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An educational tool in massage therapy for physiotherapy students: theory and practice

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The aim of this thesis was to produce an educational DVD in soft tissue mobilization for physiotherapy students. The purpose of this DVD is to further develop the student's skills by building upon the foundation established by the soft tissue mobilization course included in their curricula. The DVD makes the learning process more efficient because the necessary information is summarized in the educational tool. During the independent study hours, the DVD helps the students to focus on the relevant issues and gives them an easy start on the world of soft tissue mobilization.

The thesis was written by utilizing the latest literature and evidence in soft tissue mobilization. Based on this information, an educational tool in massage therapy for physiotherapy students was created. The techniques chosen for the DVD are easy to adapt and implement. The techniques are demonstrated along with sufficient theoretical background in order to ensure proper implementation and outcomes. The massage techniques and styles were filmed, edited and added to the DVD to form a general picture of a decent way to use them. The complete product was piloted with a physiotherapy teacher and a physiotherapy student.

The DVD includes a theory part of the effects, an introduction on correct body mechanics and a theory and a demonstration of different massage styles and techniques. These theory parts are in a PowerPoint format and the video files are in WMV type. PowerPoint is available in all Windows-based computers in which the Microsoft Office is installed in. For future developments, it would be beneficial to produce a similar kind of educational tool in Advanced soft tissue mobilization course.

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1 INTRODUCTION

Recent studies show that massage can be used as a part of the treatment for many different medical conditions (Field 2006). Based on experience, it can be noted that the field of physiotherapy massage is a depreciated form of treatment modality. The depreciation to utilize massage as a part of the treatment when it would be beneficial is usually caused by the lack of knowledge relating to the effects that massage can provide. In addition, the therapist may not possess the proper massage techniques or he/she does not know in which medical conditions massage treatment is effective. Massage can diminish pain, enhance fluid circulation, improve psychological factors, improve immunity and reduce the problems from muscular origin (Field 2006). Whereas the modern working environment is highly stressful and outcome based, massage can offer counterbalance as it is an extremely relaxing form of treatment (Field et al. 1996). The effects of massage are based on the changes in the endocrine system, circulation, nervous system and muscular system. By combining different techniques, the physiotherapist can achieve an individualistic therapeutic outcome most suited for the client. (Arponen & Airaksinen 2001, 26-72.)

In physiotherapy, the customer-therapist relationship is important. When manual therapy techniques are added to the treatment process, it gives the client the impression that his/her medical problem is being directly treated. This results in trust between the client and the therapist, in which the client feels that the treatment is more comprehensive than when only a home exercise program is drawn up. Accordingly, massage as a part of manual treatment is an important tool which is relatively easy to control compared, for example, to manipulation treatments. Moreover, by adding massage to the service repertory the physiotherapist can obtain a wider client base.

The soft tissue mobilization course includes 20 hours studying in a classroom and 28 hours of self-studying. The DVD improves the quality of self-studying, due to the

numerous hours reserved for self-studying. There is a great need for this type of educational tool. During school lectures, a vast variety of different massage techniques are presented in such a short time, the students easily forget the correct ways to apply these techniques. Thus, repetition of how to perform the massage techniques can be facilitated by the content of this educational tool. This is how the students also understand the techniques more deeply and become more familiar with them. This way is a more secure method to implement massage in the working environment. In addition, when the students understand how to apply the basic massage techniques in practice, it increases their comprehension of the massage plans presented in various massage books.

Due to the variety of the effects that massage has on body, massage can be utilized in physiotherapy in various ways. Massage is, for instance, widely used to prepare the client for the other manual therapy techniques, to relieve pain and muscle tension and to improve the recovery process after physical activity. However, to be able to use massage in physiotherapy in an effective way, it's important to know what kind of effect specific massage technique have on soft tissues. When a therapist comprehends what types of effects different massage techniques have on tissues, he/she is able to choose the most suitable techniques to provide help for his/her client.

