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BRIGHT IDEAS

NOVELTIES

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Fitting Prosthetic Limbs, Via a Computer



PHOTOGRAPHS FROM ORTHOCARE INNOVATIONS

David Boone, the chief technology officer at Orthocare Innovations, uses sensor data from its Compas system to better align the prostheses of patients.

THE best fit for a prosthetic leg depends in part on the small adjustments in alignment that help amputees walk comfortably.

Traditionally, these refinements have been done by a skilled clinician who talks with patients, observes their gait and makes incremental changes to the prosthesis over several visits, looking for the sweet spot where the alignment is optimal, says Andrew L. Steele, who fits amputees for prostheses in Waterloo, Iowa.

"I use a little bit of eye and a little bit of gut" to get the alignment right, he said. "It's a highly subjective process."

But Mr. Steele, who is himself an amputee — he lost his left leg below the knee in a farm accident when he was 12 — now has a new alignment tool.

He is trying a computer-based device that provides quantitative information to support his subjective assessment. The device attaches to the prosthetic limb and wirelessly beams information on the twisting of the limb as the patient walks, along with other data, to his computer for analysis.

Mr. Steele has been trying the system, called Compas — short for Computerized Prosthesis Alignment System — not only

on his patients, but also on himself. A software program that is part of the system interprets data collected as a patient walks; it then suggests adjustments. Mr. Steele then uses a wrench to change the angle of the prosthesis.

"It's good to have the background readings from the computer," he said. "It gives me another tool to narrow down what is causing a problem."

The new technology may be especially timely, given the large number of returning military veterans who need prostheses.

Compas, a product of Orthocare Innovations of Oklahoma City, was developed

in part with financing from the National Center for Medical Rehabilitation Research of the National Institutes of Health in Bethesda, Md.

Louis A. Quatrano, who administers financing for the center, said the device, along with others in development, might provide an alternative for some patients who must now travel to specialized, often distant, gait labs. Instead, they could be tested in the office of a local clinician.

"It might also help with consistency in treatment," Mr. Quatrano said, when a patient moves from one clinician or prosthetist to another.

Dr. Alberto Esquenazi, director of the gait and motion analysis laboratory at MossRehab in Elkins Park, Pa., says the Compas is part of a new generation of tools that provide objective alignment assessments.

"It is an innovative approach, a real departure from what has been done in the past," he said.

Dr. Esquenazi and colleagues are also developing a portable alignment system for prosthetists to use in their offices.

Doug McCormack, the chief executive of Orthocare, notes that the Compas has two parts: a \$1,500 metal plate installed near the socket of the prosthesis worn by the patient and a \$6,500 diagnostic module the prosthetist attaches to the plate during office visits. The module collects and transmits alignment data to the computer as the patient walks.

Doug Bourgoyne has been trying the Compas system for the last few months at the Raymond G. Murphy V.A. Medical Center in Albuquerque, where he is clinical supervisor of the orthotics and prosthetics laboratory. The metal plate looks like a standard metal plate used within a prosthesis, he said, "but it is smarter."

The plate has silicon strain gauges to measure forces going through the prosthesis, said David Boone, the chief technology officer at Orthocare, and electronics to convert the information to digital form and memory so measurements can be stored.

The diagnostic module that is attached to the plate in the prosthesis during office visits contains a laser to project a line on the floor as the patient walks, and a gyro-

scope that measures the rotation of the limb, Dr. Boone said. Each module can be used with multiple patients.

Mr. Bourgoyne bought three modules. They are not meant to replace the expertise that he has developed in doing alignments by eye, he said, "but they can augment it by providing numbers."

DR. QUATRANO cautioned that the Compas would have limitations. "Every individual walks a bit differently," he said, and has a different injury. "Research will demonstrate where it is most appropriately used."

Treva Monteith, a registered nurse in Yukon, Okla., has been wearing a Compas plate in her prosthesis since March. The system has saved a lot of time and effort, she said. In an earlier series of fittings, she said, "I had to go in for visits, then go home and walk, then call up, and say, 'This isn't right,' and return for more visits."

But the Compas alignment process went more smoothly, she said. "I'm very pleased," she added. "This is a lot quicker."