Ultrasound Diagnosis of Adventitial Bursitis at The First Metatarsal Head

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Abstract

Adventitial bursitis in the plantar aspect of the first metatarsal heads is characterized by abrupt onset of localized deep and discomfort in the plantar aspect of the first metatarsal head aggravated by walking. Diagnosis of adventitial bursitis is difficult to be established based solely on clinical findings, conventional radiography does not allow diagnosis of soft-tissue disorders especially bursitis. Musculoskeletal ultrasound is a useful imaging modalities to support the clinical diagnosis of soft tissue disorders such as bursitis. To our knowledge, sonographic findings of adventitial bursitis have been rarely reported. Here we present a case report of a patient with pain in the plantar aspect of the left first metatarsal head.

Keywords: *Ultrasound diagnosis, adventitial bursitis, metatarsalgia*

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Diagnosis dengan Ultrasound untuk Bursitis Adventisial pada Caput Metatarsal Pertama

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Abstrak

Bursitis adventisial pada sisi plantar metatarsal pertama dicirikan oleh nyeri yang tiba-tiba muncul dan rasa tidak nyaman pada sisi plantar caput metatarsal pertama. Kondisi tersebut diperparah oleh berjalan. Diagnosis bursitis adventisial sulit untuk ditegakkan hanya dari pemeriksaan klinis. Radiografi konvensional tidak dapat mendiagnosis gangguan jaringan lunak khususnya bursitis, Ultrasonografi musculoskeletal dapat digunakan sebagai modalitas untuk mendukung diagnosis klinis gangguan jaringan lunak seperti bursitis. Selama ini jarang ditemukan adanya laporan mengenai temuan sonografik adventisial bursitis. Berikut dilaporkan kasus mengenai pasien dengan nyeri pada sisi plantar caput metatarsal pertama yang ternyata adalah bursitis adventisial.

***Kata kunci**: Diagnosis ultrasound, bursitis adventisial, metatarsalgia.*

Introduction

There are two types of bursae that have been described: synovial and adventitious.[1] ***Synovial bursae or true bursae*** are synovial structures that decrease the friction between moving structures. These bursae develop during the later half of intrauterine life in areas where a degree of motion is required between skin and bone, and between tendons and prominences over which tendons are moving. They may lie between muscle and bone, tendon, or ligament (submuscular synovial bursae). They may also separate aponeurotic areas from bone (subfascial bursae). ***Adventitious bursae or connective bursae*** develops after birth in response to friction and pressure in superficial fibrous connective tissue in which the skin must move freely over bony surfaces. A true endothelial synovial lining is never found in adventitious bursae.[2] Adventitious bursae could be found almost anywhere, usually adjacent to bony prominences[2-4,9], at sites where subcutaneous tissue is exposed to high pressure and friction such as amputation stump and at the foot and ankle, where the most common locations are over the medial and the plantar aspect of the first metatarsal head.[5,7,9]

Adventitious bursitis (the inflammation of adventitious bursa) in the plantar aspect of the metatarsal head is caused by repetitive stress and strain of the foot during walking or prolonged weight-bearing, causing metatarsalgia, and has differential diagnosis with intermetatarsal bursitis, Morton's neuroma, or soft tissue neoplasms.[1,2,6-9] The diagnosis could be difficult only with physical examination, particularly if the patient has very thick metatarsal fat pad.[7-9] The classic clinical presentation of bursitis are abrupt onset of localized deep and aching discomfort aggravated by any movement of the structures adjacent to the bursae, sudden onset of swelling, soft tissue tumour, redness, or tenderness after repetitive activity that is localized to the bursa and not the joint.[1,9]

Ultrasound (US) evaluation for foot bursitis particularly in the plantar aspect of the foot is superior to just clinical examination or plain radiographs at visualizing soft tissue, less expensive and time consuming than MRI and allows a real time examination in acute setting according to the patient's complaint. All those advantages make the US a valuable tool to diagnose the bursitis.[5-7,9]

In this case report, we present a patient with adventitious bursitis in the plantar aspect of the left first metatarsal head. The aim of this case report is to give better understanding in diagnosing adventitious bursitis in the plantar aspect of the first metatarsal head and to demonstrate the usefulness of US examination in the evaluation and rehabilitation treatment of this kind of pathology.

