Treatment Modalities to Support Soft Tissue Repair

Sample 2
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Introduction

In this essay I will highlight the positive influences on soft tissue repair through a number of different massage treatments. The aim of this essay will be to highlight both physiologically and psychological benefits through different treatments and methods such as Cryotherapy, heat application and sports/deep massage.
Soft Tissue Massage

Soft-tissue injuries represent a significant percentage of athletic injuries. In the 2005–2006 academic school year, approximately 87.3% of reported injuries were soft-tissue injuries. Soft-tissue dysfunction can be initiated by chronic and acute mechanisms including physical, overuse, structural imbalances, or an inflammatory process. Fascia, a tough sheet of connective tissue that envelopes and binds together the soft tissue of the body, is often affected. These injuries stimulate the development of inelastic, fibrous adhesions between the layers of the myofascial system that prevent normal muscle mechanics and decrease soft-tissue extensibility. Often overlooked and left untreated, these adhesions can alter surrounding joint mechanics, resulting in pain and further pathology. The treatment and rehabilitation program for these injuries must address this myofascial component to facilitate complete recovery and function.

Soft-tissue injuries have traditionally been treated using a variety of techniques. Although there is debate as to its efficiency, massage therapy continues to be one of the most common therapeutic modalities for treating soft-tissue injuries. In addition, rehabilitation specialists often use spray and stretch, ischemic compression, heat, and electric-current therapies to treat myofascial restriction (Curran et al. 2008).

Massage therapy is one of the oldest forms of treatment in the world, having first been described in China during the second century B.C. and soon after in India and Egypt. In 400 B.C., defined medicine as "the art of rubbing. "Massage therapy disappeared from the American medical scene at approximately the time of the pharmaceutical revolution of the 1940s. Now considered an "alternative" therapy, it is becoming popular again as part of the alternative medicine movement. At this time, it is commonly defined by massage therapists as the manipulation of soft tissue by trained therapists for therapeutic purposes. Despite its long history and popularity, a Medline search yielded only approximately 200 articles from the last 30 years (Field, 2012). It is also known that the act of laying on of hands probably developed from religious and magical procedures. It was also generally believed that massage resulted in the exorcism of evil spirits or the balancing of energies. Originally, massage was often described in combination with exercises as a treatment strategy with possible influence on disease and pain conditions (Words, 2000).

Physiological Aims & Effects of STM

Massage has been noted to have several effects upon human tissues. It involves stimulation of touch, pressure, and proprioceptive receptors of the skin and underlying tissues, respectively. It also involves mechanical effects upon the superficial venous and lymphatic channel. Massage produces a reflex vasodilation of cutaneous vessels with subsequent increased blood flow to the area."

Mechanically, too, massage serves to increase venous and lymphatic flow which, in turn, promotes dispersal of metabolic waste products and absorption of excess inflammatory exudate. Thus, it may be used to reduce oedema, preventing fibrosis and possible subsequent adhesion formation. Increased extensibility of soft tissue including muscle, tendon, fascia, joint capsule, and ligamentous structures has been described also as a direct mechanical effect of massage. This stretching effect has been further applied to fibrosis and adhesion formation (Crosman et al, 1984).
Aims and methods Applied to Injuries through Deep Tissue Massage

Massage therapy, especially deep tissue massage (DTM), has been used for centuries to relieve myofascial syndromes including muscle spasm, muscle strain, and pain associated with numerous neuromuscular pathological processes. Additionally, voluntary muscle accounts for nearly 50% of body weight, and any single one of the body’s muscles may develop myofascial trigger points (TrPs), resulting in either local pain, referred pain, motor dysfunction, or a combination (Taylor et al, 1995).

