Sonographic Findings of a Semi-Professional Football Player with 1st MTP Joint Pain: Gout or Turf Toe?
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PURPOSE

- **Aim:** To review the applications and indications of sonography for forefoot disorders, especially gout and plantar plate injury of 1st MTP joint.

**BACKGROUND**

- **Utilization of Musculoskeletal Point-of-Care Ultrasound (POCUS)**
  - Portable, easily accessible, real-time, dynamic exam facilitates better clinical correlation, minimal harm and low cost.
  - Ultrasound can specify the cause when correlated well with physical exam.

- **Forefoot disorders**
  - Metatarsalgia: Refers to any conditions causing metatarsal region pain.
  - Applications of US: Gout, pseudogout, RA, OA, Morton’s neuroma, bursitis, bone disorders, foreign bodies, mucous cysts, overuse arthropathy, plantar plate injury, stress fracture, tendinopathy.
  - Gout: Inflammatory arthritis conditions by MSU crystal deposition in joints and other tissues producing acute arthritis attack and chronic arthropathy.

- **Characteristic US findings of Gout (OMERACT definitions)**
  - Specific: double contour sign, aggregates and tophus
  - Non-specific: synovial fluid/hypertrophy, power doppler signal, erosions

- **Turf toe injury:** Injury of plantar ligamentous complex by axial load delivered to a foot in a fixed equinus position at the ankle with the great toe in extension at the MTP joint.

- **Grading:** Mild sprain of the plantar ligamentous complex (Grade I) to complete disruption of these soft tissue structures (Grade III)

- **Treatment:** Initially treated conservatively despite of any grade

- **Indications for surgery:** Large capsular avulsion with joint instability, diastasis of bipartite sesamoid, diastasis of sesamoid fracture, retraction of sesamoid, traumatic hallux valgus deformity, vertical instability, loose body and/or chondral injury in MTP joint, failed conservative treatment.

- **US findings of plantar plate injury**
  - 91% sensitivity, 44% specificity
  - Hypoechoic defects puncrating homogenous hyperchoic plantar plate, increased vascularity on Color & Power Doppler

REFERENCE


CONTACT INFORMATION

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CASE PRESENTATION

- **History:** 48-year-old male who is a retired semi-professional football player. He has had mild intermittent toe pain following several significant turf toe injuries over last 2 years playing football. Has never been evaluated.
  - 1 week prior to presentation, he developed acute left great toe pain while walking. He denies recent injury. Pain significantly worse than previously. He is unable to put his shoe on secondary to pain and walks with a limp. Pain/swelling minimally improved despite Ibuprofen 800mg TID for 1 week.
  - Preliminary evaluation by physician revealed red and swollen left 1st MTP. He was advised to take Ibuprofen and Tylenol 1 more week.
  - 4 weeks later, he returns to clinic. Pain, erythema and swelling of left 1st MTP improved significantly, but still demonstrates tenderness to palpation. Pain worsens with weight-bearing on toe flexion. Urice acid level and X-ray of foot ordered. Point-of-Care ultrasound performed.

- **Physical Exam:** General, cardiopulmonary, neurologic (unremarkable)
  - MSK: Moderate tenderness on left 1st MTP joint with mild erythema and swelling. Slightly limited extension of 1st MTP of left foot. Slight limp.

- **Differential Diagnosis:**
  - Gout, pseudogout, tendinopathy of HLF or HLE tendons, bursitis, sesamoiditis, recurrent Turf Toe, plantar plate injury, OA of 1st MTP joint.
  - RA, stress reaction/fracture, intra-articular body

- **Labs**
  - Uric Acid: 7.2
  - CBC, BMP, ESR: normal

- **X-ray of Left Foot/Toe:** Joint space narrowing, spur and subchondral cyst on lateral side of 1st MTP, compatible with osteoarthritis.

- **Point-of-Care Ultrasound (POCUS)**

CASE DISCUSSION

- **Factors suggesting acute gout attack**
  - (1) Acute podagra
  - (2) Elevated uric acid
  - (3) Double contour sign & erosion (US)

- **Factors suggesting chronic plantar plate injury / consequential OA**
  - (1) Chronic lingering pain
  - (2) Recurrent Turf toe
  - (3) Arthritic changes (X-ray)
  - (4) Plantar plate insufficiency / arthritic changes at plantar plate insertion
  - (5) Large oval calcification within the synovial membrane

- **Plan**
  - Follow-up on MRI to confirm intra-articular body and assess extent of damage on plantar plate-ligaments complex and intra-articular cartilage. Will need to determine the need for foot and ankle surgeon referral

REVIEW: IMAGING FOR FOREFOOT DISORDERS

- **Standard Radiography (AP& Oblique)**
  - First-line study, more panoramic than US.
  - Allows dynamic exam of joints, tendons and nerves. No contraindications.
  - Limited assessment of internal structures of joints, bones, bone marrow.

- **Ultrasound Scan (US)**
  - Accurately guides local injections and other intervention procedures.
  - Can dynamically assess joints, tendons and nerves. Allows repeat scans.
  - Limited assessment of internal structures of joints, bones, bone marrow.

- **US findings of the Normal / Abnormal Plantar Plate**
  - Acute changes of plantar plate: Plantar plate thickening, heterogeneity, hyperemia, fibrosis of soft tissues superficial to abnormal plantar plate
  - Chronic changes of plantar plate: Osteophyte formation, replacement of normal hyperchoic fibrocarrilage with focal hypochoic defects

- **Ultrasonography in Gout Diagnosis**
  - Double contour sign
  - Hyperechoic cartilage, synovitis
  - Hypoechoic synovial membrane, tophaceous deposits

- **Sonographic Findings of Other Forefoot Disorders**
  - Ultrasound is a reliable, accurate and cost-effective tool for evaluating common foot disorders such as gout, plantar plate injury, tendinopathy, ligament injury, bursitis, Morton’s neuroma, and foreign body.

CONCLUSION

- Ultrasound should be the first-line imaging modality combined with plain films for foot disorders before considering more expensive and less assessable imaging techniques such as MRI.