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Innovations in Total Ankle Replacement: Where Are We Now and Where Are We Going?

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We are living during a time when technological innovation is unfolding at an unprecedented speed. In the world of orthopedics, it is an exciting time to be a surgeon. We have at our fingertips technology that can address surgical challenges and present endless opportunities to improve care. However, we also have a responsibility to balance the pace of innovation with a clear focus on the role technology can and should play in addressing the unmet needs of patients and physicians. Innovations in medical devices cannot just be new, they must be better, and it is our job to identify areas where technology can measurably improve care. An excellent example of where we've seen such purposeful innovation is in the evolution of total ankle replacement over the last 10 years.

When I began practicing as a foot and ankle surgeon in 2009, only about 10% of the ankle procedures I performed for end-stage ankle arthritis were total ankle replacements (TAR). The rest were ankle fusions; 11 years later, those numbers have reversed. When TAR was first introduced, it was exciting because it offered patients the opportunity for similar pain reduction as a fusion surgery without losing ankle mobility; still, the transition from the historical gold standard arthrodesis procedure would take time. We continue to gather data and identify the long-term quality of life benefits TAR offers. We also have developed the ability to tailor the surgery to the patient's unique anatomy with the advent of pre-operative templating for intraoperative guides. We have come a long way, but, as we learn more about patient needs, there is always room for innovation.

So, what is our goal for the next generation of TAR? Longevity. Surgeons always want to reduce the likelihood of a secondary procedure. As we begin to treat even younger patients living active lifestyles, implant longevity will become increasingly important. Implant loosening can result in pain and necessity for future surgical procedures. However, these challenges are not unique to ankles. Implant longevity has been a common challenge in many areas of orthopedic surgery.

Many times, we are able to learn from the successes of our colleagues in other subspecialties. This is how we first identified porous material as an exciting technological advancement for total ankle replacement. This modification to implants has a rich background of material science that has shown proven benefits in other areas of orthopedics such as spine and upper extremities. The first ankle implant to utilize this porous material, is the new INFINITY™ with ADAPTIS™ Technology* system. This device uniquely uses 3-D printing to build the implant – including the porous material – layer by layer as one mono-block piece rather than a traditional plasma spray coating or post-production attachment of a 3-D printed material to the implant. For patients, we are optimistic that this will translate into better adhesion to bone, better implant stability, and, ideally, a longer-lasting implant.

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The INFINITY™ with ADAPTIS™ Technology* was created with one goal in mind: improve patient outcomes. Regardless of how far we have come, we must be responsible and constantly re-evaluate the technologies we are using. We should not take what currently exists at face-value, but rather strive for progress. It is with this philosophy that we worked to optimize an already trusted system. We believe the ADAPTIS™ Technology* is a significant step toward longer-lasting treatment.

Ultimately, we want to see a total ankle replacement device that gives a patient at least 20 years of a functional success. We do not know if we are there yet, but I believe we are getting closer. If we continue to strive for improvement, work to monitor our successes and our failures, and apply new technology safely and effectively, we will continue to positively affect our patients' lives. Isn't this, after all, why we do what we do?

** This product is only available in the United States.*