Rowing is a sport with many variables and complexities

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Rowing is a sport of many variables and complexities. It is these variables and complexities which cause the many injuries associated with the sport. To understand some of the injuries it is essential to understand the sport.

The athlete sits facing away from the finish line with their feet fixed to a footboard in shoes similar to those of cycling cleats.

In a rowing boat the oar or blade is suspended on a rigger to create a lever and fulcrum thereby making a more efficient transfer of power to propel the boat, whereas in canoeing the oar is placed directly in the water. As mentioned earlier, their feet are fixed and they have a seat which can slide. Canoeists' feet are not fixed and their seat does not move. It is this sliding seat and rigger which creates the power to propel the rowing boat. It is more the power from the legs and back that drive the boat than the apparent pulling action of the arms.

Rowing is a sport that is more suited to Physicists than athletes and coaches, but it is the coaches and athletes that must adjust seat heights, footboard heights, rigger pitches and heights and oar spans to create an optimal arc for the athletes' blade to transfer power to the water.

Spirit levels, plumb lines and measuring tapes are common rowing coach tools. They help the coach create a mechanical advantage for the athlete. Coaches are secretive about how their boats are set up.
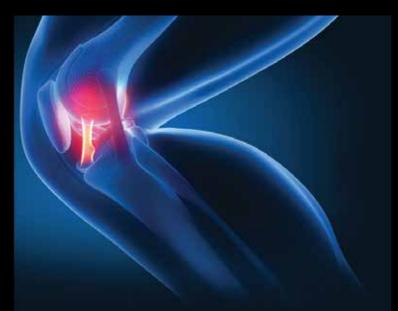
Subtle changes can create big differences in the athletes speed and power. It is not a one size fits all. Every athlete is different, with different heights, arm lengths, leg lengths and power capabilities. There is much trial and error to get the perfect boat set up.

A perfect boat set up with a poorly executed stroke will negate the levers effectiveness and result in more power being needed by the athlete. This is why they train the high mileage volumes that they do. They need to have a perfect boat set up and then create the perfect stroke with the perfect arc to create the most power from each stroke. Perfection is about efficiency.

If you remember Newtons' third Law - When one body exerts a force on a second body, the second body simultaneously exerts a force equal in magnitude and opposite in direction on the first body.

Thus whatever force the rower applies to the blade, the blade applies the same force on the rower. If you think they are rowing 36km a day, you can start to appreciate the amount of force being applied to the athletes' body.

The various phases of the rowing stroke all predispose the athlete to different injuries. The knee, lower back, wrist and rib being injured most commonly.

Knee injuries:

From the Catch phase to the Finish the athletes knees go from full flexion to extension and this is repeated over and over. Many rowers develop a Patella Femoral Syndrome (a grinding sensation underneath the knee cap) and Ilio-tibial-Band Friction syndrome (sharp pain on the outside of the knee when straightening the knee). Both these conditions may be exacerbated by the running volume that is so common in all rowing training programmes.

Lower back pain:

Lower back pain is common in rowing. Everything from muscle spasm to disc prolapse occurs. In the Catch phase the legs are fully flexed and the lower back is flexed. The back functions as a braced cantilever during the rowing stroke and is the major connection in the transfer of power from the legs to the oar. This loading causes injury, hence the importance to have a correct boat set up so as to optimise the loads. Also as the rower fatigues Lumbar flexion increases further increasing the shear load on the back. Biomechanical studies have shown that shear loads can be as much as seven times the body weight of the athlete. Sweep rowing adds a torsional component which can affect Z-joints in the back producing pain localised to one side of the back. As with most other sports, gym also plays a part in rowing. There is then increased loading while performing their gym routine which may further aggravate an already tired and painful lower back.