Case presentation

A 53-year-old household woman complained an abrupt onset of localized deep and aching discomfort of the plantar aspect of the left first metatarsal head for 2 weeks since she held her daughter wedding party. On that occasion, she had to stand for 4 hours with high-heeled shoes. The pain was aggravated by walking and standing with the foot flat on the ground. She stated that she did not have any sensory changes (paresthesia) or changes in strength. She denied of previous pain, trauma, rheumatic diseases, fever or other constitutional symptoms. Results of a physical examination revealed that visual analogue scales (VAS) for pain was 6, antalgic gait and left foot pain during the stance phase of

gait, left foot pes cavus and equinus (Figure 1a-b), no open wound, no hallux valgus or callus, swelling around the plantar aspect of the left first metatarsal head and pain with deep palpation and passive dorsiflexion of the great toe, Mulder's sign for Morton's neuroma was negative, clinical signs of infection and neurological deficits were absent. The left foot and ankle X-rays revealed impression of soft tissue swelling in the plantar aspect of the left first metatarsal head, no bony abnormalities. Blood analysis showed slight increased of ESR and CRP.

Deep palpation on the plantar aspect of the left first metatarsal head (as the most painful area that the patient complaint) was done prior to US examination (performed with longitudinal and transverse scan). The US examination was performed using MyLab 20 gold (Esaote, Italy) and a 18-10-MHz linear array transducer. Patient position was prone with a slight ankle dorsifn with a support under the ankle joint.

Figure 1. Patient in Standing Position Viewed from Ante rior (a) and posterior (b) demonstrated left foot pes cavus and equinus.

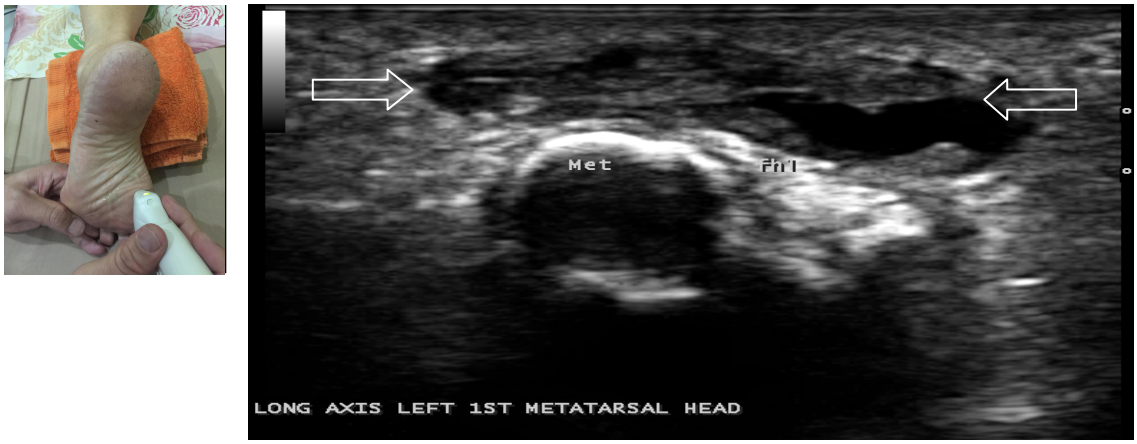

Figure 2a. Longitudinal 18-10 MHz US scan of the plantar aspect of the left first metatarsal head (Met) show a flattened compressible superficial lesion (arrow) with well defined wall and complex fluid with mixed internal echotexture, represent fluid and intralesional stringor band-like structures as hypertrophic synovial tissue separated from the flexor hallucis longus tendon (fhl).

