

Rheumatology Quiz

Anawat Suesuwan

Internal Medicine Center, Vibhavadi Hospital, Bangkok 10900, Thailand.

A 65-year-old woman with rheumatoid arthritis exhibited malalignment of the toes in her right foot, as depicted in Figure 1. Physical examination revealed no signs of active arthritis in any other joints.



Questions

1. What is her clinical sign?
2. What are the conditions associated with the sign?

Answers

1. Daylight sign. Also known as opening toes, splay toe and Sullivan's sign.
2. Intermetatarsal bursitis, synovitis, rheumatoid arthritis, Morton's neuroma, and plantar plate tear.

Ultrasound examination of the case identified a well-defined heterogeneous hypoechoic area between the second and third metatarsal heads, predominantly on the plantar aspect (Figure 2). The lesion was displaceable upon application of the MTP squeeze test. The diagnosis of intermetatarsal bursitis was established. Following an intra-bursal corticosteroid injection, the deformity resolved.

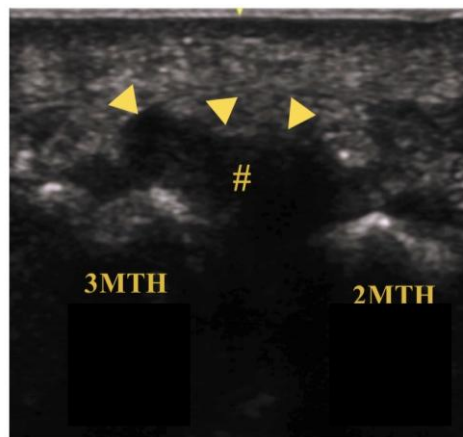


Figure 2 Transverse image over plantar aspect of 2nd and 3rd metatarsal head. # and Arrow head hypoechoic bursa; MTH, metatarsal head.

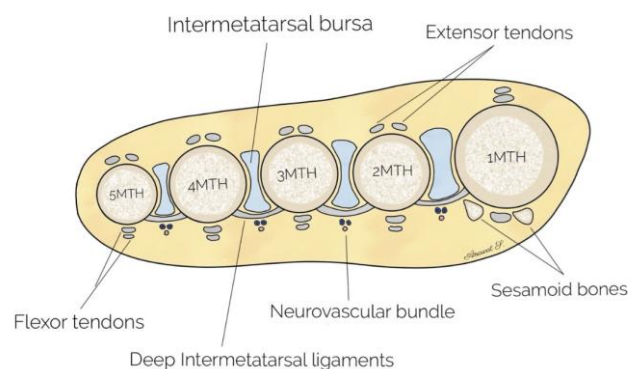


Figure 3 (Image by the author)

Short review

Daylight sign

The Daylight sign is a clinical finding in the forefoot characterized by the separation or widening of the space between adjacent toes. This metaphor came from separating the toes so that daylight becomes visible between them.¹ Several terms are used to address this symptom including spreading of the toes, opening toes, splay toe, Sullivan's sign and Vulcan salute sign (V-sign). "Sullivan's sign" is widely cited as the spreading of the toes in Morton's neuroma; however, its origins are not as formally documented as other medical eponyms. "Vulcan salute sign", the visual inspiration is Leonard Nimoy's Spock from *Star Trek*. Gally J, et al.² explicitly used the term to describe the proximal interphalangeal divergence seen on X-rays, which mirrors the famous "Live Long and Prosper" hand gesture. The "Vulcan sign" is also used to describe a specific splaying of the 2nd and 3rd toes, which can indicate a plantar plate tear or collateral ligament injury.³

Clinical Presentation and Causes

The sign is evident upon physical examination and manifests when an inflammatory process or mass in the intermetatarsal space causes the toes to separate or MTP joint instability due to any underlying cause (plantar plate tear, or collateral ligament injury). Key causes include:

- **Synovitis:** Inflammation of the synovial membrane in the metatarsophalangeal (MTP) joints is a classic cause, often noted in the first and second clefts.⁴
- **Morton's Neuroma:** Morton neuroma is symptomatic perineural fibrosis due to chronic entrapment of the common plantar digital nerve. This condition can also cause toe divergence due to its mass effect. When visible on radiographs, this divergence is sometimes called the "Vulcan salute sign" or "V-sign".²
- **Intermetatarsal Bursitis (IMB):** Intermetatarsal bursitis is inflammation of a small fluid-filled sac located between the metatarsal heads, cranial to the deep transverse intermetatarsal ligament (figure 3). Recent imaging studies suggest that IMB is a major contributor. Enlargement of the bursa due to inflammation creates a mass effect that pushes the adjacent metatarsal bones and toes outward. IMB is suspected to be a contributing factor in the development of Morton's neuroma⁴ and can be coherent (neuroma-bursal complex).⁵
- **Plantar Plate Tear or Collateral Ligament Injury:** Katherine Gavin³ proposes the use of a term, the "Vulcan sign," to increase the likelihood of plantar plate and/or collateral ligament pathology as it relates to MTP joint instability.
- **Rheumatoid Nodules:** Less commonly, these nodules can present in the intermetatarsal space and cause toe spreading. Interestingly, rheumatoid nodules can coexist with Morton's neuroma and can be the initial presentation of rheumatoid arthritis.⁶ Histologic finding that suggest rheumatoid nodule is fibrinoid necrosis rimmed by palisaded histiocytes and fibroblasts.
- **Freiberg's Disease:** Freiberg's disease is a form of osteonecrosis of the metatarsal head. This condition leads to sclerosis, flattening, and collapse of the metatarsal head, resulting in osteoarthritis of the MTP joint. Riegger M, et al.⁷ reported a case of Freiberg's disease characterized by the Daylight sign. The relatively short metatarsal responsible for the lateral deviation of the adjacent toe caused a caudal rotation.

