

Professor
takes

TOTAL ANKLE REPLACEMENT

to a new level

By Natalie St-Denis

“
What I’m hoping to gain from my research is a detailed understanding of the biomechanics at play in a healthy and arthritic ankle joint and integrate this knowledge when implanting ankle replacements, which are artificial ankle joints.”

– Dr. Victor Valderrabano

In the next decade, ankle arthritis will increase by 200 to 300 per cent, says ankle expert Dr. Victor Valderrabano. This dramatic increase isn’t just a sign of our aging population but also a reflection of our increased participation in extreme sports, which often lead to lower leg injuries and can eventually lead to post-traumatic arthritis.

Valderrabano, an orthopaedic surgeon from the University of Basel in Switzerland, is on an exchange program with the University of Calgary; he’s on a clinical fellowship working two days a week at U of C’s Division of Orthopaedic Surgery, and spends the rest of the week working on his second PhD in biomechanics. His first PhD, from the University of Zurich, is in clinical anatomy. “Biomechanics is the root to understanding orthopaedics; and greater knowledge in this area will allow me to take a different point of view when dealing with clinical questions,” says Valderrabano.

Valderrabano chose to come to the University of Calgary because of its long established relationship with his home university, University of Basel. Also, “Calgary is a leading centre worldwide in the area of biomechanics and orthopaedics,” says Valderrabano.



HINTEGRA is a three-component prosthesis that Dr. Victor Valderrabano has adapted and inserted into the ankles of 10 Calgary patients. The device allows for greater ankle movement than traditional ankle fusion.

He is doing his research under the guidance of Dr. Benno Nigg, co-director of the Human Performance Laboratory, and Dr. Cyril Frank, chief of the Division of Orthopaedic Surgery.

Until recently, surgeons have had little choice in treating severe pain from advanced arthritis. Because the ankle is such a complex joint system, surgeons have traditionally fused the joint in such severe cases. The first report of an ankle fusion is from 1882 in Austria. Although the fusion, which stabilizes the ankle by fusing one bone to the other, eliminates the pain, the fusion also results in no motion.

“This method is still being used worldwide today, but causes great disability – leaving patients unable to climb stairs, unable to enjoy sports and some people can’t drive either,” says Valderrabano. The other problem that arises 10 to 15 years after an ankle fusion is that the foot and knee start to compensate for the lack of motion in the ankle, often leading to secondary arthritis in neighbouring joints.

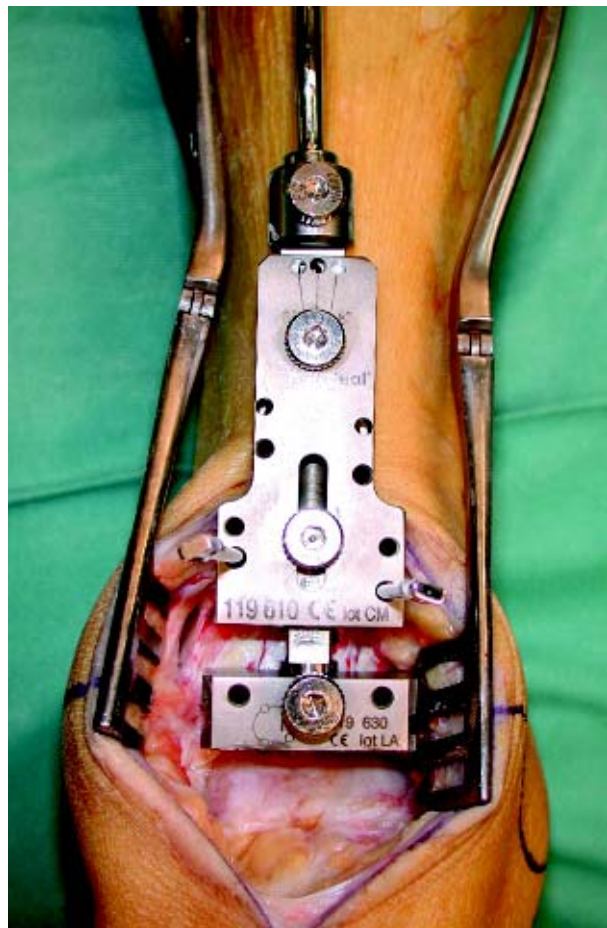
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Dr. Victor Valderrabano chose to come to the U of C because of its world leader in the area of biomechanics and orthopaedics. / Photo



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Left: An early stage in the operation on a patient's ankle.

Above: The Hintegra in place during the latter stages of the operation.

Below: An X-ray of the ankle with the new artificial joint in place.

Photos courtesy of Victor Valderrabano

are artificial ankle joints," says Valderrabano. In a recent study where he experimented with three different ankle treatments, he compared the total fusion method to newer versions of ankle replacement therapies, one which has two components allowing the foot to move up and down only, and another which has three components giving the ankle a much greater range of movement. "I found that the total fusion method does not provide optimal treatment for ankle arthritis from a biomechanics point of view," says Valderrabano.

Dr. Beat Hintermann in Switzerland originally created the three-component-prosthesis called Hintegra, but Valderrabano took the Hintegra one step further. He improved some of its design and biomechanics through his research at the U of C and clinical studies in collaboration with Hintermann in Switzerland.

Valderrabano, together with U of C's Drs. Hugh Dougall and Ian Russell, have implanted the improved Hintegra in 10 Calgarians at the Peter Lougheed Centre. They hope to eliminate pain by removing the arthritic joint, and correct any deformities and imbalances in the lower leg so as to minimize any strain on



other parts of the leg. Patients are seen every three months to follow up on their progress. "I want to know at what point in the healing process has the patient reached 90 per cent of ankle and muscle rehabilitation. For instance, are the atrophic muscles reactivating and when, has the pain gone away, and does the patient have normal movement in the ankle."

This information will also allow Valderrabano to come up with a diagnostic tool related to the

overall health of the ankle. Although the improved Hintegra is one of the best ankle implants around, it's not for everybody. Depending on the physical conditions surrounding the arthritic ankle, for some the only solution still remains a total fusion. "I hope that my clinical research will provide orthopaedics in my field a complete picture of ankle arthritis; why it develops, how to treat it and diagnose which treatment is most suitable for the patient," says Valderrabano.