Rowing

Rowing is a strength-endurance sport that demands practiced and precise technique. Technique is defined as the most efficient way to move your boat across the water. It requires individual discipline as well as teamwork. Training involves rigorous technique work and conditioning work that emphasizes endurance and power. Certain physical characteristics are ideal for elite rowers but without great technique, the optimum body size and physiological capabilities are useless. Rowing is a full body workout employing the lower body to a greater extent than the upper body. Improvement in technique and efficiency of the repetitive motion involves a never-ending series of slight adjustments. Whether an athlete rows sweep or scull, in a boat for 1, 2, 4, or 8, the components of the sport remain quite similar. Competitive rowers experience two distinct seasons—the head race season for distance events occurs in the fall with sprint season in the spring and summer. Training differs somewhat in preparation for and during each season. Here in Tempe, we tend to row 10 months out of the year because the weather allows it. We have more on-water practice throughout the year whereas rowers in other climates must rely on land and indoor practice to a greater extent.

Following reflects analysis of movements used in the sport, the physiological demands on the athlete, and injuries sustained among rowers.

Rowing Movement Analysis

There are 4 distinct parts of the rowing stroke which, ideally, flow seamlessly one to another. The **drive** is when the oar is being driven through the water by the force of the rower's body upon it. The **recovery** is when the oar is out of the water being readied for the next stroke. The **catch** is the beginning of the drive when the oar contacts the water. The **finish** is the end of the drive when the oar is released from the water.

1. Explosive movement—bilateral, repeated, rhythmic, horizontal, backward drive
2. Dynamic force to kick start the drive is provided by the contraction of the quadriceps to force the knees to extend; the ensuing contraction of the calf muscles transfers the drive through the balls of the feet. Dynamic tension is required of the lats at this time.
3. Core stabilization by abdominal and back muscles as the rower maintains strong and straight posture throughout the stroke and maintains firm, forward body angle through the recovery and most of the drive. Core stabilization with a neutral spine is crucial to the balance needed.
4. Flexion and extension at the hips as the rower swings the torso forward and back like a pendulum at the end of the drive and beginning of the recovery
5. The contracting hip extensors control and power the opening of the body angle at the catch
6. Dynamic tension through the forearms to allow the fingers to grip the oar handle, transferring the force of the drive to the oar blade

7. Arms and shoulders are used to control the oar handle height, drop the oar into the water by raising the arm level from the shoulder, explosively pull the handle into the chest at the end of the drive, and to extract the oar from the water by tapping down and pushing the handle away from the body.
8. The forearms and hands are instrumental in feathering the blade as it comes out of the water and squaring it back up in readiness for the catch of the next stroke.
9. The hamstrings and shin muscles maintain slide control in the recovery as the rower returns to the top of the slide slowly so as not to upset the forward motion of the boat.
10. Sweep rowing involves some lateral rotational movement out toward one's rigger.
11. Flexibility is particularly needed in the hips (lower back, glutei, and hamstrings), through the torso for sweep rowing, in the ankles to allow the shins to come up perpendicular to the water at the catch, in the shoulders for full reach at the catch, and in the wrists for feathering. If one is in bow seat of a scull, flexibility is needed in the torso and neck to allow the rower to look behind oneself for steering purposes.
12. All rowers must lift and carry the boats and oars.
13. Occasionally, rowers need to hoist themselves back into a boat that has flipped.
14. Great effort goes into technique work as well as being synchronized with all other rowers in the boat on all aspects of the stroke.

Energy System Analysis

In rowing physiology, blood is the key: how fast it is being pumped, how much volume is being pumped, how much oxygen it holds, and how well the muscles can use that oxygen. All three metabolic systems for energy release are being used by the rower.

- The oxidative system (aerobic) is fundamental to rowing performance. This system fuels 65-80% of the activity. A rower's VO2 Max should be trained to allow for increasing efficiency in the uptake, transport, and utilization of oxygen.
- The glycolytic system (anaerobic) fuels two phases in a race. The first is soon after the start of the race and during the first 150-200m where maximum effort is being generated to bring the boat speed up. This lasts 30-40 seconds. The second phase is at the sprint to the finish which generally lasts 50-60 seconds. Occasionally throughout the race, the crew will do a "high 10" which is 10 strokes at maximum power. This would also tap the anaerobic system as the duration of a high 10 is 15-20 seconds. Lactate training is desirable to allow the body to reach a higher lactic threshold and improve the speed of lactate removal.
- The phosphocreatine system is tapped as movement is initiated and transitioned to a higher level. This occurs at the start of the race and the initial strokes of a transition to a high 10 or a sprint.
- Periods of rest are dependent upon a coach's choice of workouts and the schedule of races at a regatta. At actual race time, there is warm-up time allowed, a trying time of getting boats aligned for the start, and finally the start. Once rowers hear, "Attention, row!" there is no rest until the boat hits the finish line.

Injury Analysis

Most rowing injuries are due to overuse. The repetitive nature of the movements can aggravate an existing problem or create a new one. Naturally, if technique is off and practice is done incorrectly, a rower is more likely to develop an injury. Following are the common injury sites due to overuse.

1. Back - generalized lower back pain, irritation under the scapulae, herniated or ruptured discs
2. Hips - piriformis syndrome and resulting sciatic problems, inflammation of the bursa on the sit bones, hip flexor tendinosis from too much layback, pain along the IT band
3. Ribs - stress fractures and intercostals strains
4. Shoulders - rotator cuff issues
5. Wrists - tendon inflammations on the thumb side and carpal tunnel syndrome from feathering
6. Elbows - irritation to bone and tendons on all sides of the joint
7. Knee - anterior and posterior pain
8. Skin - blisters and calluses can get gruesome, sun and wind burn, frostbite to fingers and toes—yes, even here in the desert