2 PURPOSE OF THESIS

The purpose of our thesis is to produce an educational DVD in soft tissue mobilisation for physiotherapy students. This DVD supports the learning of physiotherapy students on their soft tissue mobilization course which is included in their study plan. The DVD contains PowerPoint show and video clips. The DVD is mostly aimed to give general information concerning massage and to demonstrate the correct ways to apply basic massage techniques used in classic and sports massage in practice.

3 EFFECTS OF MASSAGE

Physiotherapists utilize many therapeutic modalities in his/her work. Massage belongs to the manual modalities. Other modalities are thermal modalities, electrical modalities and mechanical modalities. (Prentice 2002, xix) Massage is a psychophysical treatment technique in which soft tissues are pressed and/or stretched. Even though massage concentrates on soft tissues, it affects the function of the whole body. Massage treatment should always include some therapeutic aim. (Arponen & Airaksinen 2001, 24-26.)

3.1 Contraindications

Before the treatment session the therapists should make sure that the massage treatment is safe to perform. Contraindications related to conditions where the treatment must not be applied or it might cause harm for the client. However, some of the following contraindications are subjective and it is possible that massage can be safely performed when bearing in mind certain prerequisites. (Saari, Lumio, Asmussen & Montag 2009, 88)

Especially because the massaging hand is in a straight contact to the skin, it is important to know which skin problems are contraindications for massage. Skin infection can be spread by massage. If infection is limited locally to certain limb and the person does not have fever, other parts of the body can be massaged. However, the whole limb in which the infection locally exists should be left without massage because bacteria could spread and cover the lymphatic nodes all over in the affected limb. The reddish, swollen and gleaming skin can indicate to skin infection. In case of open wounds or skin is otherwise thin and weak and therefore in danger of becoming damaged massage can not be performed. For example, excessive use of cortisone might weaken the skin. In addition, after radiation therapy and burns the elastic characteristics of the skin can worsen and therefore if massage is applied on these areas it should be applied with extreme care. Moreover, many skin diseases are contraindications for massage. If the skin disease is contagious or if a person's well-being can

be harmed by massage in some skin conditions massage is forbidden. However, for example, psoriasis is absolute contraindication for massage only when it is in acute stage. (Arponen & Airaksinen 2001, 82-87.)

Vein and heart diseases are contraindications for massage. Slackened vein walls and valves can result in varicose veins. The mechanical pressure applied by massage can further worsen the situation and, thus, massage cannot be applied to people with varicose veins. In addition, the mechanical pressure of massage can cause great harm for person who has deep-vein thrombosis. Massaging person with deep-vein thrombosis could result in embolism. (Arponen & Airaksinen 2001, 84-85). For a person whose limbs are swollen due to some cardiac insufficiency, diabetes or atherosclerosis massage cannot be applied (Arponen & Airaksinen 2001, 84-85; De Domenico 2007, 135-136).

Cancer has been a contraindication for massage for a long time because it has been thought that massage contributes the spreading of the cancer cells (Arponen & Airaksinen. 2001, 84). However, the newest study does not agree with this assumption. Controversially, the newest study shows that massage can improve the immune function of the cancer patient and this way help in fight against the cancer. (Fritz 2009, 184.) However, tumors are locally contraindicated (Werner 2009, 679)

A person who has paralysis due to some central nervous system condition or trauma are usually spastic and even light external stimulus can cause spastic reflex reactions. Clients who are prone to this kind of spastic reflex reaction can not be massaged. However, for some people who suffer from paralysis due to some CNS problem light effleurage techniques can provide relaxing effect. In addition, in areas where the sensibility of the skin has decreased the massage should be applied really carefully or should not be applied at all. (Arponen & Airaksinen 2001, 85-86.)

