Insights Into Chiropractic

*Discerning the true nature of an alternative health care method*

# How Does Manipulation Improve the Healing Process of Soft Tissue Injuries?

## INTRODUCTION

Joint mobilization and manipulation are methods that are often used in the rehabilitation of musculoskeletal soft tissue injuries. Although used in many cultures for thousands of years(1), the use of these manual methods in Western medicine remains largely misunderstood. This misunderstanding may be due to the fact that immobilization is the treatment of choice for fracture of bone. Common sense would seem to dictate that the same or similar treatment used in the treatment of hard tissue injuries would be appropriate in the treatment of musculoskeletal soft tissue injuries, since immobilization does provide relief of acute pain for both types of injury in the short term.

A growing body of evidence is demonstrating that early mobilization and/or manipulation is the treatment of choice for spinal injuries that do not demonstrate instability(2,3), however, in spite of this evidence immobilization in the form of bed rest and cervical collars remain widely used.

The purpose of this article is to review specific aspects of the healing process of musculoskeletal soft tissues and describe the therapeutic benefit early mobilization and manipulation has on the process.

## SOFT TISSUE REPAIR

Manipulation/mobilization appears to have beneficial therapeutic effects in terms of the healing process of musculoskeletal soft tissue lesions. A brief review of the normal morphology and histology of ligaments will be helpful in understanding how manipulation/mobilization results in enhanced healing. Skeletal ligament tissue has been shown to consist of multiple fibers of collagen in a roughly parallel arrangement along the longitudinal axis of the ligament. Scattered throughout these collagen fibers are the cells that maintain the ligament tissue. These are called fibroblasts or fibrocytes. A regular corrugated appearance of the tissue has been observed and is referred to as the "crimp" of the ligament. This crimp allows some elongation of the ligament without damage and also serves as a form of shock absorber (4)(Figure 1).

When the musculoskeletal soft tissues are damaged, the inflammation, that occurs, sets the stage for the formation of a scar that will replace the damaged tissue(4-6). The scar tissue that is laid down by the fibroblast cells lacks many of the biochemical properties of the original tissue type. These alterations include an increase in

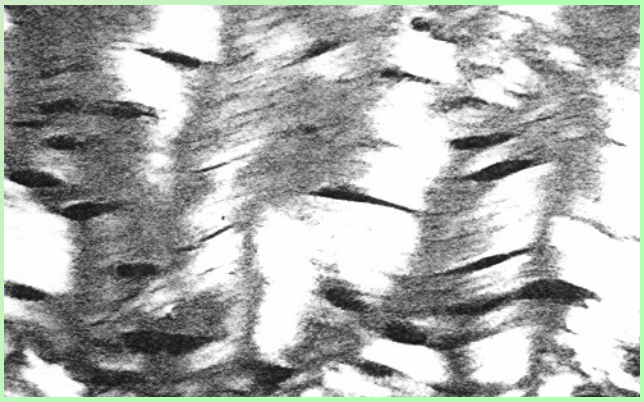

Figure 1. Scanning electron micrograph of normal ligament tissue.


Stephan J. Troyanovich, D.C. ▪ 322 Susan Drive, Suite B ▪ Normal, IL 61761

collagen mass, a change in collagen type (increased Type III collagen composition versus normal Type II collagen), and increases in glycosaminoglycans and water concentrations.

Further, biomechanical alterations also exist in the scar formation. These changes exist as alterations in the collagen cross-links, i.e. an increase in the number of cross links which bind the individual fibers, and an amorphous configuration of collagen fibers (Figure 2). This results in a mechanically inferior tissue with peak failure stresses of only approximately 40% of the original normal ligament tissue, per unit area of the scar(4).

