To Scan or Not to Scan?

This DPM was skeptical about digital foot scanners until she actually began to use one.

BY DIANNE MITCHELL, DPIM

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Author’s Note: Dr Mitchell wishes to clarify that she is not specifically endorsing the Sharp Shape scanner in this article. This scanner is the one she used for her evaluation but she states that her primary goal here is to delineate the similarities and differences between digital scanning and traditional plaster casting.

I have long been a skeptic regarding functional foot orthotic scanners. I did not think a scanner could capture a good foot image, nor did I believe an acceptable orthotic device could be constructed from a scan. Unlike many of my colleagues, I enjoy casting the foot in plaster. I am proficient and like having a mold to discuss with patients.

Investigating scanners started as more of a curiosity than a need. Several months ago, I started evaluating the Sharp Shape Laser scanner. My first official hands-on experience was on a non-patient day. I discovered very quickly that there is a learning curve to scanners if you want to maintain the quality of your cast and the integrity of your orthotics.

Lesson #1: A laser scanner does not make you a better orthotic negative cast maker. A scanner will not make up for weaknesses in casting technique. In fact, it may even emphasize any bad habits you have developed. You must identify the poor scans and discard them.

Lesson #2: Just because you make nice plaster casts does not mean you will immediately scan beautiful images with the scanner. I know what I want in a plaster mold. I want the subtalar joint in neutral, a good heel mold for bisection purposes and forefoot-to-rearfoot relationship, a straight lateral border, and the first metatarsal plantarflexed. To maintain these evidence-based standards, you want to make sure that you could accurately replicate this with your scans.

Lesson #3: You must know how to discern a good plaster mold from a poor one before attempting to use a scanner. Then, you must be able to look at the computer screen and know if your scanned image is good or poor.

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look good or bad and make corrections before sending the image to the lab for an orthotic device to be constructed.

Once I became more proficient, I decided to scan six patients in the office and take my measurements and order functional foot orthotics. The plan was to evaluate the completed orthotic versus the patient’s foot clinically and ensure I was obtaining an appropriate orthotic device. I was really happy with the outcome, as the devices all contoured patients’ feet well and offered appropriate pain relief as planned. Again, there was a learning curve in the office.

**Lesson #4:** Scanners require you and the patient to be still; otherwise your image will show motion that you need to recognize and throw out and re-scan. I simply explained what I was doing with each patient and rescanned if I needed to. It is very important to capture the foot non-weightbearing with the subtalor joint in neutral and the first metatarsal plantarflexed. Also, the posterior heel must be completely scanned for bisection purposes in order to balance the forefoot to the rearfoot and capture the full three dimensional contour of the plantar surface of the foot. Scanners can also be sensitive to the amount of light in the room and skew the image; this needs to be identified and corrected.

**Why non-weightbearing?** Literature has shown that partial weightbearing molds, foam box impressions for example, allow first metatarsal dorsiflexion and therefore have a poor forefoot-to-rearfoot relationship due to an artificial forefoot varus.1,2

**Why plantarflex the first metatarsal?**

The more the first metatarsal is dorsiflexed, the less motion is available at the metatarsal phalangeal joint in gait. Again, literature has shown that by plantarflexing the first metatarsal, the available first MPJ range of motion increases.3 This results in less functional hallux limitus, for example. By casting NWB this allows you to plantarflex the first metatarsal to its end range of motion.

**Why capture the posterior heel?**

The calcaneal bisection is needed in order to balance the forefoot to the rearfoot for the best custom function.

**Why a full, or true, 3-D foot image?**

The better the contour of the device to the foot, the better is the redistribution of plantar pressures for pain reduction and mechanical support. For example, in a pes cavus patient with forefoot pain, you want your completed functional foot orthotic to contour the patient’s foot like a glove. This will allow pressure redistribution from the forefoot and heel into the arch. Also, tension through the plantar fascia is reduced with better contact of the orthotic to the arch. The literature has found that the most effective way to decrease plantar fascial strain is by eversion of the forefoot.4 This is easily done by plantarflexing the first metatarsal.

It was at this time that I wanted to perform a side-by-side comparison of my plaster casting to the scanner. The patient I used is a 63 year old female with a history of “problem feet” and longtime leg, knee, back, and neck pain. She reported a history of custom molded orthotics made from the foam box technique, and she described the results as “functioning with ‘less pain.’” She thought this was “as good as it was going to get” with her pronated, low arched feet.

I explained to her that she would be scanned first, and then molded in plaster. I took measurements following the molding and wrote identical prescriptions for a polypropylene functional device and a graphite functional device. Once I received the two devices, I could not tell them apart. I dispensed them both to the patient, who also could not tell the difference in feel between the device from the scanner and the device from the plaster mold.

Patient testimonial: “The difference between the ‘stand in the box’ fit and the casted/scanned prescription is unbelievable. I didn’t know how much extra relief I would gain from the new orthotics—more energy, no pain, fewer visits to the chiropractor, and no Advil … more stable when climbing stairs or walking on uneven surfaces.” She feels no difference between the two pairs I ordered for her.

So, you ask, what scanners, or digitizers, are out there and avail-

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**It is important to contact the vendors of the various units and schedule on-site visits.**

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can about what each unit has to offer. This, in turn, allows you to make an informed decision as to the technology that works best for my patients. I want great scans to make great orthotics with and, if that meant staying with plaster, then I would do so. I want great orthotic re-

sults for patients to best treat them. So far, I am enjoying the scanner and am very much satisfied with the results I am seeing. I look forward to more use. PM

References:

2 Laughton C. A Comparison of four methods of obtaining a negative impres-


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