

Sports, war transform artificial limbs

By James Dao, New York Times

John Kremer, a Navy explosives expert, lost both his legs below the knee after stepping on a mine in Afghanistan in 2010. In his San Diego hospital bed, he assumed he would be chained to a wheelchair for a year or more. Walking seemed a distant goal. Running? He could barely comprehend the concept anymore.

But with the encouragement of therapists at the Naval Medical Center, Kremer was walking in two months, running in five and skydiving after nine. He did his first 10-kilometer race, about six miles, one year after stepping on the mine. Today he runs, swims or bikes almost daily and competes for the Navy's wounded warrior team in swimming, shooting, seated volleyball and wheelchair basketball.

"For me, being able to compete was a big morale boost," said Kremer, 29, a former explosive ordnance disposal technician first class, who was medically retired from the Navy last year.



John Kremer, an explosives expert, lost both his legs below the knee. Photo/Todd

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Like Kremer, more than 1,600 American service members lost limbs in Iraq or Afghanistan, mainly to homemade bombs not unlike the ones that maimed scores of people in Boston on Monday. Now, the vast body of knowledge gained from treating those troops is likely to help speed and improve the recovery of people whose limbs were amputated after Monday's attack, experts say.

Over the past decade, prosthetic technology has advanced significantly, with computerized knees and ankles that adjust to terrain and activity. Lighter and more malleable materials have allowed amputees to wear synthetic legs longer – and even run marathons. And devices have been customized for a dizzying array of activities, from golfing and skiing to scuba diving, backpacking and even rock climbing.

Perhaps most significantly, doctors know more about treating and salvaging limbs, making recovery faster than a decade ago. Thousands of therapists have also been trained to care for wounds like those sustained in Boston. And groups that organize athletic events for disabled athletes have popped up across the country, serving both civilians and military veterans.

"What's so great now is that there are literally thousands of trained instructors all over the country who know how to teach the disabled," said Kirk Bauer, the executive director of Disabled Sport USA and a disabled Vietnam veteran.

"And there is state-of-the-art equipment that levels the playing field," he said. "That's been a revolution."

Part of that revolution has been the view, now widely accepted, that athletic endeavor – whether competitive or recreational – helps amputees recover emotionally, psychologically and physically, even if they were not athletic

before their injuries.

“It provides a sense of accomplishment and bonding,” said Richard Stieglitz, a physical therapist who is executive vice president at the Wounded Warrior Project, a nonprofit group created in 2003 to assist wounded veterans. “Very often doing something you never did before the injury is huge. It teaches people that life goes on.”

Seth D. Messinger, a University of Maryland anthropologist who has studied rehabilitation programs for the military, said training for athletics gives amputees a clear way of measuring the incremental progress of recovery.

“Rehab for traumatic limb loss is not a short thing, and patients want to know what they have to do next,” he said. “A sports model offers people a set of stages. You’ll walk between parallel bars, then walk with canes, then learn to run.”

But he and Stieglitz warned that athletics alone are not sufficient to address the less obvious problems that may accompany limb loss, like traumatic stress disorder or anxieties about employment.

“Dealing with those things could be more difficult than the amputations themselves,” Stieglitz said. “And just as they are for warriors, they may be hard to spot.”

For people not in the military, paying for care and prosthetic limbs may also be a major issue. The military provides almost unlimited therapy and multiple prostheses. Some wounded troops have three or four: one for walking, one for running, another for biking and other sports.

But private insurance, for those who have it, may limit visits to therapists and cover only a single, basic prosthetic leg. Buying an advanced device can cost more than \$30,000; customizing them for various sports costs thousands more.

Still, Bauer, who lost his left leg above the knee to a grenade in Vietnam, says the world is far different from when he was injured in 1969.

Then, his first prosthetic leg was made of balsa wood with plastic laminate; today they contain carbon fiber, titanium and microprocessors. Then, orthopedic surgeons scoffed at the idea of skiing on an artificial leg. Today, his organization organizes expeditions to climb mountains and other strenuous athletic endeavors.

He has climbed Mount Kilimanjaro in Tanzania and attempted Mount McKinley in Alaska. He recently finished a grueling 26-mile hike through the desert of New Mexico and has completed marathons, including Boston's.

"It was the greatest high in the world," he said of finishing that race, in 2000. "This is what sports does for us, it gives us that confidence. You feel you can tackle the world."