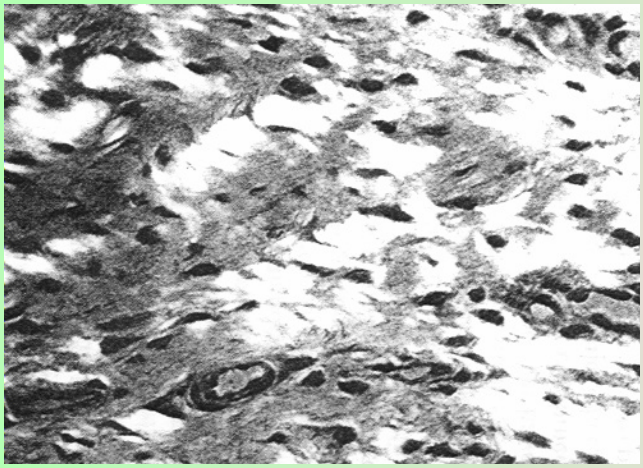

Figure 2. Scanning electron micrograph of scar tissue matrix demonstrating amorphous arrangement of collagen fibers.

To reiterate, this scar tissue lacks the physical properties, such as tensile strength and extensibility of the original soft tissue, and movement during the healing process appears to induce the formation of a more viable scar(5,6).

Cyriax(5) states, "When non-bacterial inflammation attacks the soft tissues, that move, treatment by rest has been found to result in chronic disability later, although the symptoms may temporarily diminish. Hence, during the past century, treatment by rest has given way to therapeutic movement in many soft tissue lesions. Movement may be applied in various ways: the three main categories are, 1) active and resistive exercises; 2) passive, especially forced movement; and 3) deep massage." Although Cyriax has outlined three basic ways to induce movement(massage, exercise, and manipulation) we shall concentrate upon "forced movement" in the form of manipulation/mobilization in our discussion.

The therapeutic benefit of early manipulation / mobilization of soft tissue lesions appears to lie in the mechanical stress imparted to the developing scar. As tension is applied to the lesion through the osseous levers utilized in manipulation techniques, it induces the developing fiber network to be arranged in a more orderly longitudinal fashion. This more orderly longitudinal arrangement allows the scar to be more functionally adapted. That is to say, the scar, that has healed in the presence of manipulation, more closely resembles the original soft tissue in terms of structure and hence, function (5).

Although this model of improved healing as a result of manipulation/mobilization was illustrated utilizing the ligament as the damaged tissue, other musculoskeletal soft tissues appear to be affected beneficially as well: "Mechanical loading and motion are found to be particularly important to the mechanical characteristics of the healing process. . . It appears that mobilization of the tendon results in an effective repair without overwhelming scar formation(6)."

In addition, enhanced nutrient exchange appears to be facilitated by mobilization/manipulation: "Nutrient transport within the tendon sheath, produced by a pumping mechanism, induced by the movement of joints and tendon excursion, may be an important factor in improving intrinsic healing(6)."

Although treatment of soft tissue injuries of the spine has traditionally consisted of immobilization by bed rest and cervical collars, recent treatment guidelines have concluded that such treatments are detrimental and manipulation/mobilization is the treatment of choice. For example, the recent clinical practice guideline published

by the Agency for Health Care Policy and Research (AHCPR), a division of the U.S. Department of Health and Human Services, states, that for acute low back problems in adults: "Relief of discomfort can be accomplished most safely with nonprescription medication and/or spinal manipulation(3)." The AHCPR recommendations for treatment for acute low back problems was made after an exhaustive review of over 350 scientific articles on the subject of low back pain. Among the 350+ articles were over 37 randomized controlled trials of spinal manipulation for low back pain.

Likewise, the findings of the Quebec Task Force on Whiplash Associated Disorders found that cervical spine injuries secondary to vehicular trauma that did not include fracture or dislocation responded best to nonnarcotic analgesia and nonsteroidal anti-inflammatory agents, range of motion exercises, manipulation or mobilization by trained persons, and return to normal activities as soon as possible.

## CONCLUSION

Doctors of chiropractic have always advocated therapeutic movement as a means to limit the adverse effects of immobilization and to promote health. Although practicing for many years without research to validate what chiropractors believed to be true, recent research has confirmed the clinical effectiveness of chiropractic manipulation. For the best opportunity for these types of lesions to heal maximally, chiropractic treatment is becoming the standard of care.

## REFERENCES


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