

PULLING SHOULDER PAIN AWAY

by Patrick L. Jacobs, Ph.D.

An ounce of prevention can help prevent tons of shoulder misery.

Chronic shoulder pain is one of wheelchair users' major complaints. Numerous research studies have found that approximately two thirds of people with paraplegia report considerable shoulder pain that interferes with their mobility. This pain, significantly associated with wheelchair propulsion and transfers, had a tendency to worsen with increased use. The pain is often a precursor to rotator-cuff and other shoulder injuries that may, unfortunately, require corrective surgery. Shoulder surgery is especially traumatic for someone who uses a manual wheelchair, as mobility is dramatically compromised during the postoperative period.

Research has shown that the most frequent cause of shoulder pain and injury is overuse syndromes. These are common to athletes, such as baseball pitchers, who are involved in throwing activities, or competitive bench pressers who take part in pressing movements. Overuse syndromes are generally characterized by an imbalance in the joint caused by overde-

velopment of the structures on one side of the joint and lack of development in the structures on the opposite side.

Unfortunately, misconceptions regarding sport-specific conditioning have increased the incidence of imbalanced muscular development in athletes.

The general idea of conditioning for performance often incorrectly places too much emphasis on developing the muscles primarily involved in the sport motions. This approach regularly results in overdevelopment of the agonists (primary muscles), with minimal stress placed on the antagonists (muscles opposite the agonists) and stabilizing muscles. Over time, the muscle stresses around the joint may become imbalanced and lead to instability, pain, and, therefore, a greater chance of serious injuries.

Upper-body Pain

In the case of someone using a manual wheelchair, the normal activities of daily life may contribute to overuse syndromes. Daily tasks like wheelchair



propulsion, transfers, and weight shifts involve relatively high-force pressing actions that stress the anterior deltoid, triceps, and pectoral muscles. Rehabilitation programs are directed to enhance the ability to independently perform daily tasks and therefore generally concentrate on those and similar motions.

While this is quite appropriate in a rehab setting (for a modest time period), continued exercise conditioning solely of pressing-type motion may, over time, produce overuse syndromes of the upper-



body joints. This training strategy neglects the rest of the important muscles surrounding the shoulder joint, such as the rotator cuff, posterior deltoid, trapezius, and rhomboid, leaving that joint exposed to possible injury.

In order to protect the shoulder joint, it is important to initiate an exercise program that develops balanced musculature on all sides of the shoulder and elbow joints. To counteract the repetitive pushing motions that are part of daily wheelchair use, a workout routine should fea-

VitaGlide incorporates a press-and-pull arm motion in which the two handles are directly linked, so as one handle is pressed (or pulled) the other is moved in the opposite direction. VitaGlide users report it allows them to regularly train and improve their cardiovascular fitness without the pain they previously experienced from other devices.

ture a variety of pulling motions. This approach can be used with resistance and cardiovascular training programs.

Balanced Resistance Training

Resistance training has been shown to be effective in increasing wheelchair users' upper-body muscular strength and power. The ability to produce more mus-

cular force may significantly enhance the areas that require repeated bursts of force, such as pushing up a ramp or quickly crossing a busy intersection.

Various wheelchair sports also require considerable levels of muscular force production. However, upper-body pain (especially in the shoulder) is inversely related (oppositely associated) with more



Resistance pulling exercises can be effective as motions in which force is exerted in virtually the opposite directions of the pressing exercises. For example, the opposite move of horizontal press is seated row. Likewise, the opposite of overhead press might be lat pulldown (shown here).

independent lifestyles. Therefore, resistance training is effective in enhancing wheelchair users' daily task and sport performance as long as the exercise program is designed to establish a balance of the joint stresses.

Resistance pressing exercises such as the rickshaw or dipping are quite effective for increasing performance of wheelchair propulsion tasks and transfers. Most trainees are also familiar with exercises such as horizontal press (bench press or horizontal machine press) and overhead shoulder press, which are useful in developing the pectoral and anterior deltoid muscles. While these help with muscle development and improving wheelchair propulsion and transfer tasks, they must be balanced with movements that primarily stress the antagonists of those pressing actions.

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tions of the pressing exercises. For example, the opposite move of horizontal press is seated row. Likewise, the opposite of overhead press might be lat pulldown.

It is important to perform a complete range of motion. It is not productive to use a heavy weight that prevents movement through the full range of motion. People with cervical-level spinal-cord injuries (SCIs) often do not possess adequate grip strength necessary to perform these important exercises but can do them using specialized wrist cuffs with hooks on the cuff or on the bar.

Wheelchair athletes should also consider external rotation exercises to condition the rotator-cuff muscles. These can be performed with a wall pulley or elastic tubing. Position the wheelchair at right angles to the pulley with your far elbow bent at your side. The motion involves rotating the shoulder outward and controlling the motion back toward the pulley. This is one of the most important

resistance-training exercises to strengthen or rehab the rotator cuff.