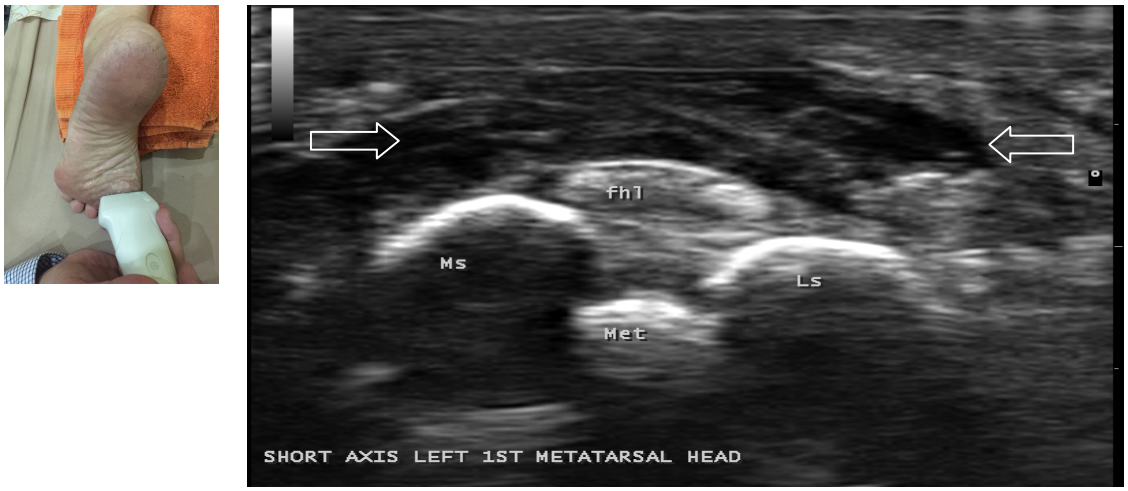

Figure 2b. Transverse scan showing the same lesion separated from the flexor hallucis longus tendon (fhl) and located in close relationship with medial sesamoid (Ms) and lateral sesamoid (Ls).