Other conditions in which the massage is contraindicated are: fever, acute traumas such as cold bites, soft tissue strains and sprains, fractures, hemophilia, local inflammation, disoriented client, disease which is not in control (diabetes, asthma, epi-

lepsy, rheumatoid arthritis), blood vessel prostheses and myositis ossificans. (Cash 1996, 19-25; Saari et al. 2009, 88.)

3.2 Effects on circulation

It is generally approved that when applying the strokes in the same direction as the venous return and lymph flow, the circulation of fluids improves (Archer 2007, 7; Arponen & Airaksinen 2001, 74-76; Cash 1996, 15-16). For example, Wolfson proved that local venous blood flow can be increased by massage and Wakim noticed that average blood flow increases in massaged limb (De Domenico 2007, 119-120). Järvinen (2001, 2) discovered that effleurage stroking improves lymph flow markedly right under the skin. In this study, deep pressure effleurage was noticed to be more effective than superficial effleurage. Additionally, it has been proven in animal studies concerning lymph flow that massage speeds up the absorption process of the injected substances (De Domenico 2007, 121). However, it is still under further examination how massage affects lymph flow in muscles. Järvinen (2001, 2) showed in his study that massage does not increase lymph flow in muscles more than, for example, exercise does.

The improvements in liquid circulation are results from the mechanical overpressure which the stroking hand causes in front of it when it transfers liquids further. Because there is an accumulation of liquids and overpressure in front of the stroking hand, there will be less liquid and low pressure just distally the stroking hand. (Ylinen, Cash & Hämäläinen 1995, 12.) What is more, Pemberton suggested that not just mechanical pressure but also the nervous system through axon reflex contributes the emptying of blood vessels (De Domenico 2007, 119-120). Right after this emptying process the blood vessels concerned are dilated and filled up with fresh blood (Cash 1996, 15). It has been noticed in studies that even all the small capillary vessels become dilated and visible in places which have been massaged (De Domenico 2007, 120). This dilation of capillaries is also contributed by the production of histamine and heat which is produced by massage when different layers move against each other and cause friction (Braun & Simonson 2008, 409; Ylinen et al. 1995, 14). Hyper-

emia is the phenomenon in which the quantity of blood in capillary network increases (Archer 2007, 298).

Even though, it is clear that massage improves lymph flow and local venous blood flow, it stays still unclear whether massage improves the total blood flow among healthy people (Archer 2007, 7). However, it has been proved by Pemberton that at least in flaccid and paralyzed extremities massage improves circulation (De Domenico 2007, 119). Archer (2007, 7) concluded this question concerning the relationship of total blood flow and massage so that the possible improvement in circulation that massage and passive movement may provide can benefit sedentary and immobile patients whereas exercise is the best modality to increase total blood flow among physically active people.

It is believed that the enhancements in circulation that massage provides help the body to get rid of the metabolic by-products (Arponen & Airaksinen 2001, Paine 2007, 56-57; Ylinen et al. 1995, 15). This statement is supported by the studies that show that massage can reduce the intensity of delayed onset muscle soreness (DOMS) and the amount of some by-products which are formed during the exercise (De Domenico 2007, 123). Massage is thus used to speed up the recovery process and to reduce DOMS after exercise (De Domenico 2007, 267-268). In addition, it is thought that enhanced circulation also leads to an increased supply of oxygen and nutrients (Paine 2007, 54). Thus, massage can be used to restore the normal circulation; oxidation, nutrition and waste exchange in soft tissues which are tensed or in spasm and therefore suffer from improper circulation (Archer 2007, 73-77). Moreover, the sufficient circulation, oxidation and nutrition are important in healing process after soft tissue traumas (Fritz 2005, 431). Thus, massage can be used in post-acute phase of the healing process to improve the circulation and this way to ensure that the substances necessary for effective healing process are available (Cash 1996, 81; Paine 2007, 157).

