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KIN 856: Assignment #3

Serving a volleyball requires the player to apply force to a volleyball in two different ways; first, by throwing it in the air, and second, but striking it in order to send it across the net to a desired location. In order to perform many of these movements, the shoulder allows for a wide range of movements, but this wide range of movements also makes it easy for the shoulder to become unstable, which can result in injury. The constant repetition of movements also leaves volleyball players susceptible to injury.

Volleyball is not necessarily a fast-paced game—while players do move quickly on the court during a volley, there are many "breaks" for time outs, subbing, and time between serves. This means that volleyball players should be well versed in anaerobic training that allows them to perform high intensity bouts of movement throughout the game.

Skill—Overhand serving in volleyball/Training to prevent Injury

Muscular Adaptations—During a volleyball serve, there is an amount of external rotation that occurs when the arm is brought back before the hit, and the arm being slowed down after hitting the ball. The muscles (infraspinatus and teres minor) may become weak overtime because of the repetitive overhead motion of hitting a volleyball. In order to avoid or help prevent injury to the rotator cuff (which the aforementioned muscles are a part of), volleyball players should do strength and resistance training in their shoulders. One way is to concentrically strengthen the external rotators using a resistance band or some sort of weight. Players could also horizontally abduct and externally rotate the shoulder with a weight. This should result in some muscle hypertrophy, which would be the increase in the cross-sectional area of the existing fibers of the rotator cuff. A player with a greater muscle cross-sectional area should be able to create more force, but it should also help to prevent overuse/repetitive use injury in the shoulder. Supporting ligaments and tendons will also strengthen as the muscle increases. The connective tissues can

show growth depending on the intensity of the strength activities. As a volleyball player begins to increase the weight during shoulder strength training, there should also be growth of the involved connective tissues. The changes to muscular strength are extremely important in order to prevent injury in the shoulder. These injuries are common due to repetitive use, but if the muscles involved are stronger, they are less susceptible to weakening. What is interesting, though, is that the muscular gains made through training happen only after the neural adaptations have occurred at the beginning of a new training regimen.

Neural Adaptations—According to the slides, as muscular force is being produced at higher intensities and force outputs, the nervous system will also need to make a few adaptations of its own. During resistance training, like the previously shoulder exercises while not excluding countless others, there are increases in motor cortex activity when the level of force developed increases or when learning a new exercise or movement. During anaerobic exercise like resistance training that a volleyball player might go through prior to a season, the player's brain is making adaptations that allow for increases in activity. There could be more motor units and those units could be firing at a faster frequency. It is also possible that with the proper resistance training, the central nervous system of an athlete could adapt by allowing some motor units to be used out of order in order to help with greater production of movement. In the case of volleyball players, this might mean that they could activate their muscles in a different order in order to produce the most effective strike while serving. This may not happen with a volleyball player necessarily, but it depends on the frequency and intensity of the resistance training regimen. The resistance training regimen could also enhance the reflex response (known as the neuromuscular

reflex potentiation) which could improve the magnitude and rate of force development. This would also allow action potentials to cross the neuromuscular junction faster.

References

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