

Carry That Weight

Fluoroscopic Imaging Helps a Revolutionary Orthopedic Implant Land on its Feet

DaVinci called the human foot “a masterpiece of engineering and a work of art.” To most of us, the engineering remains an accepted mystery that’s taken for granted.

And, despite being two of the most dynamic parts of the body, it’s rare for feet to be viewed by the common person as masterpieces. “The foot is the most used and abused part of our body,” says Michael E. Graham, DPM, FACFAS. “We put our socks on, put our shoes on, and basically forget about our feet.”

A movement to treat more than just symptoms

Dr. Graham’s practice specializes in the treatment of hyperpronation, or excessive rotation of the rear foot. Hyperpronation occurs when the space between the talus (ankle bone) and calcaneus (heel bone), the sinus tarsi, closes. “The abnormal closure of the space leads to out-of-aligned feet,” Dr. Graham explains, noting that the deleterious effects of partial and full obliteration of the sinus tarsi aren’t limited to the foot and ankle. “The closure can lead to a misalignment to the rest of your body potentially leading to knee problems, hip problems, and back problems – all because of that little space closing abnormally.”

The hereditary condition, which is present in approximately 50 to 60% of the population, can be characterized by a number of symptoms that range from slight discomfort to excruciating pain, such as flattened arches, bunions, and hammertoes, to plantar fasciitis, cruciate ligament dysfunction, sciatica, and even temporomandibular joint disorder (TMJ).

Traditionally, orthotics are used as a first line correction of hyperpronation. However, these devices work on the bottom of the foot and do not correct the abnormal motion of the talus on the calcaneus. In some cases, molded braces are used to stabilize the ankle, but do not impact the underlying cause of the motion. In Graham’s view, orthotics, special shoes and physical therapy are extrinsic treatments applied to an intrinsic dysfunction.

When orthotics fail to alleviate pain, some patients undergo complex reconstructive surgeries with extensive recovery times. Subtalar arthroereisis, implantation of a stent to open the closed space, has also become a popular treatment. However, issues such as improper placement and shifting or dislodging of the stent have resulted in a removal rate that approaches 40%. In 2004, Graham received FDA approval for his design for a titanium sinus tarsi implant that revolutionizes the existing technology, and decreases the removal rate to less than 3%.

“Now we can have the patient stand and put their foot through a range of motion”



Dr. Graham is impressed by the Hologic Fluoroscan™ InSight's mini c-arm digital acquisition and high definition images, while keeping dose extremely low.



The Hologic Fluoroscanner™ InSight offers ultra-fine detail and unprecedented flexibility – the perfect technology for Dr. Graham's subtalar arthroereisis practice.

State-of-the-art invention supported with extraordinary imaging

With the development of his HyProCure™ sinus tarsi implant, Dr. Graham sought imaging technology to match his own innovation. "When a patient comes in with any kind of a foot problem, we would traditionally take the standard weight-bearing radiograph. The problem with this older technology is that this is a dynamic problem with patients' feet – and with radiography we're only taking a snapshot." When it was suggested that he integrate fluoroscopy into his practice, he dismissed the idea. "I thought they were absolutely insane," he admits. "Patients can't stand on the fluoroscopy unit."

His opposition didn't last long. Impressed by the digital acquisition and exquisitely clear high-definition images produced by Hologic's Fluoroscanner™ InSight mini C-arm extremity imaging system, Graham was convinced that it was the perfect technology for his subtalar arthroereisis practice. But the challenge of capturing weight-bearing range of motion remained. With an inventor's enthusiasm, he designed a weight-bearing stand to use with the Fluoroscanner InSight. "Now we can have the patient stand and put their foot through a range of motion," he says. Fluoroscanner InSight "is completely changing the whole imaging of foot and ankle — it's just tremendous."

The Graham International Implant Institute, founded by Dr. Graham as a teaching institute for surgeons wishing to learn the HyProCure procedure, features the Fluoroscanner InSight as a teaching tool that moves light years beyond standard X-ray screening. "Post-operatively it's a very strong tool to see what's been corrected and see the proper placement of the stent," he explains. Often these systems are used in hospital operating rooms and surgery center ORs to check placement during the actual procedure."

Answers in plain sight with Fluoroscanner InSight

Dr. Graham takes it a step further. "Without the dynamic

fluoroscopic images the patient doesn't know what their true deformity is and neither does the doctor. I had a chiropractor come in with chronic heel pain. He wanted the traditional treatments but he did not want to have the stent procedure performed for whatever reason. Once he got up on the fluoroscopy unit and he saw exactly what his deformity was, the next statement out of his mouth was "Okay. When can I get this done?" So that's just how powerful the fluoroscopy is."

The extremely low-dose Fluoroscanner InSight is also ideal for patients who may be concerned about radiation exposure. "You have more radiation going outside for a walk in the summer," Graham points out. He is also pleased with Hologic's support as a forward-thinking developer of imaging solutions. "We do have a lot of technical things that we're working on because we're really trying to push this as the 21st century piece of equipment for foot and ankle imaging. So we've been working with Hologic on making it even better." In a recent collaboration, Graham worked with Hologic engineers to transmit fluoroscopic images from the imaging suite to a large monitor in a private consultation room where the doctor can show patients their images and explain their condition. "It's really interesting that we're actually taking the images from the fluoro unit and putting it into a private room."

The Fluoroscanner InSight is also practice-friendly. "That's the great thing about Hologic – they really have a great program to get these into the doctor's offices," Graham enthuses. "We're able to bill out these studies so we're generating income from these machines." He adds, "even if the physician is only using the Fluoroscanner InSight as a diagnostic tool, utility and reimbursement is significantly greater than traditional X-ray units."

With hard drive storage for up to 7,000 images, and optional USB and DVD-RAM storage, the DICOM-compliant Fluoroscanner InSight makes image transfer to PACS systems easy, and the unit conserves floor space too. "When doing a comparison of traditional X-ray units, we need developer and film and inspections and storage and all these other things, and the Fluoroscanner InSight just completely overshadows the other units. Not only are the quality of the images better but we don't have to worry about all these other problems," Graham stresses. "The Fluoroscanner InSight is not only advantageous for foot and ankle physicians to have this in their office; in my view it's not an option — it's a must."

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