A study by Dolder & Roberts. (2001) investigated the effects of soft tissue massage on range of motion, reported pain and reported function in patients with shoulder pain. Twenty-nine patients referred to physiotherapy for shoulder pain were randomly assigned to a treatment group that received six treatments of soft tissue massage around the shoulder. Measurements were taken both before and after the experimental period by a blinded assessor. Active range of motion was measured for flexion, abduction and hand-behind-back movements. Pain was assessed with the Short Form McGill Pain Questionnaire (SFMPQ) and functional ability was assessed with the Patient Specific Functional Disability Measure (PSFDM). The treatment group showed significant improvements in range of motion compared with the control group for abduction (mean 42.2 degrees, 95% CI 24.1 to 60.4 degrees), flexion (mean 22.6 degrees, 95% CI 12.4 to 32.8 degrees) and hand-behind-back (mean 11.0 cm improvement, 95% CI 6.3 to 15.6 cm). Massage reduced pain as reported on the descriptive section of the SFMPQ by a mean of 4.9 points (95% CI 2.5 to 7.2 points) and on the visual analogue scale by an average of 26.5 mm (95% CI 5.3 to 47.6 mm), and it improved reported function on the PSFDM by a mean of 8.6 points (95% CI 4.9 to 12.3 points). We conclude that soft tissue massage around the shoulder is effective in improving range of motion, pain and function in patients with shoulder pain.
Cryotherapy

Physiological Effects, Application of Cryotherapy & Methods of Application
Cryotherapy, in the form of cold-water immersion and ice packs, has been used for decades as a post-exercise recovery strategy in a variety of sports. The application of cold is believed to work by decreasing muscle temperature levels, diminishing pain and muscle spasm and reducing the inflammatory process; thus aiding the recovery process after trauma (Anon 2012). A study by (Field, 1998) found that cryotherapy helped improve musculoskeletal pain, spasm, connective tissue distensibility, intramuscular temperature, nerve conduction velocity, and spasticity. Whole body cryotherapy consists of a brief exposure to extreme cold chamber (-110 oc).

Contraindications When Applying Cold.

Nadler et al, (2004) states that caution must be exercised when applying cryotherapy in the vicinity of superficial nerves, especially if cold is combined with compression. Peroneal neuropathy as well as ulnar, axillary, and lateral femoral cutaneous nerve injury. Other precautions when applying cold is to ensure the patient doesn’t suffer with a circulatory insufficiency, cold allergy and diabetes.

Adverse reactions

Immediate reactions as a result of Cryotherapy can be such things as;

Pain - cryotherapy is usually well-tolerated but can sometimes be painful if a deep freeze has been necessary (i.e. to treat a basal cell carcinoma). This discomfort can occur both at the time of treatment and for a variable time thereafter. Painkillers (such as paracetamol) taken for the first 24 hours may relieve the discomfort; also taking a painkiller an hour or so prior to the anticipated treatment may reduce the discomfort. • Swelling and redness - this is a normal immediate response to freezing the skin and usually settles after two to three days. For a short while the treated area may ooze a little watery fluid. Cryotherapy close to the eyes may induce prominent puffiness of the lower eyelids which settles within days.

Blistering - this is also a common consequence of cryotherapy and blisters settle after a few days as the scab forms. Some people blister more easily than others and the development of blisters does not necessarily mean that the skin has been frozen too much. Occasionally the blisters may become filled with blood; this is harmless and should only be punctured if a blister is painful and very uncomfortable, using a sterile needle. We would suggest you gain advice from your GP or doctor who performed the treatment before doing this.

Infection - uncommonly, infection can occur, resulting in increased pain and the formation of pus: this may require topical antiseptic or antibiotic therapy from the doctor who performed the treatment or your GP
Cryotherapy can also cause more subsequent side effects such as;

Scarring - rarely, a scar will form, especially if a deep freeze has been necessary (i.e. to treat a basal cell carcinoma).

Hypertropic/Keloid scarring – very rarely a raised scar can form following treatment with cryotherapy which appears as a rounded, hard growth on the skin. These are harmless lesions, more common in dark skinned individuals compared to Caucasians.

Pigmentation changes - the skin at and around the treatment site may lighten or darken in colour, especially in dark-skinned people. This usually improves with time but may be permanent.

Numbness - if a superficial nerve is frozen, it may result in numbness of the area of skin supplied by that nerve. Normal feeling usually returns within a matter of months.

These side effects should all be dealt with differently.

Aims and Protocols to Help Aid Recovery

A study by Beebe. (1982) tested 37 participants with ankle sprains within different categories. Cryotherapy was applied to these participants for 15 minutes one to three times per day versus the heat application which was also applied 15 minutes one to three times per day for a minimum of three times per day. Application of these different methods were applied from 1-36 hours post sustained injury. Sprains were categorised into 5 grades depending on the severity. Only 2 of these grades were considered for this study and received treatment. The study showed that the application of cryotherapy application of upto 36 hours post injury occurring highlighted a significant improvement over heat application. Therefore, early use of cryotherapy, continued with adhesive compression is an effective treatment of ankle sprains yielding earlier complete recovery than late cryotherapy and heat application.

