand and wrist, decreased range of motion, and decreased strength in the wrist. Radiographic results were negative. MSKUS was used in the office to assess the ligaments and tendons of the wrist, and an ulnar thrombosis was incidentally seen; this had not been considered prior the MSKUS (Figures 1 and 2).

DIAGNOSIS

This patient developed an ulnar artery thrombosis extending proximally 2.5 cm from the hook of the hamate. MSKUS was

Figure 1. Transverse ultrasound view of the left ulnar artery showing thrombosis at the level of the distal ulna.

performed (GE Logic E with a 12-MHz probe) using grayscale and Doppler imaging with standard wrist protocol. This identified a thrombosis measuring 2.5 cm in length, completely occluding the ulnar artery. No pseudoaneurysm was found, and the triangular fibrocartilage complex, ligaments, tendons, hook of hamate,

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Figure 2. Cross-sectional ultrasound view of the left ulnar artery showing thrombosis at the level of the distal ulna.

radial artery, and median nerve in the carpal tunnel were all normal in appearance. The patient had mild swelling and redness in his hand and wrist with diminished range of motion. Subsequently, an Allen test showed a radial dominance in flow. Ulnar thrombosis, also known as hypothenar hammer syndrome, can develop when there is repetitive trauma to the hypothenar eminence near the hook of the hamate.⁶ The ulnar artery is somewhat exposed in this area. This type of repetitive trauma can lead to damage and exposure of the subendothelial collagen. Thrombosis can present with symptoms of inflammation, pain, and paresthesias to the distal extremities. Arrangements were made for the patient at the hospital for consultation with vascular surgery. The surgeon elected to confirm the diagnosis via arteriography (Figure 3) of the wrist, and the patient was given the option of thrombolytics or an open arthrectomy of the ulnar artery. An open arthrectomy was performed, and the patient recovered well with no complications. He was released from the hospital 2 days after the procedure and has made a full recovery at 2-year follow-up.

DISCUSSION

MSKUS played a vital role in the diagnosis of this patient. The differential diagnosis of a skateboarder with wrist pain can be extensive, and when radiographic results are negative, physicians are left with the history and physical examination to make their assessment. Differential diagnosis for this patient included fracture of the wrist or hook of the hamate, ulnar nerve entrapment at the Guyon canal, muscle or bone contusion, flexor carpi ulnaris tendinopathy, ligament sprain, triangular fibrocartilage complex, Raynaud phenomenon, and artery or vein pathology. This patient, with wrist pain and a negative radiographic finding, would have warranted computed tomography or magnetic resonance imaging (MRI), which would have delayed the diagnosis and its urgent treatment. If MSKUS

Figure 3. Arteriogram of the left ulnar artery showing a blockage of the artery at the distal third of the ulna. No flow is seen distal to the blockage.

had yielded negative results, the next appropriate step would have been to obtain MRI, which is helpful in the evaluation of tendons, ligaments, and vessel pathology but is much more costly and time-consuming. Since MSKUS was available in the office to make the diagnosis, this patient received prompt treatment. MSKUS technology is improving for visualization of soft tissue, and it has the potential to be the only necessary modality needed for a diagnosis when radiographic results are negative. Studies comparing MRI to MSKUS show equal value in the diagnosis of joint synovitis¹ and rotator cuff injury.² Arteriography was performed in this patient at the surgeon's discretion as the gold standard for artery thrombosis. This study determined that there was insufficient collateral blood flow in the palmar arch from the radial artery, an important factor in determining the surgical approach. With MSKUS, providers are able to receive patient feedback during the examination and can visualize tendons, ligaments, nerves, and vasculature dynamically, adding a useful dimension in the diagnosis of musculoskeletal injuries.

MSKUS technology has improved greatly in recent years and is becoming effective in the outpatient setting. MSKUS is a safe, practical, and quick alternative to MRI or computed tomography. Outside an obstetric or cardiology office 30 years ago, office use of an ultrasound machine was rare. Overall MSKUS usage is up 200% from 1996 to 2006 based on Current Procedural Terminology codes.⁵ Applications in sports medicine have increased MSKUS use in the office—in particular, ultrasound-guided injections. It is now becoming the standard of practice to use ultrasound when doing certain injections and aspirations because it improves accuracy with better patient results.³ MSKUS is being used in many settings that were never explored before. Malone et al described a new technique using MSKUS in carpal tunnel as an alternative to open-release surgery utilizing percutaneous hydrodissection of the median nerve.⁴

Ulnar artery thrombosis is a rare entity, and the potential for morbidity with delayed or missed diagnosis can be extensive. MSKUS played an important role in the evaluation and diagnosis of this patient.

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