

Rehabilitation

Moving forward with injury repair

Introduction

This article will discuss the instigation of controlled movement early in the management of musculoskeletal injuries to aid functional repair.

Tissue Repair

Following injury or surgical repair the body undergoes an active repair process – the process of inflammation. The mention of the word “inflammation” has generally been seen as a “bad thing” – patients are prescribed anti-inflammatory medication to “reduce” the inflammation present.

Inflammation is a Positive Process:

Repair cannot take place without inflammation.

The inflammatory response can be seen to have two major roles:

- a) protection of the body from infection and clearance of tissue debris from the site of injury; and
- b) structural repair of the damaged tissue¹.

The inflammatory process has three distinct phases²:

- acute (inflammatory) Phase 0-3 days
- subacute (proliferative) Phase 3-21 days
- chronic (remodelling) Phase 21 days+

During the acute inflammatory phase injury manifests as swelling, redness, heat, pain and loss of function. Within this time the main aim of treatment is to minimize haemorrhage, swelling, inflammation, cellular metabolism and pain, and also provide ideal conditions for healing and repair processes³.

During the subacute proliferative phase, the debris of damaged cells is removed by phagocytosis, and

fibroblast cells produce weak collagen fibres which begin to form weak scar tissue. Increased amounts of scar tissue (collagen) and reduced cross-links between fibres have been associated with increases in the strength of the tissue⁴.

During this phase the irritation produced by early tissue mobilization is desirable. There is an accumulating body of research that supports the role of controlled mechanical stress to connective tissue to aid repair and provide optimal healing. This mechanical stress can be brought about by exercise and manual therapy techniques⁵. This process is highly dependent on stresses that are imposed on the scar tissue^{6, 7}.

Tension and movement to connective tissue encourages normal collagen turnover and aligns the collagen fibrils along the lines of stress within the repairing tissue.

When stress is applied to tissues, adaptation occurs through a process of mechanotransduction, whereby the mechanical or manual therapy is converted into biochemical signals which bring about the synthesis of “repair cells” within the connective tissue or muscle^{7, 8}.

Hence the repair will be incomplete if the tissues are not provided with the correct level of mechanical stress. Evidence of incomplete repair includes excess scar tissue with adhesions and a mechanically weaker tissue.

The mechanical tension applied to the healing tissue should be within the pain-free range and to the onset of tissue tension – as felt by the therapist (if utilizing a manual technique) or the patient (if utilizing active or passive movement). This motion should be dynamic

and rhythmical in order to stimulate adequate repair^{9, 10, 11}.

Controlled clinical trials of acute soft tissue injuries provide support for the use of early controlled motion at the site of injury to provide superior healing results; the strength of repaired ligaments has been shown to be greater in animals which were allowed to continue to exercise rather than rest¹². Following surgical repair, tendons which were mobilized rather than immobilized have higher tensile strength and a reduced re-rupture rate^{13, 14, 15}.

Movement is paramount in the healing of tissues. As stated by Lederman¹: "Movement is the blueprint for repair. Tissues that heal with functional movement are better suited to meet functional demands when the individual returns to daily activities. Tissues that have repaired without movement or with limited movement will fail to meet the functional demands of normal daily movement".

Conclusion

The instigation of controlled movement early in the management of musculoskeletal injuries, both acute and following surgical repair, has been shown to expedite recovery and return to full function, when compared to immobilization.

So, how should this be accommodated within clinical practice? I will leave you with the recommendations of Kannus et al¹⁶:

"Within the limits of pain, everything that is not explicitly forbidden is allowed."

References

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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
www.neoligaments.com