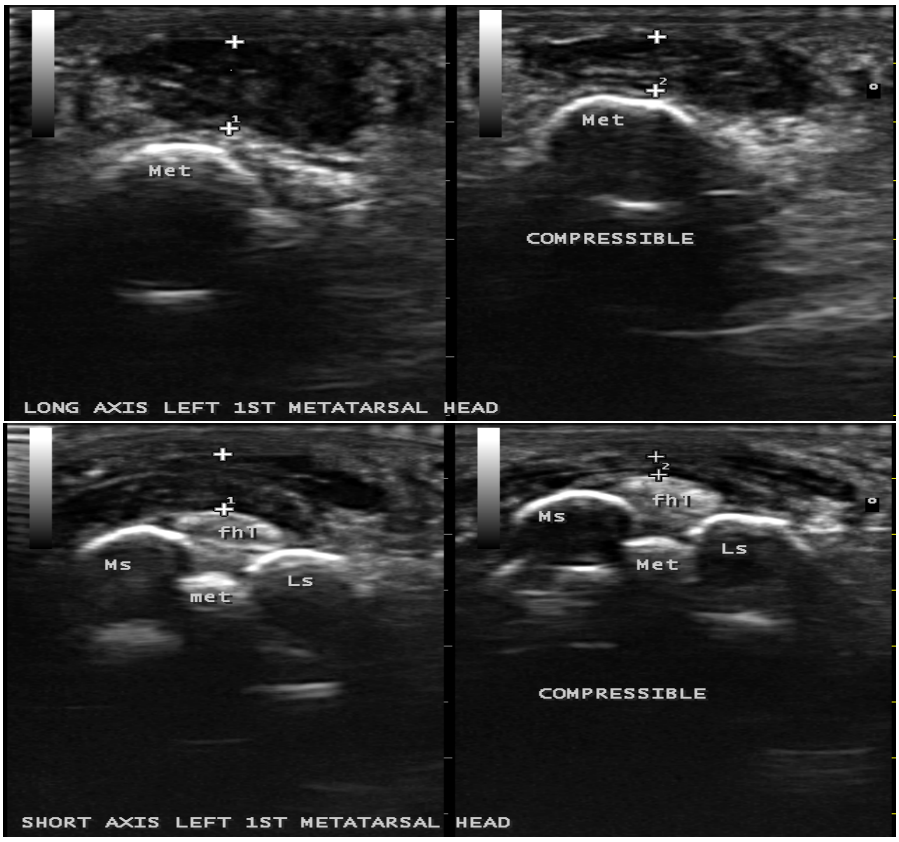

Figure 3. Longitudinal (a) and transverse (b) 18-10 MHz US imaged obtained over the plantar aspect of the left first metatarsal head (Met) showing compressibility of the superficial focal mass. Fhl= flexor hallucis longus tendon, Ms= medial sesamoid, Ls= lateral sesamoid, Met= metatarsal head

Compression scan, Doppler and comparison with the non painful foot were also performed.

US imaging in the plantar aspect of the left first metatarsal head revealed a flattened compressible superficial focal lesion with well defined wall and complex fluid with mixed internal echotexture (containing both fluid and synovial hypertrophy), distinguishable from the flexor hallucis longus tendon, superficial to the sesamoid bone with negative power Doppler signals, no joint effusion or tenosynovitis (Fig. 2a-b, 3a-b).

Figure 4. US guided aspiration using an in-plane approach. Fhl= flexor hallucis longus tendon, Ms= medial sesamoid, Ls= lateral sesamoid, Met= metatarsal head.

Those US findings are representing a bursitis in the plantar aspect of the left first metatarsal head. Bursal fluids was subsequently aspirated under US guidance (Fig. 4) and laboratory fluids analysis demonstrated. Clinical presentation and US examination of this patient suggested the diagnosis of adventitious bursitis in the plantar aspect of the left first metatarsal head and the patient continued to have Physical Medicine and Rehabilitation programs.

Discussion

History of the patient, clinical presentation, blood analysis and X-rays findings of this patient rule-out the diagnosis of Morton's neuroma, arthritis, gout, infection, trauma, diabetic callus and adventitious bursitis on the medial aspect of the first metatarsophalangeal joint with hallux valgus as the possible causes for metatarsalgia[1,6,8]

US examination in this patient revealed a bursitis in the plantar aspect of the left first metatarsal head. Given its compressibility (Fig. 3a-b) and anatomical location a diagnosis of adventitious bursitis was given (bursitis is compressible while other soft tissue tumours e.g., Morton's neuroma or neoplasms, are mostly uncompressible). It was not an intermetatarsal bursitis (usually found in the first through fourth intermetatarsal space and frequently associated with Morton's neuroma)[7,9]. US also demonstrated a complex fluid with mixed internal echotexture appearances within the bursa which represent fluid and synovial hypertrophy. Adventitious bursitis does not have true endothelial synovial lining but only synovium like columnar cells[3], lining the bursal cavity.

A distinction between inflammatory or non-inflammatory bursitis is sometimes difficult to given by US.[7] Bursal fluids analysis under US guided aspiration in this patient demonstrated non-inflammatory bursitis. The predisposing factors for this patient were: pes cavus with equinus foot, repetitive stress and strain of the foot during walking, and prolonged weight-bearing[8] (since she standed for 4 hours with high-heeled shoes). High-heeled shoes will put more stress on the metatarsal head of the pes cavus with equinus foot and could develop adventitious bursitis.

Conclusion

US examination is a valuable tool, superior to clinical examination, in the diagnosis of adventitious bursitis or other deep synovial bursitis of the plantar aspect of the foot and it also could be of help in the US-guided aspiration and injection.

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