Because massage can be used to improve lymphatic flow, massage is widely used method to get rid of the edema after the soft tissue traumas (Fritz 2005, 431). Edema puts hydrostatic pressure on nociceptors. This irritates nociceptors and causes the

feeling of pain. Thus, by using massage the pain originating from edema can be relieved. (Fritz 2005, 441.) Massage has been discovered to decrease diastolic and systolic blood pressure in studies (De Domenico 2007, 120). Massage can benefit mild hypertension cases but in case of severe hypertension massage is forbidden (Fritz 2009, 733).

3.3 Effects on muscle tissue

Massage has been noticed to increase the range of motion (ROM) in joints. It is thought that massage causes muscle relaxation and this way increased muscle length. Increased muscle length enables increased joint ROM. (De Dominico 2007, 122.)

Traumas, long-term isometric contraction and immobilization can result in adhesions and excess fibrous connective tissue (scar tissue) in soft tissues (Arponen et al. 2001, 79; Ylinen et al. 1995, 31-32). The adhesions are emerged when fibers stick together due to lack of intercellular fluid (Archer 2007, 87). Because of the long-term isometric contraction posture muscles, for example, erector spinae, are prone to excessive local fibrosis and muscle atrophy. Adhesions and fibrotic tissue distract normal soft tissue function. In muscles, additional fibrotic tissues and adhesions reduce elasticity, flexibility and strength. (Archer 2007, 74; Arponen & Airaksinen 2001, 77-79; Ylinen et al. 1995, 31-32.) Less elasticity in muscles causes them to be prone to further injuries (Renström et al. 2002, 318). Fibrosis can also prevent the interstitial fluid circulation because sometimes the tiny pores in the fascias can be closed due to fascia fibrosis and thickening. Thus, massage can break these thickenings, and this way the tiny pores open again and interstitial fluid can flow normally. (Cash 1996, 16)

Soft tissue healing process after trauma happens in 3 stage which are acute, sub-acute and maturation stage. Acute stage begins at the time of tissue trauma and lasts from several hours to 3-5 days. In the acute stage primary and secondary edema are formed and inflammation process begins as immune response to injury. Chemical substances and edema irritate nociceptors which cause pain signal. As a protective response to pain, muscles surrounding the trauma will spasm. Muscle spasm prevents further injury and, therefore, muscle which is in protective spasm should not be mas-

saged in the acute phase. Towards the end of the acute phase, hematoma is formed by fibroblasts, and leukocytes. Phagocytes finish their cleanup process and they return to circulation. In the acute stage, PRICE (protect, rest, ice, compression and elevation) is the most important treatment to prevent the formation of secondary edema and further damage, and to relieve pain. Apart from this, Fritz (2005, 457) suggests that in case of soft tissue strain the strained sites of the soft tissue are sticky for the first two days after the trauma. Thus, in case the strained soft tissues are superficial and easily reachable, it can be pushed against each other in order to minimize the amount of scar tissue needed to cover the trauma site. (Archer 2007, 100-106; Paine 2007, 152-155.)

The sub-acute phase begins when the key physiologic events of the acute phase are over. However, physiologic events of acute and sub-acute phase overlap, so it is hard to say exactly when one phase has ceased and another has started. Sub-acute stage may last for up to 6 weeks. At the beginning of sub-acute phase fibroblasts will form granulation tissue throughout the hematoma. The granulation tissue is a net of weak fibers. The fibers which are aligned at best to tolerate stress will strengthen and fibers which are misaligned will break. The process in which the weak granulation fibers are thickened and strengthened is called collagen remodeling. To ensure that the correct granulation fibers are strengthened, it is important to move the affected tissue in pain-free range of motion in sub-acute phase. Effleurage can also be carefully applied in sub-acute stage to improve the circulation and this way to reduce the secondary edema and to stimulate the healing process. In addition, ice massage can be utilized in this phase. (Archer 2007, 103-107; Paine 2007, 156-158.)