Severe synovitis in the forefoot can manifest as a characteristic "Daylight" sign, characterized by the separation of adjacent toes. Persistent inflammation and proliferation within the MTP joint synovium lead to the stretching and weakening of the joint capsule, resulting in the loss of integrity of stabilizing structures such as the collateral ligaments and plantar plate.⁸ Joint capsule and plantar plate pathology are also prevalent in the painful forefoot of patients with rheumatoid arthritis (RA).⁹ Metatarsalgia accompanied by the Daylight sign in patients suspected of inflammatory arthropathy can indicate the presence of intermetatarsal bursitis, suggesting RA with a sensitivity of 69% and specificity of 70%.⁴ Consequently, the Daylight sign serves as a significant indicator of early and active RA. It can be the initial symptom of RA, appearing even before clinical joint swelling becomes palpable within the MTP joints themselves.

Table 1 Differential diagnosis of Daylight sign and Metatarsalgia

Pathological conditions	Primary etiology	Nature of pain	Key clinical features	Ultrasound findings ¹⁰
Morton's neuroma	Perineural fibrosis due to chronic entrapment	Sharp, burning, electrical, radiating to toes	Relieved by removing shoes; positive Mulder's click test	Well-defined hypoechoic mass with "Rat's tail sign"
Plantar plate tear	Mechanical overload, mucoid degeneration	Deep, dull, mechanical ache beneath the MTP joint	Floating toe; loss of toe purchase; localized plantar tenderness; positive Drawer test	Discrete anechoic cleft or area of heterogeneous echotexture in the plantar plate
Rheumatoid arthritis	Synovitis, intermetatarsal bursitis, rheumatoid nodule	Deep aching, feeling of walking on glass/pebbles, morning stiffness	Symmetric polyarthritis; boggy swelling; positive MTP squeeze test	Synovitis, hypoechoic, poorly compressible, non-displaceable intra-articular tissue, with or without increased vascularity
Intermetatarsal bursitis	Inflammatory fluid accumulation in bursa	Dull ache in the interspace, worsened by lateral compression	Forefoot splaying; often co-exists with RA or neuroma; highly compressible on US	Compressible, hypoechoic area in intermetatarsal space
Freiberg's disease	Avascular necrosis of the metatarsal head	Deep progressive bone pain localized to the joint	Severe loss of joint range of motion; flattening of the metatarsal head on X-ray	Irregular deformed flattened metatarsal head in a longitudinal view

To cite: Suesuwan A.

Thai J Rheum. 2026;3(2):86-90. Available from: <https://he04.tci-thaijo.org/index.php/tjr>

References

1. Anthony D Woolf. History and physical examination. In: Hochberg MC, Gravallese EM, Smolen JS, van der Heijde D, Weinblatt ME, Weisman MH, editors. *Rheumatology*. 8th ed. Philadelphia: Elsevier; 2023. p. 236.
2. Galley J, Sutter R, Germann C, Pfirrmann CWA. The Vulcan salute sign: a non-sensitive but specific sign for Morton's neuroma on radiographs. *Skeletal Radiol* 2022;51(3):581-6.
3. Gavin K. The Vulcan Sign: A Radiographic and Clinical Indicator of Plantar Plate and Collateral Ligament Injury. *Western Journal of Orthopaedics* 2020;9:1.
4. Larsen SB, Sogaard SB, Nielsen MB, Torp-Pedersen ST. Diagnostic Considerations of Intermetatarsal Bursitis: A Systematic Review. *Diagnostics (Basel)* 2023;13(2):211.
5. Cohen SL, Miller TT, Ellis SJ, Roberts MM, DiCarlo EF. Sonography of Morton Neuromas: What Are We Really Looking At? *J Ultrasound Med* 2016;35(10):2191-5.
6. Chaganti S, Joshy S, Hariharan K, Rashid M. Rheumatoid nodule presenting as Morton's neuroma. *J Orthop Traumatol* 2013;14(3):219-22.
7. Riegger M, Guidi M, Filardo G, Candrian C. Splay Toe after Freiberg-Köhler's Osteonecrosis: A Case Report of a Successful Operative Treatment in a Rare Multiplanar Foot Deformity. *Case Rep Orthop* 2020;2020:8830166.
8. Jaakkola JI, Mann RA. A review of rheumatoid arthritis affecting the foot and ankle. *Foot Ankle Int* 2004;25:866-74.
9. Siddle HJ, Hodgson RJ, O'Connor P, Grainger AJ, Redmond AC, Wakefield RJ, et al. Magnetic resonance arthrography of lesser metatarsophalangeal joints in patients with rheumatoid arthritis: relationship to clinical, biomechanical, and radiographic variables. *J Rheumatol* 2012;39(9):1786-91.
10. Chen X, Zhou G, Xue H, Wang R, Bird S, Sun D, Cui L. High-Resolution Ultrasound of the Forefoot and Common Pathologies. *Diagnostics (Basel)* 2022;12(7):1541.