REHABILITATION SCIENCE

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Definition of Rehabilitation

Rehabilitation in equine practice is almost always discussed as a part of the recovery plan after injury or surgery. Rehabilitation can range from a diligent hands-on approach to a complete hands-off approach of "turnout in the back 40". A potential means to help define the pros and cons of these two approaches, and everything in between, is to look to other species for direction. Of course, human rehabilitation is the most advanced, but small animal rehabilitation can also be of interest when developing concepts that will be useful in equine rehabilitation.

The science of rehabilitation takes the basis of knowledge from biomechanics, kinesiology and anatomy, and adds to that a practical clinical application. Rehabilitation is not just rest with a gradual increase in work. Rather, the science of rehabilitation takes into account information that we have learned from how tissues heal and in what environment they heal the best, to develop a specific rehabilitation protocol. The goal is to apply information from a variety of fields of science, so that the practitioner has the best chance of obtaining the highest quality of healing.

Teamwork between specialists is important because each member can then use their expertise to move the protocol forward. It is difficult for one practitioner to have all the skills needed to bring an injury from start to finish. However, it is not easy to work with a team approach because everyone must value the perspective of the other members. Sometimes the answer can best come from a discussion with the groom rather than the doctors! However, the umbrella that directs the protocol should always lie on the shoulders of the attending veterinarian. In addition, the rehabilitation program should begin with a thorough diagnosis of the horse.

Although it seems fundamental, it is important that the terminology used to discuss rehabilitation protocols is universal. The use of biomechanics to help define this terminology is beneficial. For example, extension and flexion of the spine must be clearly defined as well as what does "thoracic rotation to the right " really mean.

Current Rehabilitation Theories

Diagnosis of the specific problem, or problems, is essential, however during the rehabilitation plan, focus is usually not just placed on the site of the injury.

Agonistic and antagonist muscles are of equal importance when trying to improve the faulty movement pattern that is typically present when injury occurs (Scholtes et al, 2010).

Many times when a horse is palpated, the site of minimal movement is thought to be the main problem area. However as we look at new research, we see that hypermobility can be an important forbearer of injury (Sahrmann, 2011). As hypermobility continues, the joint breaks down and the muscles begin to spasm due to overwork, leading to further complications. The end result is hypomobility where the degenerative process has resulted in the loss of cartilage and exostosis (Adams and Dolan, 1995).

Compensation of the horse due to injury or surgery is another important consideration during the rehabilitation program. Injury, that is not traumatic, is almost always the result of a long-term condition of incorrect biomechanics (Scholtes, et al, 2009). Due to limitations in movement, the body will start to change the biomechanically correct manner in which it moves, resulting in pain and breakdown of the musculoskeletal system (Van Dillen et al, 2007). Unfortunately, only removing the pain will not necessarily solve the problem if the incorrect mechanics are not addressed.

Pain as a secondary or primary result of injury must be recognized and dealt with. Pain may cause the movement of the horse to change as a consequence of injury (Sterling, 2001), or incorrect biomechanical movement may result in pain (Sahrmann, 2002). In addition, if the animal is in pain due to a compensation that has resulted from the injury, dealing with only the site of the injury will not heal the horse.

Strengthening during rehabilitation is emphasized in most protocols, but many times over strengthening of one area is the reason the injury occurred. The over strengthened area results in limited mobility in that region leading to hypermobility in another region of the body (Lotz, et al, 2006). To heal the injury it is sometimes necessary to obtain more flexibility at the primary injury site, while strengthening another associated area. To gain joint stability, the balance of flexibility and strength should be emphasized. The major factor in cartilage degeneration appears to be stresses on the synovium due to joint instability rather than inflammation (Lukoschek, et al, 1986).

Asymmetry of movement causes significant biomechanical problems in the body leading to injury (Guilak, et al, 2004). Symmetry of motion is the foundation of quality movement, and quality movement is a very important element of long-term pain-free movement (Gombatto, et al, 2008). Of course, symmetry must be evaluated based on the specific movement, but saggital plane symmetry is a quality to strive for.

Torque is sometimes referred to as rotation, but is actually the force that causes the movement and can result in biomechanically correct or pathological rotation. Of

course, pathological rotation can deteriorate joints fast. However, we sometimes don't associate pathological rotation with asymmetrical movement. The two typically go hand in hand (Lukoschek, et al, 1986). For example, in humans, the incorrect alignment of the thorax is a major factor in patients with neck pain (Sahrmann, 2011). In the horse, observation of the symmetry of the rotation in the pelvis can be an important indicator of the pressures placed on the stifle and hock, and visa versa.

Muscle memory is a strong force to contend with. This is the element that keeps us from relearning to walk every time we wake up in the morning. Muscle memory patterns have been shown to be an adaptation of the neuromuscular system (Chapman et al, 2009; Wakeling and Horn, 2009), and changing movement patterns takes time and repetition (Halsban and Lange, 2006). Rehabilitation programs that occur over an extended period of time and emphasize quality movement will logically have a better chance of success.

Concussion, or ground reaction force, is a major concern during rehabilitation and due to the pressures exerted to the repairing structures, it should be. However, research has shown that the body can handle higher concussionary forces than previously thought, as long as the force is applied in a biomechanically correct manner (Rupp, et al, 2010).

Proprioception is the ability of the muscles to react appropriately without conscious effort. For example, proprioception pulls your foot back as you start to step into a hole in the dark. Proprioception is one of the first reactions of the body to diminish with immobilization (Hewitt, 2002). Without proprioception retraining, the horse likely has a greater chance to reinjure when the footing becomes uneven, or they loose their balance, especially at speed.

Sahurmann (2011), a leader in physical rehabilitation theory and techniques for people, has summarized the theory of how motor control is related to movement asymmetries, which is related to pain syndromes. She states that "the critical factor is not what you do as much as how you do it".

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