CASE REPORT

Fibular insufficiency fracture: an under-reported complication of advanced tibialis posterior dysfunction

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SUMMARY

We present a case of fibular insufficiency (stress) fracture in a patient with pre-existing asymptomatic advanced tibialis posterior dysfunction. The patient had severe planovalgus (flat foot) deformity but no pain before the injury; hence had never sought any treatment. She was first treated conservatively for the fracture which failed to control the deformity and had ongoing symptoms. She eventually required tibio-talo-calcaneal fusion. To the best of our knowledge, this is the first case report of this condition in the English literature. In patients with severe tibialis posterior dysfunction, weight-bearing axis passes directly from calcaneum to fibula making it vulnerable to fracture. Patients should be made aware of this risk even if they are asymptomatic and encouraged to use orthotic support for protection against insufficiency fractures.

BACKGROUND

Tibialis posterior dysfunction (adult/acquired flat foot) is a common foot and ankle problem starting with degeneration/inflammation of the tibialis posterior tendon leading on to a flat foot deformity. Most patients can be treated initially without surgery using orthotic supports, but patients with severe deformity may require corrective surgery. It is not uncommon to find patients with acquired flat foot deformity who are asymptomatic and hence not using any orthotic support. This is true even in stage 3 and stage 4 dysfunction where the deformity is severe, but they do not get always referred to secondary care promptly.

We report a case of previously undiagnosed tibialis posterior dysfunction presenting with insufficiency fracture of fibula. Tibialis posterior dysfunction is a very common condition; however, a fibular insufficiency fracture is an uncommon, avoidable complication of it. This should prompt the treating physician to warn patients with severe deformity against non-compliance to orthotic treatment.

CASE PRESENTATION

A 69-year-old woman was referred with worsening flat foot deformity to orthopaedic clinic. The deformity had been present for a number of years and was largely ignored until it started causing lateral sided leg pain in the preceding weeks.

There was no history of diabetes or any previous ankle injury. She had received no orthotic treatment for her flat foot in the past. She reported no pain in

the opposite side where she had a similar deformity. She could not do even a double heel raise with loss of inversion strength and no power on testing tibialis posterior on either side.

INVESTIGATIONS

Radiographs showed a healed high fibula fracture ([figure 1](#)). MRI was considered unnecessary for the painful side owing to the presence of ankle arthritis and valgus deformity on radiographs which confirmed advanced tibialis posterior dysfunction. An MRI scan was done for the opposite ankle when it became symptomatic later which confirmed stage 4 tibialis posterior dysfunction. Dual energy X-ray absorptiometry scan in the previous year had shown evidence of osteopenia, and she was already on calcium supplements.

DIFFERENTIAL DIAGNOSIS

The diagnosis was insufficiency fracture of fibula secondary to untreated & advanced tibialis posterior tendon dysfunction (adult flat foot).

TREATMENT

She was given orthotic weight-bearing boot; however, symptoms failed to settle down. Owing to background osteopenia and fixed deformity with arthritis in the ankle joint, she was an unsuitable candidate for joint sparing surgery. She eventually underwent a tibio-talo-calcaneal fusion (fusion of both ankle and subtalar joints), which successfully resolved her symptoms, and she was brace free by 6 months ([figure 2](#)).

OUTCOME AND FOLLOW-UP

She is now awaiting a similar procedure on the opposite side which became symptomatic during this period and has been protected with orthotic supports in the interim.

DISCUSSION

A review of English literature identified one other case report of a 44-year-old Chinese textile worker with flat foot deformity who developed lateral ankle pain without any preceding injury.¹ Her CT and MRI scans showed a stress fracture of distal fibula. The investigations did not show any other medical problems, and there is no comment on bone density. The patient was treated non-operatively in a cast, and the fracture healed. The

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Figure 1 Case 1—healed fibula fracture with persistent planovalgus deformity.

diagnosis of tibialis posterior dysfunction was made on clinical examination of both injured and uninjured sides. The authors did not offer surgical correction of the flat foot deformity and does not mention orthotic supports. They do discuss whether this may be an indication for surgery in these patients. There are reports of acute tibialis posterior tendon rupture with associated pronation-type ankle fracture requiring surgical repair of the torn tendon along with ankle fracture fixation,² but these are acute traumatic, unstable fractures rather than insufficiency fractures presenting subacutely.

Insufficiency fractures are stress fractures of weak or osteopenic bone resulting from repeated cyclical loading. In a normal leg with neutral ankle alignment, the fibula takes up to 6.4% of weight transmission from the foot.³ This, however, depends largely on the alignment of the foot and increases significantly with eversion of the ankle. It is known that in adults with acquired flat foot deformity, weight-bearing shifts to the lateral part of the ankle joint and gets transferred to the fibula.⁴ The incidence of subfibular impingement in severe tibialis posterior insufficiency has been reported to be up to 66% compared with 5% in controls in weight-bearing CT scans.⁵ This should significantly increase the risk of insufficiency fracture especially in the osteopenic bone. Orthotic supports and insoles are invaluable in preventing the abnormal loading of fibula and so are calcaneal osteotomies.⁶

Figure 2 Case 1—6 months post-tibio-talo-calcaneal fusion with full correction of deformity.

We had a second patient with similar history/diagnosis and successful treatment; however, we regret that the patient died by a year of her surgery from unrelated causes, and hence we could not obtain consent for publication. The option of joint sparing surgery (osteotomy and tendon transfer) was considered and discussed with the patients. This was not chosen by patients owing to the need for non-weight-bearing mobilisation in the postoperative period. An earlier surgical intervention such as internal fixation for the fracture alone is likely to have failed as well unless the flat foot deformity was also addressed at the same time.

Learning points

- We feel that patients with advanced tibialis posterior dysfunction should be referred to secondary care even if they are asymptomatic.
- Worsening of lateral side pain or fibular tenderness in patients with tibialis posterior dysfunction may be a warning sign of an insufficiency fracture and should be investigated further.
- Patients should be made aware of this risk even if they are asymptomatic and encouraged to use orthotic support for protection against insufficiency fractures.

Contributors SS initiated the case report and wrote the first draft. HK is the senior author who revised the draft and obtained patient consent.

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REFERENCES

- 1 Cheng Y, Yang H, Ni L, *et al*. Stress fracture of the distal fibula in flatfoot patients: case report. *Int J Clin Exp Med* 2015;8:6303–7.
- 2 Bernstein DT, Harris JD, Coscolluela PE, *et al*. Acute tibialis posterior tendon rupture with pronation-type ankle fractures. *Orthopedics* 2016;39:e970–e975.
- 3 Takebe K, Nakagawa A, Minami H, *et al*. Role of the fibula in weight-bearing. *Clin Orthop Relat Res* 1984;184:289–92.
- 4 Friedman MA, Draganich LF, Toolan B, *et al*. The effects of adult acquired flatfoot deformity on tibiotalar joint contact characteristics. *Foot Ankle Int* 2001;22:241–6.
- 5 Malicky ES, Crary JL, Houghton MJ, *et al*. Talocalcaneal and subfibular impingement in symptomatic flatfoot in adults. *J Bone Joint Surg Am* 2002;84-A:2005–9.
- 6 Havenhill TG, Toolan BC, Draganich LF. Effects of a UCBL orthosis and a calcaneal osteotomy on tibiotalar contact characteristics in a cadaver flatfoot model. *Foot Ankle Int* 2005;26:607–13.

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