Balanced Cardiovascular Training

The benefits of cardiovascular training have been well established and include increased aerobic capacity (VO₂max) and metabolic rate, control of body weight, improved lipid profiles, stress reduction, as well as increased muscular endurance. Cardiovascular endurance training is generally performed with an intensity that allows exercising for extended periods. Professionals recommend three to five weekly sessions 20–60 minutes in duration.

Cardiovascular exercise modalities should allow rhythmical activity that can be performed continuously or intermittently during the session. This type of workout is particularly important for wheelchair users whose lifestyles tend to be less active. Due to limited activity some wheelchair users are more likely to become overweight and develop diabetes and higher blood pressure and cholesterol levels compared with able-bodied individuals.

Wheelchair users can significantly increase their health and fitness with several different forms of arm endurance activities. The most common are wheelchair propulsion and arm-cranking ergometry. Unfortunately, these have been associated with increased incidences of shoulder pain and injury. Scientific investigations indicated these activities primarily stress the anterior deltoid, triceps, and pectoral muscles within a limited movement range. Thus, exercise conditioning that includes only these often leads to overuse syndromes of the shoulder and increases the likelihood of pain and injury.

The cardiovascular training options available to wheelchair users are limited, as most exercise devices are based on leg activity. There is, however, equipment designed for the general population that does use productive arm movements. Several of these incorporate a press-and-pull arm-movement pattern within a horizontal plane. Recent unpublished studies compared this movement pattern with that of arm cranking.

The press-and-pull exercise allows a greater amount of arm work to be performed, elicited much more muscle effort

Top Product

RMT Fitness's VitaGlide™, an exercise system designed to improve the quality of seated fitness programs, was selected as a finalist for the Naidex New Product of the Year Award.

Naidex is the United Kingdom's largest home-care event. Organizers received more than 80 entries for this award.

Based in Miami, Fla., RMT manufactures exercise equipment for people with disabilities. It is a division of RehaMed International.

CONTACT: RMT Fitness, 14008 Southwest 140th Street, Miami, FL 33186. (800) 577-4424 / (305) 969-2155 (fax) / info@rmtfitness.com / www.rmtfitness.com.



People with cervical-level spinal-cord injuries (SCIs) often do not possess adequate grip necessary to perform some important exercises. However, using specialized wrist cuffs with hooks on the cuff or on the bar itself, this can be accomplished.

from the back muscles (trapezius, rhomboids, latissimus dorsi), and resulted in a significantly greater shoulder and elbow range of motion. The Schwinn Airdyne stationary bicycle and the NuStep recumbent trainer offer this press-and-pull arm motion in combination with leg exercise. Such devices are quite effective for many populations but have minimal application for wheelchair users due to the requirement for transfer onto the seat, minimal seating stability, and institutional pricing.

A new product, VitaGlide™ (www.rmtfitness.com), has recently been specifically designed to meet wheelchair users' exercise training needs (see "Top Product"). It incorporates the press-and-pull arm action previously unavailable to people unable to perform leg exercise. The press/pull movements provide a much greater range of motion at the shoulder and elbow than arm crank ergometers, matched with dramatically greater muscle stress of the muscles associated with the pulling movements. Resistance can be easily adjusted to allow appropriate training intensity (some endurance or strength) for wheelchair users. People who have tried VitaGlide say it allows them to regularly train and improve their cardio-

vascular fitness without the pain they previously experienced from other devices.

VitaGlide incorporates a press-and-pull arm motion by which the two handles are directly linked, so as one handle is pressed (or pulled), the other is moved in the opposite direction. The linked design provides particular benefit to people with a deficit on one side of their body, such as stroke patients. Using their stronger side they can push and pull their weakened side through a full range of motion, providing the reciprocal pattern found in many rehabilitation programs.

Rather than requiring a transfer onto an attached seat, users are able to roll into place and exercise from their own chairs. Eliminating transfers significantly increases the level of exercise independence available for many people.

Hand movements are guided by the VitaGlide within two converging lines, thereby providing trunk rotation. Wheelchair users rarely have the opportunity to condition trunk muscles, which are vital in stabilizing the torso and in many daily functions such as reaching for objects. Early anecdotal reports indicate

this rotation is also quite effective in reducing the waistline.

Wrapup

Wheelchair users' exercise programs should include movements that stress the muscles involved in pulling. Daily activities such as wheelchair propulsion, transfers, and weight shifts primarily stress the anterior deltoid, triceps, and pectoral muscles. Over time the posterior shoulder muscles tend to become lax and produce imbalanced stresses onto the shoulder joint. Pain and increased chance of serious injuries to this joint can dramatically limit daily activities.

Proper selection of exercise movements and devices can allow wheelchair users to improve their fitness and reduce the chance of developing secondary disabilities (overweight, diabetes), upper-body pain, and/or orthopedic injuries.

An ounce of prevention can definitely help to prevent tons of shoulder misery.

References

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Patrick Jacobs, Ph.D., is an associate professor at the University of Miami (Fla.), Department of Neurological Surgery, Miami Project to Cure Paralysis. He is also a research health scientist, Miami VA Medical Center, Center of Excellence in Restoration of Function in Chronic SCI.

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