neoligaments™

Ian Horsley MSc. MCSP
CLINICAL LEAD PHYSIOTHERAPIST to the English Institute of Sport for the North West Region

Dawn Maguire
MARKETING CO-ORDINATOR

Rehabilitation

The Missing Link

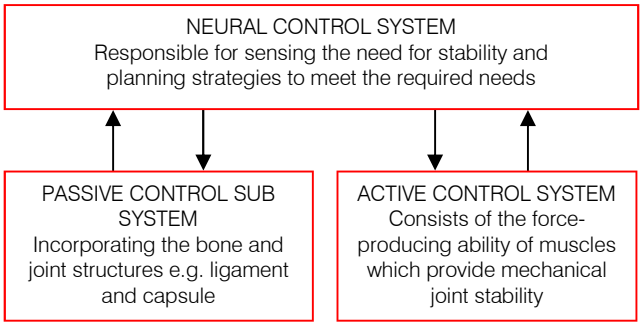
Introduction

It is all well and good being able to recognize, diagnose and treat a musculoskeletal problem within a patient, but it does not necessarily mean that the patient will be restored to "normal" at the end of the treatment process. This article discusses rehabilitation and its relevance to clinical outcome.

Importance of Rehabilitation

Maintaining or restoring precise movements within the systems of the body is key to preventing or correcting musculoskeletal pain[1]. This control is managed by the neuromuscular system which involves subconscious integration of sensory information producing controlled movement through co-ordinated muscle activity[2].

Panjabi[3] introduced a concept of a stabilization system made up of three subsystems to explain how stability is dynamically achieved.

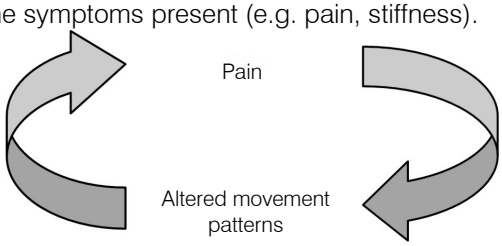


This system relies heavily on the activation of the neural control sub-system. This control system must activate the right muscles, by the right amount, in the right sequence, and at the right time. Thus there is an interdependence of the musculoskeletal system and the central nervous system – changes on one part of the system will cause compensations or adaptations somewhere else in the system, as the body attempts to reach homeostasis[3]. Neuromuscular control represents a complex interaction between sensory input, central processing and efferent output. Adverse neuromuscular control will inevitably lead to injury or to reduced functional levels[4].

In rehabilitation, the clinician is not only concerned with treatment of the physically presenting symptoms (e.g. pain, muscle weakness or joint stiffness) but also with the restoration of health, physical fitness and optimally functional motor performance[5]. It has been demonstrated that the presence of only a small amount of swelling within the knee joint causes reflex inhibition (failure of contraction) of the *vastus medialis* muscle of the knee[6], and that following an ankle sprain, there is a delay in activation of the ankle stabilizing muscles[7]. But more importantly, Bullock-Saxton[8] showed that following an ankle sprain there was a delay in activation of the hip muscles on the same side, and a decreased detection of vibration. Thus if the treatment provided concentrated only on the local symptom of the ankle sprain (e.g. pain, range of movement and strength) then the restoration of normal ankle function would not be accomplished, as there would still be a faulty gait pattern due to the delay in hip muscle recruitment (ever wondered why patients continue to limp in the absence of any local problems following an ankle sprain?).

Rehabilitation may include therapeutic exercise to the affected muscle, joint or nerve and may be focused on strengthening muscles, mobilizing joints and soft tissues to restore range of motion, re-education of muscle function to stabilize joints or regions of the body, and re-education of muscle activity in active

joint movement in functional activities[9].
During the acute phase the patient will develop abnormal movement patterns in order to achieve the intended goal – i.e. limping. Inactivity of muscles may be brought on by enforced bed rest or splinting. These adaptive behaviours may persist after the symptoms have resolved and faulty motor programmes may perpetuate them. The patient moves in the most effective way possible with respect to the symptoms present (e.g. pain, stiffness).