Another essay by Kowal. (1983) describes a study in which 7000 outpatients received ice massage of sufficient duration to cause numbness (5-7 minutes), followed by range of motion and mobilization exercises. The study reported that 80% achieved "a predictably rapid and satisfactory treatment" with regained function using only this treatment in less than three formal treatments. 23 patients were treated with a variety of musculoskeletal and neurological disorders for 20 minutes with towels soaked in 35-40° C ice water. After one to several treatments, pain was sufficiently decreased or eliminated in 74% of those patients with pain. Range of motion improved in 94% of the patients limited in range of motion, and spasticity was decreased in 67% of patients with spasticity.
The table above shows the benefits of the application of cryotherapy.

<table>
<thead>
<tr>
<th></th>
<th>Short Cold Application (30 min or less)</th>
<th>Prolonged Cold Application</th>
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<tbody>
<tr>
<td>Skin capillaries</td>
<td>Constriction followed by dilation</td>
<td>Constriction (to prevent heat loss)</td>
</tr>
<tr>
<td>Skin color</td>
<td>White, then red</td>
<td>Rough, even more pronounced (&quot;goose bumps&quot;)</td>
</tr>
<tr>
<td>Skin texture</td>
<td>Rough (due to action of the erector pilar), then smooth</td>
<td></td>
</tr>
<tr>
<td>Cell tissue size</td>
<td>Little change</td>
<td>Slightly decreased</td>
</tr>
<tr>
<td>Tissue pressure</td>
<td>Decreased</td>
<td>Decreased</td>
</tr>
<tr>
<td>Tissue metabolism</td>
<td>Decreased</td>
<td>Decreased</td>
</tr>
<tr>
<td>Pulse</td>
<td>Quick, then rapid</td>
<td>Slow</td>
</tr>
<tr>
<td>Respiration</td>
<td>Gasp, then increased rate and depth of breathing</td>
<td>Decreased respiration rate</td>
</tr>
<tr>
<td>Heart stroke volume</td>
<td>Increased</td>
<td>Increased</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>Increased</td>
<td>Decreased</td>
</tr>
<tr>
<td>Pain sensation</td>
<td>Decreased</td>
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Heat Treatment

Superficial heat application and cooling modalities are often used in conjunction with static stretching to increase the efficacy of static stretching. The principal methods by which both superficial heat and cold may improve the efficacy of stretching are by reducing muscle pain and decreasing muscle guarding (Taylor et al, 1995). Therapeutic heat treatment is applied to more chronic injuries however care is needed due to the potential inflammatory response. Heat treatment has also been shown to improve joint stiffness and improve muscle activation and temperature before exercise (Beebe, 1982).

The three methods above are the most popular choice of treatments regarding sports therapy. In this essay I will list different studies carried out on each treatment as well as explaining the findings.

Methods of Application

An essay by Rivenburgh & Medicine (2017) states that heat application occurs in three different types of manners: conduction, convection and radiation. Conduction is an exchange of thermal energy between two objects within contact of one another i.e. hot packs. Convection is a more rapid process, occurs when a heated medium i.e. water, air moves across the body’s surface, developing temperature changes. Radiation is the transfer of heat from a warm source to a cooler source through a conduction medium such as air. Heat creates several physiological changes through subsequent vascular changes, causing vasodilation.

Physiological Effects from Heat Application

The result of this dilation gives an analgesic effect. In addition, nutrients and oxygen are increased at the cellular level, and the removal of waste products that result from the inflammatory process is facilitated. It is also known that heat causes changes in collagen fibres of tissues.

It is theorized that heat acts on the free nerve endings, tissues and peripheral nerve fibres increasing pain threshold. It is also known to relieve muscle spasm by decreasing the muscle spindle activity and sensitivity to stretch. Heat application increases vasodilation as already discusses. In result of vasodilation the increase of oxygen occurs which results in the increased metabolic rate. This has been known to increase by up to 3 times (Rivenburgh & Medicine, 2017).

