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CASE

The patient is a 29-year-old soldier who has been deployed to Kuwait for 6 months and presented with a self-reported "bunion" on his left foot. He was referred to physical therapy (PT) for evaluation by the screening medic. He had ignored the pain until the previous week, when he ran 3 days in a row. Running and, occasionally, walking aggravated symptoms. He did not have any right foot pain. The medical history included fracture of the left foot with occasional pains in the midfoot.

What was discovered The patient exhibited mild hallux valgus while standing and a slightly decreased arch on the left foot. There was tenderness to palpation at the first metatarsophalangeal (MTP) joint, the fifth metatarsal (MT) head, and the cuboid, along with a functional leg-length discrepancy on the right due to pelvic joint misalignment.

After alignment and resolution of the leg-length discrepancy in the PT clinic, the patient had less pain with walking. His symptoms further decreased after joint mobilizations to his foot across the midtarsal joint. He was instructed to continue with the pelvic exercises and to follow-up in 1 1/2 weeks.

The patient returned and complained that the pain was still at 5 on a 0 to 10 scale with normal walking. This time, no change in symptoms occurred with pelvic alignment. The patient's boots appeared to be narrow compared to his feet, so a measurement was taken across the MT heads of each foot—also called "ball width" (see Figure 1). Measurements showed the left foot was 0.5 cm wider than the right. A measurement across the toe box of his boots in the approximate location of the MT heads showed just enough width space for the right foot but not enough space for the left. His boot size was a 12 narrow.

What was done With the patient lying supine, a length measurement was taken from the base of the heel to the longest toe (see Figure 1). Such measurement is simple and allows a relative comparison for each foot. The soldier's left foot was found to be 0.5 cm longer than the right. The patient was sent for radiographs with his boots on and with them off. There was a nearly equal MTP angle measurement for both feet while barefoot (see Figure 2). With boots on, however, the MTP angle for the left foot measured 5 degrees greater (see Figure 3). A prescription for larger boots was written, and the soldier was sent to supply to get a new pair. A follow-up visit was planned for 2 weeks later.

At the follow-up appointment, the patient reported his pain as an intermittent 2 to 3 on a 0 to 10 scale. Now he experienced this pain only after walking or standing for long periods. His new

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FIGURE 1

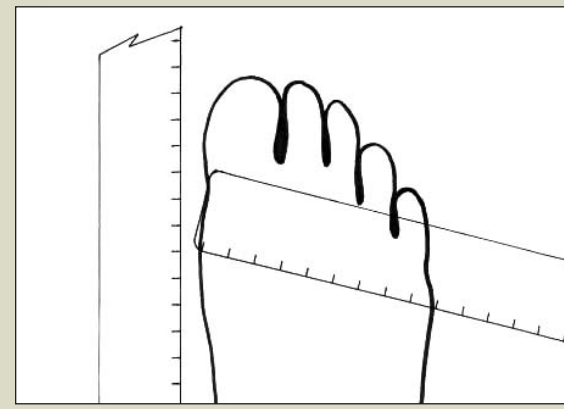

FIGURE 2

FIGURE 3

boots were a size 12 regular. Supply did not have any size 12 1/2 boots. The patient was instructed to wait for the symptoms to diminish further before returning to running. He did not return for his follow-up visit in 2 weeks.

DISCUSSION

During the initial visit, treatment of this patient focused on the difference in biomechanics due to the functional leg-length discrepancy and on the history of fracture. With resolution of the leg-length discrepancy and joint work to break capsule adhesions, the patient had decreased pain with walking.

On the second visit, the patient's pain was unchanged from the first visit. Since the initial treatment did not result in long-term decreased symptoms, other factors, including boot size, were examined. Recall that on the initial examination, the patient had tenderness to palpation at the first MTP joint and fifth MT head. These symptoms are consistent with wearing a boot that is too narrow. The patient's left foot was also 0.5 cm longer than the right foot. This appears to be a minor variation, but in combination with the extra width, the length difference provided enough extra abduction forces on the MTP joint that pain resulted. The patient's pain dropped by more than 50% after he began wearing wider boots and probably would have decreased further if size 12 1/2 boots had been available.

Comment In the PT clinic during my 1-year tour in Kuwait, many patients presented with foot pain. Many were found to have mismatched feet or improperly sized boots. None of those soldiers identified with mismatched feet knew before deployment that their feet were different. The desert-issue boots likely magnified differences between feet in ways that their usual shoes did not. To respond to this problem, we created a formal memorandum and sent the soldiers to supply to get new boots. The basic width and length measurements used for the soldier in this case can be applied in any clinic or any deployed area.

The most current available epidemiologic survey estimated that 40% of people in the United States have foot problems.[1] A different study of 6,800 subjects found that approximately 65% of men and 75% of women exhibited differences in foot length.[2] One third of these subjects demonstrated a 1/4-in difference. A half shoe size equals 1/6 in and a full shoe size equals 1/3 in, or about 1 cm. For ball width, approximately 61% of the men and women exhibited a difference, with approximately 30% having a 1/4-in difference, or one full shoe width. The authors of this same study concluded that no two feet are exactly the same in shape, size, proportion, stretch, or expansion when standing.[2] □

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