Reconstructing

Hope

**PICTURE THIS:** a four-year-old boy gets his hand caught in a meat grinder. A man suffers severe leg injuries in a paragliding accident. A woman has cancer that destroys part of her cheek. In the past, these patients might have had to go to another city for reconstructive procedures. Today, these surgeries can be performed right here in Tucson, which is becoming home to a number of world-class surgeons.

*Tucson Lifestyle* asked these doctors to help us explore the world of reconstructive surgery. Our thanks to:

- **Warren Breidenbach, M.D.**, a world leader in composite tissue transplantation and the new Chief of the Division of Reconstructive and Plastic Surgery at the University of Arizona Department of Surgery.
- **Frederick Menick, M.D.**, an internationally acclaimed plastic surgeon in private practice who specializes in nasal and facial reconstruction.
- **Craig Hurst, M.D.**, an associate professor of plastic and reconstructive surgery in the UA Department of Surgery whose sub-specialty is pediatric plastic surgery (including cleft palate and cleft lip).
- **Cheri Ong, M.D.**, a specialist in breast surgery at the Institute for Plastic Surgery.
- **Kathleen Duerksen, M.D.**, who specializes in facial and eye cosmetic and reconstructive surgery.
- **Audrey Erman, M.D.** and **T.J. Gernon, M.D.**, co-directors of the head and neck cancer program at the University of Arizona Medical Center – University Campus.
- **Brandon Z. Massey, M.D.**, chief of the division of plastic surgery at Tucson Medical Center and a specialist in hand, wrist, trunk and extremities reconstruction (he also works at the Institute for Plastic Surgery).
- **Brian Kolfage**, a triple amputee injured in Iraq, who has undergone reconstructive surgery and has two prosthetic legs and a prosthetic hand. We also interviewed his prosthetist, Jeff White.
“I primarily perform reconstructive surgery of the hand, wrist, extremities and trunk,” says Dr. Brandon Z. Massey. Many of Dr. Massey’s patients need reconstruction due to a wound or defect, loss of function or significant pain.

“Reconstructive surgery has changed — there continue to be advances in the equipment available to us that allow us to perform complex reconstruction of problems that would not have been easily accomplished ten years ago.”

The most exciting new techniques involve arthroscopy or endoscopy to accomplish reconstruction and treatment of the hand and wrist. This allows doctors to treat conditions such as carpal tunnel syndrome, wrist ligamentous problems or excision of ganglion cysts using only very small incisions and fiberoptic cameras to accomplish what used to be done through much larger incisions.

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The Procedure

“I prefer to use the patient’s own tissue to reconstruct his body and create something out of nothing, but when that is not possible, I use other techniques including soft tissue and skin substitutes and orthopedic hardware to accomplish the goal.

“My most challenging reconstruction involved a patient who sustained bilateral lower leg injuries in a paragliding accident. He had an open ankle fracture on the left side and a large wound directly over his fracture and fixation hardware. The patient had already had his right leg amputated below the knee as a result of the accident, so I was determined to help him salvage his left leg. Using all methods of reconstruction, including microsurgery, I was able to provide excellent soft tissue coverage and get his wound healed so he could walk on his left leg,” Dr. Massey says.

“My most satisfying reconstruction involved a four-year-old boy who got his hand caught in a meat grinder. Through multiple surgical procedures and reconstruction, I was able to salvage his entire hand and allow him to regain good functionality.”

September 11, 2004, started out like any other day in Iraq for Tucsonan Brian Kolfage. But it didn’t end that way. “A 107-millimeter rocket landed next to me and exploded,” the Airman recalls. “It blew off both of my legs, and my right hand had to be amputated. Normally people don’t live through that.” At the time, he was the most severely injured soldier to survive. One of the main reasons Brian lived is because the explosion happened on base, which meant help was available immediately.

Brian spent two months in a hospital room at Walter Reed Army Medical Center and another 10 months at Fisher House near the hospital while he underwent physical therapy. “I got my prosthetic legs while at Walter Reed and I had reconstructive surgery on my left hand,” he remembers. “The explosion had nearly destroyed my thumb on that hand, so the surgeon did a bone graft: he took bone from my hip and put it in my left hand so that my thumb remained operable.”

Brian’s prosthetic legs

After leaving Walter Reed, Brian basically quit using his prosthetic legs. They were complicated, and he hadn’t received enough education or physical therapy with them. “When I got back to Tucson, I contacted Hanger Prosthetics & Orthotics. The president of the company personally flew out from Texas to see me, and told me they could get me walking. They flew me to Oklahoma and worked with me for two weeks. Then, for two years, I did rehab every week here in Tucson.”

Walking on two prosthetic legs is no easy task — in fact, it takes 300 times more energy for Brian to walk than it takes the average person. In addition, he was dealing with quite a bit of pain where the prosthetic legs met his body.

“I have worked with Brian over five years, and the fact that he walks at all is a miracle,” says Jeff White, certified prosthetist/orthotist at Hanger Prosthetics & Orthotics in Tucson. “The reason it is harder for him to walk is because the amputation on his left side was through the hip; that means the femur on that side is missing. Because the femur on the right side is
only about three inches long, he has nowhere to get the leverage to walk,” White explains. “In addition, Brian has heterotopic ossification (bone tissue forms outside the skeleton), resulting in little spikes growing on his bones, which makes it more difficult to fit his legs.”

**Finding relief from the pain**

In 2007, Brian finally found relief from the pain with a gel pad created by Alps, a prosthetic manufacturing company that designs liners and other components. “Brian was the first person fit with the gel, which was designed for Winter the dolphin (the star of *Dolphin Tale*, who has a prosthetic tail),” says White. “The gel is like something I would sit on, but it is inside my prosthetic leg,” Brian relates. “Nothing else had worked before this.” The prosthetic liner is called WintersGel. “Now I can wear my legs all day without pain. I use my wheelchair 90 to 95 percent of the time, but I walk on my legs to get my chair out of the car.”

“At first, we didn’t know what Brian would be able to accomplish,” says White. “We started with short prosthetic legs and moved Brian up gradually as he got his balance.” To help with that, White made an attachment for Brian’s amputated arm socket that he uses like a cane. “We call it the crutch arm,” says White. Microprocessors that allow the knees of the prosthetic legs to bend also make a huge difference. “We are hoping to get new knees with a newer version of microprocessors that offer even more stability.”

**Using his prosthetic hand**

His amputated right hand has never really been an issue, Brian says. “I have been given a number of hands to test out along the way. I have hands like you have shoes! Having a prosthetic hand makes things a lot easier. It’s tough to function with just one hand.”

There are always new advances in prosthetic hands, according to White. “On new hands, the fingers can work independently and the thumb can move separately, which allows different gripping patterns.” As for how the fingers move, “there are sensors inside the hand, and when Brian flexes the muscle in his arm, it sends an electrical impulse through the sensor that moves the fingers and/or hand.

“Because Brian is missing both legs, he uses his hands to push off to stand up,” Jeff explains. “Most prosthetic hands are not durable enough to withstand that kind of pressure, but there is a new one on the way from Otto Bock that is more durable, and has more gripping patterns.

“Brian is a young guy and real active,” Jeff relates. “What most impresses me about him is his positive attitude. It has taken hundreds of hours of working together to get him where he is today, and he is always positive.”

Brian, who married Ashley on May 28, 2011, is pursuing a degree in architecture at the University of Arizona. He is in his third year of the five-year program and plans to obtain his master’s degree.

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