This is now the domain of rehabilitation – restoration of optimal motor performance. It cannot be assumed that abolition of the presenting clinical signs (e.g. pain, stiffness) will automatically lead to improvements in performance and restoration of normal function. Following local treatment to normalize conditions around the joint, muscle balance needs to be restored. To regain skilful performance requires not only the ability to generate muscle forces but also to time muscle activations in order to control complex multi-segmental linkages along the kinetic chain[5] – the stronger muscle is not functional if its onset is delayed and uncoordinated with other associated muscles[3]. Hence, as the pattern of muscle activation differs according to the task[10] the neural adaptations which occur as a result of training are themselves specific[11]. This requires that rehabilitation needs to be specific to the action being trained[12] and practice of an action is necessary for there to be improvements in the performance of that action.

PRACTICE MAKES PERMANENT **NOT** PERFECT

Strengthening the quadriceps muscles of a patient who has knee pain using knee extension exercises does not mean that these strength gains will be beneficial to improving gait. Isolated knee extensions carried out in a sitting position are non-functional and an open chain exercise whereas walking is a closed chain exercise.

Conclusion

In planning a rehabilitation programme one needs to consider motor learning and skill acquisition. Rehabilitation should be planned to enable the individual to return to everyday life and the athlete to return to sport.

A basic tenet to accompany rehabilitation is:

"Act Locally - Think Globally"

This is not a new notion: "If you really want to help someone you must find them where they are and start there. All true caring starts with humility. You, the helper, must understand what they understand. If you cannot, your understanding will be of no avail. You must understand that helping is not domination but serving."[13].

References

1. **Sarhmann SA.** Diagnosis and Treatment of Movement Impairment Syndromes. Mosby, St Louis, 2002.
2. **Williams GN, Chmiekuski T, Rudolf K.** Dynamic knee Stability: current theory and implications for clinicians and scientists. *Journal of Orthopaedic Sports Physical Therapy* 2001; 31: 546-566.
3. **Panjabi MM.** The stabilizing system of the spine. Part 1, function, dysfunction and enhancement. *Journal of Spinal Disorders* 1992; 5 (4): 383-9.
4. **Hurd WJ, Snyder-Mackler L.** Neuromuscular Training in Donatelli, R. (ed). *Sports Specific Rehabilitation.* Churchill Livingstone, St Louis, 2007.
5. **Carr J, Shepherd R.** Regaining skill in motor performance in musculoskeletal physiotherapy. *Clinical Science and Evidence Based Practice* Second Edition . Refstauge, K. and Gass, E. (eds). Butterworth Heinemann, Oxford, 2004.
6. **Stokes M, Young A.** The contribution of reflex inhibition in arthrogenous muscle weakness. *Clinical Science* 1984; 67: 7-14.
7. **Konradsen L, Raven JB.** Ankle instability caused by prolonged peroneal reaction time. *Acta Orthop Scand* 1990; 61 (5) 388-390.
8. **Bullock-Saxton JE.** Local sensation changes and altered hip muscle function following severe ankle sprain. *Physical Therapy* 1994; 74 (1) 17-28.
9. **Moore A.** Principles of patient management in Petty, N (Ed). *Principles of Neuromusculoskeletal Treatment and Management: A Guide for Therapists.* Churchill Livingstone, Edinburgh, 2004.
10. **Rutherford OM.** Muscular co-ordination and strength training implications for injury rehabilitation. *Sports Medicine* 1988; 5: 196-202.
11. **Sale DG.** Neural adaptations to resistance training. *Med SG. Sports E* 1988; 20: 135-145.
12. **Buchner M, Larson EB, Wagner EH.** Evidence for a non-linear relationship between leg strength and gait speed. *Age Ageing* 1996; 25: 386-391.
13. **Kierkegaard S.** *The Sickness Unto Death.* Penguin Books London, 1849.

neoligaments™

Developed and manufactured by Neoligaments™
A division of Xiros™
Springfield House Whitehouse Lane Leeds LS19 7UE
Tel. +44 (0) 113 238 7202 Fax. +44 (0) 113 238 7201
enquiries@neoligaments.com