Water Polo

February 20, 2006

The Sport

An exciting, often brutal water sport and the first Olympic team sport (debuted in 1900), water polo combines the fast actions of basketball, rugby, swimming, throwing and wrestling. During a match, players constantly tread water, swim, sprint, tackle, block, and occasionally shove, pull, kick and even punch. The game is played in seven-minute quarters, but the regular fouls can extend the match time to about an hour of nearly non-stop action. Compared to many other team sports, it is relatively a shorter game, but one hour of continuous high-energy, explosive performance while in the water requires the water polo athlete to possess a superior level of physical fitness!

The Demand

Each team starts the quarter with a sprint from its own end-line, contesting for the ball floating in mid-pool. Sprinting also occurs frequently throughout the match, such as dashing into position as the play demands. Sprinting against the fluid resistance of water requires power and speed in the legs and arms, and strength in the trunk. Other elements of the match also requires power and speed, such as blocking a shot, hitting the ball out of the opponent's possession or escaping from the grip of someone trying to drown you!

The greatest demand for power exists in the shot. The water polo shot is a unique skill in which the player attempts to score a goal by throwing the ball fast and accurately into the goal. It is an explosive overhand throw, similar in biomechanics to a baseball pitch. And similar to the baseball pitcher, the water polo thrower must rotate the trunk in order to create maximum angular momentum to propel the ball with high speed at the release. This body rotation occurs first at the hips, followed by the trunk, then the shoulders, and finally the throwing arm. The large muscles of the hips and especially the anterior trunk must work to produce this rotation. Before the throw, however, the body must rise as high as possible out of the water to escape its fluid resistance, enabling a faster rotation; the legs, therefore, must extend powerfully to raise the body out of the water (the "boost") immediately prior to the forceful flexion of the leading hip to impart a rotation force that leads through the rest of the body. Skilled throwers exhibit this movement very forcefully. Trunk rotation contributes about 30 to 35% to the speed of the shot, so it is crucial to increase power output of the legs and trunk to attain a greater throwing velocity.

An hour of treading water, repeated sprinting and intermittent explosive movement draws heavily from the aerobic, anaerobic and ATP-PC systems.

The Injuries

Water polo is a contact sport involving swimming, throwing and, occasionally, kicking, wrestling and boxing. As such, athletes exhibit common injuries that are often unrelated to fitness level: scratches, facial injuries such as black eyes, split lips or broken noses, eye irritation due to chlorine, and finger injuries due to contact with other players. Currently scientific literature on water polo injuries is limited, but because the ball shot is similar in biomechanics to the baseball pitch, the shoulder of the water polo athlete can be equally susceptible to overuse or acute injuries. Good throwing technique must be developed, but it should also be accompanied by proper strength in the muscles and structures of the shoulder joint. Equally important is the strength development in muscles that contribute directly to the power of the throw, specifically the muscles around the legs, hips and torso. Weak muscles in these areas may cause compensation and undue stress at the shoulder joint. The egg-beater kicks can also place stress on the knees (Weinberg, 1986), therefore strength in the connective tissues of the knees must be sufficient. The strength-training program must address these areas of susceptibilities.

The Strength Program

Structural and functional strength is important to preventing injuries, so strength exercises such as squats, deadlifts, presses and pull-ups are used, among others. Strength of the trunk is especially important for throwing, so various abdominal and back exercises are used to strengthen the trunk to support a powerful throw. Shoulder exercises involving PNF patterns are used to strengthen the rotator muscles of the shoulder girdles to prevent shoulder injuries and improve throwing performance. Base strength is also required before entering a power training phase to improve explosive performance.

Sprinting, blocking, wrestling with opponents, and shooting the ball require power, so full-body explosive exercises such as snatches, cleans and jerks and their variants are utilized with appropriate progressions. These exercises train both power and strength at the same time, making them a highly efficient way for athletic strength training. Other power exercises are performed using the medicine balls or plain body weight.

Although no literature can be found on the metabolic profile of water polo players, it has been said that the fuel for this sport is about 60% from the aerobic system, 20% from the anaerobic system, and 20% from the ATP-PC system. These figures may vary, but the essence is that all the energy systems must be trained effectively through a combination of aerobic exercises, intermittent sprinting, and explosive drills. The purpose of this combined training of energy systems are to meet and exceed the metabolic demand of water polo.

In addition to solid sport-specific skills (which comes through only practice), players with the highest level of physical fitness are the ones that out-sprints, out-swim, out-tackle, out-throw, and out-play the opponents. Work hard on your water polo skills by spending time in the water, but make sure you support those skills with a superior level of physical fitness by spending time with dry-land strength training!