Don's duck feet

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How would you assess this man's foot eversion, and what could you do to prevent his risk of future problems resulting from an expected build up of callus?

Case history

Don is 59-years-old and has recently been diagnosed with type 2 diabetes. He has all of the 'F words' for diabetes:

- he is over Forty years of age
- he has a Family history of diabetes; his sister also has type 2 diabetes
- he is Fat (weight 87.5 kg, height 1.75 m; BMI 28.6 kg/m^2).

You have advised Don to 'eat less and walk more',[1] but he says he can't walk 10 minutes a day, let alone 30 minutes, because his feet hurt.

Don takes off his shoes and socks and shows you areas of callus on the medial side of the first metatarsal heads and great toes. These areas feel hot and become tender with walking.

Don has tried various types of 'bandaids' to shield these areas, but the bandaids often rub. He has also tried different shoes and finds soft shoes to be the most comfortable; however, even with soft shoes and if the bandaids are not rubbing, walking makes the arch area of his feet become sore and produces a burning pain on the medial aspect of his ankles and knees.

When Don stands and walks you notice that his feet are quite abducted (30 to 40°) and everted – just like duck feet, which he has always had. When you check his shoes you can see they have worn more on the medial heel and medial forefoot regions. Otherwise, Don has healthy feet with normal blood flow and sensation.

Questions to consider

- Why has Don developed duck feet?
- What factors relevant to Don's feet should you assess?
- How can Don's footwear and footcare be improved?
- What else can you and Don do to reduce his risk of future problems?

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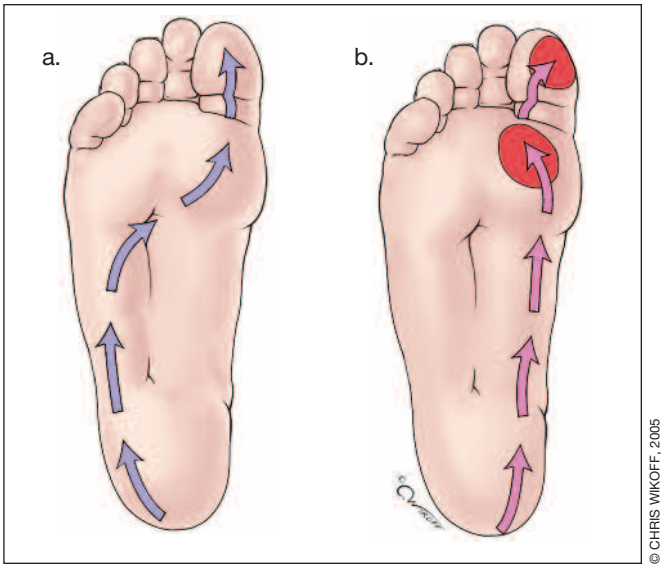

Figure 1. Load patterns of a normal foot (a) and a flat foot (b). The pattern of loading of duck feet is similar to that seen with flat feet.

Figure 2. A young person with both duck and flat feet. This combination is not uncommon and results in very high loads on the medial sole.

Why Don has duck feet

Don has abducted hips and lateral tibial torsion – his feet are at the end of very turned out legs.[2] This foot eversion means the medial side of the foot becomes disproportionately loaded while walking. This pattern of loading is similar to that seen with flat feet (Figure 1b); the combination of duck and flat feet is not uncommon and results in very high loads on the medial sole (Figure 2). Since the first metatarsal head and hallux try to 'push off' during the walking cycle, loads are very heavy there because the feet are so abducted. The skin thickens in compensation, forming callus and/or corns.

Factors relevant to Don's feet to assess

The factors that should be assessed during a foot structure check up are summarised in the Table. Assessment of these factors should reveal problems that Don's foot anatomy is causing.

continued

Table. Summary of the foot structure check up

Factors	Feet	Footwear	Gait
Nonweight-bearing factors	• Plantar calluses • Dorsal pressure areas • Arch shape	• Shape • Sole	Not applicable
Weight-bearing factors	• Normal • Flat: rolled in • High arch: rolled out	• Do the feet lean in or out of shoes? • Are there pressure areas over toe regions of the shoes?	• When the patient has bare feet, do the feet roll in or out, or stay straight? • Do shoes change the barefoot gait pattern? Is this better or worse?

In the long term, soft tissues and muscles adapt to a skeletal abnormality. The internal rotators become weak and the balance between the muscles around the knee and the knee position change. The wear on the medial side of Don's shoes has already been identified.

Improving Don's footwear and footcare

Don probably likes a soft leather shoe that doesn't rub the arch of his foot. Although this type of shoe is soft and pliable, it distorts more easily, increases pressure on the sole and won't support his feet. Generally, shoes curve inward from heel to toe (i.e. they are slightly curved in). The normal foot distributes the load from heel strike to lateral midfoot to medial forefoot (see Figure 1a) and the structure of the shoe (the 'last') reflects this. But this sort of 'last' would not suit Don's feet where loads fall medially. Don needs a straight lasted shoe with a firmer heel counter and flexible forefoot.[3] Recommendation of this type of shoe would be the first step to take in improving Don's footwear. Such footwear may provide enough support on its own, but if it doesn't an orthotic might be needed to reinforce the effect of the shoe.

Reducing Don's future problems

To reduce future foot problems, three areas should be addressed:

- the basic foot anatomy
- soft tissue and muscle adaptations that may be counter-productive
- problems correctible by footwear and footcare.

Don's foot anatomy might be so extreme that a vigorous physiotherapy, podiatry and self-care program would not make his feet functional. If this was the case, an orthopaedic surgeon might be able to change his anatomically turned out legs and/or address the problem of overload of the medial compartment of his knee.[4]

A physiotherapist could suggest a program to strengthen Don's internal hip rotators and rebalance the forces around his knee.[5] If Don were to have surgery, a physiotherapy program would be an important part of management.

Given Don's leg alignment, some ongoing pressure over the hallux and first metatarsal heads is likely to remain despite everyone's best efforts. Don needs a plan to manage the expected callus build up. He has healthy blood flow and sensation, normal vision and easy access to his feet, so regular gentle use of a pumice stone or equivalent abrasive would keep callus under control. It is important that the callus does not build up, as it will be painful and discourage exercise (while sensation is normal) or could cause a future ulcer (once sensation is lost). A podiatrist could show him how to keep control of the callus and also monitor his footwear and orthotics to make sure that they continue to meet the needs of his anatomy. MT

The last article in this series – a patient handout of simple footcare routines for your patients with diabetes – will appear in next month's issue of Medicine Today.

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