Journal of Orthopaedic Experience & Innovation
Clinical, Economic, and Innovative Orthopaedic Experience

Sah, MD, Alexander. 2024. "'In My Experience…The Use and Value of the Novel, Handheld Wireless, Implant Agnostic Robotic.'" *Journal of Orthopaedic Experience & Innovation* 5 (2). https://doi.org/10.60118/001c.125418.

Editorial

"In My Experience…The Use and Value of the Novel, Handheld Wireless, Implant Agnostic Robotic"

Alexander Sah, MD, MD[a]

Keywords: TKA, Robotics, T-Mini

https://doi.org/10.60118/001c.125418

Journal of Orthopaedic Experience & Innovation

Vol. 5, Issue 2, 2024

The author reviews his experiences with the THINK Surgical TMINI® Robot.

We're all trying to figure out how to do our knee replacements even better, and technology clearly has been a major advancement in recent years. While I was interested in robotic technology early on, I just didn't love the big robots that were out there. Large form factors took up a lot of space in the OR, completely changed the ways that we do our surgical procedures, and restricted us to a single implant vendor. We had to learn a whole new way to do a joint replacement- awkward processes, completely different steps, taking us and our support staff out of where we're most familiar and comfortable.

Then, over time, the national trend has been to do more robotic surgeries with the traditional platforms currently on the market, which require changing how we do surgery, hoping to get a better result. There were some aspects I liked about it; the CT planning, precision of knowing the implant sizes, the soft tissue and gap balancing, and the precision of bone resection. I think all those things definitely were of value. It's just the things we had to sacrifice to use the technology, it just wasn't for me, not in a high-volume practice doing a lot of surgery. We were getting very good results without it.

Subsequently, most of the other large companies also came out with their robot platforms, and our institution did acquire a couple of them. I have used them and experienced some of the positives. But some of the negatives, that you just can't get away from, such as the price tag of the robot, limited implant selection, line of site issues, the size in the OR, the learning curve for the staff, and the time it takes to do the surgery are unescapable. For me, no matter how much I try, it's very hard to make it time neutral or be efficient when you're using these traditional robotic technologies.

But then I came across the TMINI Robot, and TMINI to me made the most sense. It's just so intuitive. It's the right size, it's wireless, it's handheld and in the form of a drill that we're used to, and familiar with the feel of it. It's easy to use in terms of it only turning on when it's in the correct plane, so pin placement is extremely precise, accurate, and natural to use. Even people who've never done surgery can figure out how to use this tool correctly. But what's great is that it is a sterile device and free from any physical restrictions or connections to a large robot.

Being sterile, you don't have to drape it. I get worried about draping and sterility issues with standard robotic arms. We playfully term it the "naked robot" because it's just in our hands and sterile, which is unique. It's also easy in terms of how, as surgeons, we learned to do joint replacement surgery. I think every orthopedic surgeon is probably very proud that they know how to use a saw and a drill and are good with their hands and know how to execute those parts of the procedure with expertise.

The robots initially were meant to give us more accuracy and precision with bone cuts, but again, I think orthopedic surgeons know how to do that. So then I think what happened was the benefits of robots really became, no longer

a Alexander Sah, MD currently serves as Director of the Outpatient Joint Replacement Program and Co-Director of the Institute for Joint Restoration and Research at Washington Hospital in Fremont, CA. He earned his medical degree, graduating Magna Cum Laude, from Thomas Jefferson Medical College in PA. He then went on to complete his residency at the Harvard Combined Orthopaedic Program and then a joint reconstruction fellowship at Rush University Medical Center in Chicago. Dr. Sah is a member of leadership committees for the American Academy of Orthopedic Surgeons, the California Orthopedic Association, and the American Association of Hip and Knee Surgeons. In 2016, he was selected as 1 of 10 orthopedic surgeons in the nation to the prestigious AAOS Leadership Fellows Program. He is a multi-year recipient of the "Best of Fremont" Doctor and Orthopedic Surgeon Awards and named a California Top 10 Orthopedic Surgeon, among many other honors. He also serves as a reviewer for Clinical Orthopedics and Related Research and an editor for Techniques in Orthopaedics. Dr. Sah is widely published and is an esteemed speaker, having presented at more than 50 meetings and conventions across the United States.

