I stayed conscious until we reached the U.S. Navy Alpha Surgical Company at Al Asad Airbase. Then I was anesthetized and sent to the operating room, where I joined the hundreds of amputees who have lost limbs in the two wars we are currently waging.

IMPROVISED EXPLOSIVE devices (IEDs) like the one that got me had become, by mid-2004, our enemies' weapon of choice, and we had spent a lot of time preparing for the threat. We were all to some extent prepared for the possibility of death, but I hadn't given much thought to how my life might change if an IED took one of my limbs. Ever since the first few amputees returned from Afghanistan in 2001, they have been the very public face of modern warfare as it is waged on the ground—a little different from the sterile video output of a laser-guided bomb or unmanned drone. The media coverage often emphasizes the medical care that saves their lives, and the advanced prosthetics they wear, with phrases like *bionic arms* and *thought control*.

THE MOST IMPORTANT THING THAT CAN BE DONE RIGHT NOW TO PUSH PROSTHETICS INTO THE 21ST CENTURY IS TO OPEN THE TECHNOLOGY TO THE WORLD

Lying in a hospital bed in Landstuhl, Germany, I only knew that I had survived and that a young Marine named Brian Parello had not. The doctors had saved my right elbow and part of my forearm. I talked to my wife on the phone. I got a Whopper from the hospital's Burger King. On the way back to the United States, in a morphine haze, I took pictures as we flew over Iceland. I made my first, totally unintelligible attempts to write with my left hand. I already felt worlds away from Anbar province, and I immediately began to feel guilty about the early ticket home, despite its price.

I arrived in the United States on January 5 and was home a week later on convalescent leave. Before I deployed, I was a biomedical engineering graduate student at Duke University, in Durham, N.C., so I did what any engineer would do with the time: I began scouring the Internet for articles on prosthetic technology, trying to envision what my future would look like. My doctor told me I would have to go through a few more surgeries, and once my incisions had healed I would get a state-of-the-art myoelectric arm.

Myoelectric arms have joints powered by electric motors. They are controlled by electrical signals on the surface of the skin, which are produced by the remaining muscles in the arm. According to a 2005 article, the latest and greatest myoelectric prosthetics allowed a wearer to move the limb just by thinking about it. Many articles have anticipated robotic arms that function as well as or better than their human analogues—letting an amputee shave, hold a knife or fork, button a shirt, or turn an ignition key.

I went to see Glen Hostetter, a prosthetist at Duke. I was telling him how excited I was about the arm I would get at Walter Reed Medical Center when he stopped me. "Have you ever seen a myoelectric hand?" he asked quietly.

I had never seen a real one up close. He dug around the back of his office and brought back a demonstration model of a child's myoelectric hand. All I could say was, "That's it?"

Instead of the lifelike motion of individual fingers I had expected, I was looking at a rigid, hand-shaped electric clamp. The creepy "flesh tone" vinyl glove encasing it seemed to be designed more to make other people feel better than to restore function. The arm I eventually got at Walter Reed wasn't much better. The socket offered a limited range of motion. The beautiful cover, painted by an artist, was too fragile for everyday use. The hand couldn't even turn a doorknob, and it was useless for what prosthetists clinically call the "activities of daily living"—the same activities the popular science coverage had talked about. It was not what I expected it to be, nothing like what I'd been promised by the media, and definitely not what I wanted.

THE CHASM between what people think is out there and what is actually available to an amputee has existed for years. The hype isn't limited to the popular press: Scientific research and even scientific literature repeat these claims. The first myoelectric prosthetic arm was demonstrated in 1955. That benchtop presentation included a powered hook that looks remarkably like one I got from Walter Reed. In 1965, a *New York Times* headline proclaimed "New Process Will Help Amputee to Control Limb With Thought." In 2007, a *Popular Science* article described an early prototype robotic hand as "mind controlled" and "dexterous enough to play the piano." There was even a video of the hand playing "Frère Jacques." The headlines have stayed the same, but as I discovered, so has the technology. These prosthetic "concept cars"—even the ones that live up to their claims—have historically had little effect on what most arm amputees actually wear.

Let me be clear: No expense has been spared on providing military arm amputees with the most cutting-edge technology available for replacing their limbs. Amputees at Walter Reed get the works—myoelectric and body-powered prosthetic arms with any attachments we might want, sports and other task-specific arms, cosmetic arms painted with the tattoos we used to have, you name it. In 2006, the Veteran's Administration spent US $1.1 million on prosthetic devices and services. It's the best insurance and the best care in the world, but that doesn't change what there is to buy or what it can do.

The body-powered prosthetic split hook I chose instead of the myo arm has been characterized by some as little more than a rubber band and a stick. But the surprisingly useful mechanical design has endured for close to a century. It has been improved incrementally since 1912, when it was patented by D.W. Dorrance, who lost his arm to an industrial accident. Body-powered prosthetics have cable controls that you move by shrugging and tensing your shoulders, an action that opens and closes a simple hook or hand appendage. After trying everything else, I opted to wear this arm exclusively.

The kind I wear, made by Hosmer Dorrance Corp., is indistinguishable from those worn by amputees after World War II, except in materials: silicones and plastics in the socket, carbon fiber instead of wood or fiberglass in the frame, titanium instead of steel in the hook, Spectra (a type of strong, lightweight synthetic fiber) instead of steel cable for control. Despite two corporate acquisitions, Dorrance's name remains stamped on every hook the company makes.