Using a power rack for squatting

John Garhammer, Ph.D., C.S.C.S.
Department of Physical Education
California State University
Long Beach, California

Generally accepted safety considerations, such as spotting, are more likely to be violated in the bench press than in any other exercise. The squat is probably a close second. Squatting should be done with one or more spotters if some type of safety rack is not used. One spotter is adequate if his or her size and strength are appropriate for the lifter. For example, a taller and stronger person can safely spot a weaker person, but the reverse situation could injure both the lifter and spotter. For a single spotter, the best method is to stand directly behind the squatter and, if needed, assist the ascent by placing his or her forearms under the lifter’s shoulder joints and lifting up (Photo 1). If the trainee is larger and stronger than any available spotters, then two or three spotters should be used — for example, one on each side of the bar.

In order to emphasize the need for proper use of a power rack for squatting, it is helpful to point out ways to avoid injury if squatting without a spotter. If a trainee undertakes this risky way to squat and loses balance or cannot rise from the bottom position, two methods of injury avoidance are possible: while thrusting forcefully upward (as during the initial part of a normal ascent) rapidly duck the head and push the barbell forward with the arms (this pushes the lifter backward away from barbell) so the barbell lands on the floor in front of him or her (Photo 2); or, while thrusting forcefully upward, let go of the bar with one hand and rotate that inside of the body away from the barbell while pushing the bar backward (and the body forward) with the other hand (Photo 3).

These procedures would not be needed with proper spotting techniques, but they do show that injury may still be avoided (although the floor may be damaged) when the unexpected happens. With this introduction, the importance of proper use of a power rack for squatting will be easier to explain.

The key advantages to using a power rack as a safety rack for squatting are total freedom of
movement to use your natural leverages to their best advantage without the need for a spotter, and a safety net to fall back on if a problem arises, namely the safety pins. If the safety pins in a power rack are not set properly for each user, the rack may be more dangerous than squatting without a spotter.

Typical power racks have vertical support columns that are spaced about two feet (65 centimeters) apart front to back. If the safety pins are set too low and the trainee loses balance or cannot stand with the weight, the injury-avoidance techniques described above for use when a spotter is absent may not work. In fact, they may be very dangerous, because the barbell may bounce off of the vertical support columns back toward the trainee.

Photo 4 shows correct positioning of the safety pins, two to four inches (five to 10 centimeters) below the lowest position of the bar during the squat. Photo 5 shows what might happen if the pins are set too low and the forward-throw escape (Photo 2) is attempted. The barbell may bounce back onto the trainee. A similar hazard exists if the barbell is thrown backward. Always adjust the safety pins for each person squatting in a power rack. Excessive adjustment can be avoided with teams by having athletes of similar size squat in the same rack.

Note that if the safety pins are set slightly higher, a different type of injury may be caused. Because squat depth often varies by one or two inches (2.5 to 5.0 centimeters) from one repetition to the next, the bar may bump a pin if the pins are set too high. If one pin is hit, balance will shift to the opposite side of the body and undue joint stress will occur asymmetrically, increasing the risk of injury. If both pins are hit simultaneously, the weight will briefly be removed from the trainee and may cause a momentary muscle relaxation, resulting in temporary loss of proper positioning, muscle tension and coordination when the barbell is subsequently raised from the pins. This
sequence of events also increases the risk of injury.

Some squat racks other than power racks also provide a safety net. A horizontal support beam is often extended from an inclined squat rack with multiple level supports from which to lift the bar (Photo 6). This may work well in most cases (but not if balance is lost backward) if the support beam is at the correct height for a given trainee and he or she is positioned properly over the horizontal beam. Some racks of this type have horizontal support beams at several heights in a stair-step arrangement to accommodate lifters of different sizes and using different squat depths.

Proper hand position on the bar is another safety consideration for squatting in a power rack. Many trainees will let their grip widen on the bar after lifting it from the rack supports. In this case, the hands may be just above the safety pins during the squat (Photo 7). If a problem arises and the barbell is set down or dropped onto the safety pins, the hands or fingers may be crushed between the bar and the pins. Each user must be aware of his or her hand positioning relative to the pins. This can prevent serious injury by avoiding unsafe hand spacing or by permitting a quick movement to move the hands away from the pins if the bar is dropped. A few seconds for pin height adjustment, and an awareness of hand positioning, are the main ingredients to a safe squatting workout in a power rack. ●

Acknowledgements
Photos by Dr. Ralph Rozanek. Equipment for most photos provided by Los Alamitos Sport Performance and Orthopedic Rehab Training, Los Alamitos, California.

* Editor's note: Squatting without spotters is not recommended by the NSCA.