Contraindications of Heat Application

Nadler et al. (2004) states that thermotherapy should be used with caution in patients with diabetes mellitus, multiple sclerosis, poor circulation, spinal cord injuries, and rheumatoid arthritis because it may cause disease progression, burns, skin ulceration, and increased inflammation. When using thermotherapy, skin should be protected in heat sensitive or high-risk patients, especially over
regions with sensory deficits. Caution should be used with products generating high intensity heat (greater than 45ºC), such as with Hydrocollator packs or electric heating pads.

**Adverse reactions to Heat Application**

The patient may suffer with numbness in which the heat application could cause further arm such as burning and blistering. In result of this the patient should be cared for my further medical attention.

<table>
<thead>
<tr>
<th>Table 1. EFFECTS OF HEAT TREATMENT FOR TENDON INJURIES</th>
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<td><strong>Short Heat Application (30 min or less)</strong></td>
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*From the table above you will see the benefits of heat application.*

**Compared effects of Cold and Heat treatment**

A study by Beebe, (1982) compared the effects of cold, heat, and contrast bath treatments on the amount of oedema in first- and second-degree sprained ankles during the post-acute phase of rehabilitation. Thirty subjects with post-acute sprained ankles were assigned to a cold A specially constructed tank was used to take pre-treatment and post-treatment volumetric measurements of subjects’ sprained ankles. Descriptive statistics, a 3 x 3 two-way analysis of variance for repeated measures, and Tukey's Honestly Significant Difference post hoc test revealed that cold therapy produced the least oedema in subjects with sprained ankles. All three treatments (cold, heat, and contrast bath) produced an increase in the amount of oedema in the post-acute sprained ankles of the subjects. Heat and contrast bath therapy produced almost identical increases in the amount of ankle oedema on each of the three days of the study. The study concluded that cold therapy is the most appropriate of the three treatments if the therapeutic objective is to minimize oedema before rehabilitative exercise during the third, fourth, and fifth days post injury for first- and second-degree ankle sprains.

**Conclusion**

This essay highlighted the benefits of STM (soft tissue massage), Cryotherapy (Cold therapy) and heat therapy. It highlighted the positive physiological effects through a number of different studies.
on the different types of injuries varying from muscle strains, to ligament sprains. It also highlighted which therapies is best suited dependant on the severity of the injury. It is prominent from this essay that the different therapies show significant improvements in regards the Range of movement, pain relief and physiological effects.

The studies highlight to me that the different treatments should be implemented dependant on the injury. It can also be implemented in a way to help aid sports performance.

From the studies discussed STM is a great way on improving the client’s range of motion as well as improving oxygen to the effected site and removal of waste products. It is also proven to be a good way on improving the muscle blood flow which can be detrimental to and athletes sporting performance and recovery.

Another treatment which can be applied is Cryotherapy (cold therapy) this is a great treatment to apply to clients or patients with or without injuries. The implementation of cryotherapy helps with dilation and blood stroke volume. These two things alone can help with increased blood to the affected areas which can reduce inflammation and reduce pain through numbness. It can also help an athlete post sporting event, as it can help blood flow which helps remove waste products and increased oxygen supply.

The last treatment to discuss is the implementation of heat treatment. As study by Rivenburgh & Medicine (2017) highlight how heat application can cause vasodilation. The dilation effect results in an analgesic effect. In addition to this, nutrients and oxygen are increased at a cellular level which removes waste products. It is also highlighted that heat can increase pain threshold and muscle spasms. Vasodilation increases the supply of oxygen which increase metabolic rate. The increase in blood flow will then increase the number of antibodies, leukocytes, nutrients and enzymes to the tissues. It is highlighted that for every increase of 10 degrees, the cells chemical activity and metabolic rate increase by upto 2-3 times.

Heat application is also hugely beneficial to improving stretching sensitivity and blood flow which plays a huge role in the athletes sporting performance and injury prevention. It is advised that heat application should be incorporated with mobility to adopt the best effect on muscle elasticity and range of motion.

These three treatments are hugely beneficial as they can all be implemented in different ways depending upon the severity of the injury. I would recommend STM to help increase blood flow as well as release trigger points and muscle adhesions to help increase muscle performance, it can also help increase blood flow which can help with waste removal and oxygen supply to help aid recovery. Cryotherapy is a treatment to apply post injury to help reduce swelling of affected area. It is also hugely beneficial as it increases blood flow to effected areas which contain antibodies and oxygen. And heat therapy is an effective way to increase muscle temperature and blood flow which will help with muscle elasticity and sensitivity which can improve athletic performance.
References