Visit Dr. Alexander Sah

Connect with Dr. Alexander Sah on LinkedIn

Conflicts of Interest Statement for Dr. Alexander Sah

Visit the Open Payments Data Page for Dr. Alexander Sah

about the accuracy of the cutting, but instead about the balancing and knowing where to put the implants and having the ability to accurately change implant position when desired. TMINI can do all of those things. So, having something that is easier to use, smaller profile, much less learning curve for both the surgeon and the staff, it's a no brainer to use that kind of technology, to achieve the results that we wanted with the big robots.

I appreciate and enjoy the fact that I get to still be in control of the saw blade, the cuts, the resections, and I can adjust it live during surgery. Really, in my mind, the TMINI should be the robot for the masses. Honestly, this is the one that should have come out first, if everything went the way we would have hoped for because it's not a leap, it's not a dramatic change from traditional teaching that we have in our residencies and fellowships. It's a natural progression from using standard instrumentation to go to this smart handheld robot.

I think it's a bigger leap for current residents and fellows to go to purely robotic surgery where they're so dependent on it that they may not remember or know the truly important aspects of doing a good knee replacement if the robotic procedure fails in the middle, or if they have to abort using the technology. They still need to know how to do a knee surgery well. I fear that gets lost in modern training.

More and more, people are asking about robotic technology. They may or may not know the pros and cons of the technology, but they assume it is better. Others are willing to do whatever the surgeon thinks is best. I've not yet had a patient who we've offered robotic technology to decline it. I think there's a natural acceptance by the public to believe that technology is better, and they can see the benefits of it. It's unlikely robotic technology would give a worse outcome. It's either going to be as good, or better, depending on what you believe in the literature. Patient adoption is much higher and probably continues to grow faster than what we would expect.

To proceed with a TMINI procedure, we order a pre-op CT, which then we can do pre-op planning. The surgeon chooses an open platform implant and plans the surgery and bone resections, and then approves that plan, which will then be loaded into the TMINI robot platform at the time of surgery. You know going into surgery the planned implant sizes, so you can streamline your efficiencies in the OR by knowing what trials and implants will be needed. Then in the OR, you execute the TMINI procedure, which, again, is very familiar to the typical steps and protocols and procedures we're used to, with our usual training for joint replacement. Then, it's virtually time neutral. Some of the early studies have shown, from early adopters, that the learning curve is generally only 5 to 10 cases. It's unlike other robotic adoptions that need a hundred or more cases in the learning curve. It's much shorter with TMINI just because of how familiar and intuitive it is.

The TMINI robotic platform now has the ability to balance gaps with intraoperative implant adjustments. Combined with the accuracy of preop implant size selection, and the speed of the balancing technology in the OR, surgical efficiency is enhanced. More cases can be completed in a day, with less stress on the surgeon and the staff. Traditional robotic technology has penetrated about 15% of the market, which is significant. The benefits are attractive, but the burden to obtain large robots and to use them in practice remain substantial. I believe the TMINI can be the robotic platform for the 85% who want all of the benefits of advanced technology, but want to remain in control of the surgery, and have the freedom of implant choice. Rather than being restricted to the implant your robot dictates to you, the focus can return to implant design and features which have traditionally been most important to surgeons. With TMINI technology, the synergy of alignment philosophy/surgical technique with implant design choice will lead to the most optimized experiences for the surgeon, and the best outcomes for our patients. For those surgeons who, like me, were waiting for the right robot for the right time, that time is now.

Submitted: October 31, 2024 EST, Accepted: October 31, 2024 EST