

Shoulder to the wheel: New ways to rehabilitate injured shoulders pay off for patients

by Cary Groner

As aging baby boomers do their best to remain active, increasing numbers of them are discovering that injured shoulders can be surprisingly difficult to heal. One of the biggest problems is that pain leads to harmful alterations in motor activity that can delay or halt recovery, whether from the injury or the surgery to correct it. Fortunately, physical therapists and other clinicians are developing new tools and approaches to address these problems.

"One of the most challenging aspects of shoulder rehabilitation is regaining a functional pattern of movement," said Sandy L. Burkart, PT, PhD, who practices at the Palm Beach Institute of Sports Medicine in Boca Raton, FL.

Burkart explains that most post-surgical patients suffer a fairly severe loss of proprioception—an awareness of the patterns of muscle contraction and movement—in the affected arm. The phenomenon is caused primarily by muscle-guarding "spasm" that protects the glenohumeral joint and its tissues.

"If you can change the early sensations of pain, you can produce a better functional outcome," Burkart said. "It centers on low-load training. The more we facilitate proprioception in the arm, the less pain the patient has, and the easier it is for us to facilitate functional movement patterns."

The approach lets the therapist take advantage of motor programs in the patient's brain that were in use before the injury and surgery, according to Burkart. First, using a technique called effort substitution, Burkart fine-tunes patients' movements of the fingers, wrist, and elbow so they don't reflexively produce muscle guarding at the shoulder. Second, he has them pay close attention to specific movements of their uninjured arms, because patients' awareness of such motions can be transferred to the half of the brain that controls the injured one.

"I published a study using functional MRI, demonstrating that stroke patients have the same intensity of firing patterns in the brain when they imagine a movement as with actual activity," Burkart said. "For an orthopedic patient it's easier than with a neurologically involved patient, and that's where the UE Ranger comes in."

An assistive motion device, the Upper Extremity (UE) Ranger was created to help postoperative patients achieve relaxed and graded motion progressions starting fairly soon after surgery. It is designed with articulated joints at both the base and the hand piece, which keeps the patient's hand open. As a result, patients don't need to grip, so they avoid associated arm and shoulder contractions that can impede the healing process.

"Because of the Ranger's design, we can begin early passive movement and early active-assisted movement; it's probably the most significant piece of equipment we use postsurgically on the shoulder," Burkart said.

Phil Sizer, PT, PhD, sees the task in a similar light. Sizer is a professor in and program director of the ScD program in physical therapy in the rehabilitation sciences department at Texas Tech University Health Sciences Center in Lubbock.

"The most troublesome issues are restoring arthrokinematic motions and restoring control," Sizer said.

To help restore motion, he typically performs manual therapy with the patient's arm elevated to help orient the joint. To restore motion control, he uses closed-chain movements and partial weight-bearing to help centralize the humeral head.

"In that position, we work on different locomotor groups to restore activity," he said. "Then we go to recumbent, open-chain (movements) and concentrate on eccentric loading."

Sizer and his team use the Ranger so patients can more fully relax as they move the affected arm.

One clinician who understands the Ranger's capabilities is Dan Miller, PT, who practices at Moving Well in Omaha, NE. Miller invented the device.

"The shoulder is complex—one of the most dynamic, mobile joints of the body," Miller said. "Because of that, it is susceptible to changes in neuromotor tone and postural asymmetries. Once you have pain, that can shut down certain motor inputs, which alters your biomechanics. It's an unhealthy progression that is not going to resolve the origins of the problem."

Miller often sees subacromial impingement, where tendons get sandwiched between bone, leading to chronic pain, inflammation, biomechanical dysfunction—and surgery. His job is not just to rehabilitate postoperative shoulders, but to address the biomechanical issues and pathology that created the problem in the first place.

"Knowing what I know now, I would never want these patients to grip a rigid bar," Miller said. "With the Ranger, the combination of not gripping and articulating joints allows the upper extremity to move as designed. The device supports both the passive and the active-assisted phases of rehabilitation, and patients get a reduction of pain and inflammation."

That pain relief, coupled with the innovative therapeutic approaches made possible by the UE Ranger and associated treatment advances, promises to have weekend warriors back on the field sooner than would have been possible even a few years ago.

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