In maturation stage the collagen remodeling process continues. This stage can last for up to 1 year. The collagen remodeling is finished when ROM is full and resistance tests in the whole range of motion are pain free. In maturation stage massage is used to reduce the amount of adhesions and break apart poorly aligned fibers. (Archer 2007, 103-107; Paine 2007, 156-158.)

Massage's ability to enhance the healing process after soft tissue trauma has been examined. In one study the animal muscles were first subjected to crushing injury.

Then some of these animal muscles were massaged and some were not. In microscopic examination massaged muscles looked normal, included no secondary fibrous bands separating the muscle fibers, and had no fibrous thickening around the vessels and no signs of interstitial hemorrhages. Whereas non-massaged muscles showed dissociation into fibrils of the muscle fibers, thickening of connective tissue, interstitial hemorrhages, increased number of nuclei in the connective tissue, and an enlargement of blood vessels with thickening of their adventitious coats. (De Domenico 2007, 123.) There is also some evidence that friction massage stimulates fibroblast activity which improves collagen healing (Archer 2007, 7).

It is also suggested that massage can improve the muscle length-strength ratio. When length-strength ratio is optimal the actin and myosin can slide efficiently over one another. Thus, it is considered that by improving the length-strength ratio massage can also indirectly increase the muscle power. (Archer 2007, 73-74)

In rest the molecule bonds in cytoplasm and myofilaments become stiff. If person starts high demand physical activity without warming up these molecule bonds might break causing microtraumas. (Murtoaro & Vuotoniemi 1997, 11.) Massage can be used to warm up the tissues, for example, before the highly aggressive methods such as joint manipulation (Cash 1996, 262).

3.4 Effects on nervous system

Nervous system is consisted of central nervous system (CNS) and peripheral nervous system (PNS). PNS is subdivided into autonomic and somatic nervous system (SNS). Autonomic nervous system (ANS) is composed of sympathetic and parasympathetic nervous system. The sympathetic nervous system is responsible for “fight or flight” kind of function where as parasympathetic nervous system has calming effect on the body and it returns the body to a non-alarm state after stress. (Fritz 2009, 130.)

By massage it is possible to affect the function of autonomic nervous system. According to Fritz fast-paced, rigid massage for a short time stimulates sympathetic nervous system. (Fritz 2009, 138.) This kind of stimulus is used by therapist when a

client wants to become more concentrated and attentive, for example, before sport event (Archer 2007, 180). In one study students with attention-deficit/hyperactivity disorder benefited from massage therapy. The student received massage therapy twice per week for 20 minutes. Comparing to control group the students receiving massage therapy showed improved state of mood, improved classroom behavior and less anxiety, daydreaming and hyperactivity. (Field 2006, 70-74.) Massage which stimulates sympathetic nervous system causes the release of adrenalin and nor-adrenalin and this way it increases the heart rate and heart contraction volume. This makes the heart more vulnerable for cardiac rhythm problems. Therefore, when people with possible heart problems are massaged, the massage should be slight and slow especially in thoracic area in order to avoid cardiac problems. (Ylinen et al. 1995, 21.) Fritz (2009, 138) proposes that slow, rhythmic, broad-based massage for a longer time would result in parasympathetic nervous system activation. Activation of parasympathetic nervous system results, for instance, in blood pressure decrease, in stomach mourning and in reduced heartbeat (Ylinen et al. 1995, 21). A client responds to the parasympathetic activation with relaxation, restoration and contentment (Fritz 2009, 136). Treating tender points with massage can cause the feeling of “good pain” that can result in release of body's self-produced painkillers and mood altering chemicals. These chemicals inhibit sympathetic nervous system and stimulate parasympathetic nervous system. (Fritz 2009, 131.)

The somatic nervous system is a part of the peripheral nervous system. It controls movement and muscle contraction, muscle relaxation patterns and motor tone of muscles. SNS also influences the length-tension relationship of muscles. (Fritz 2009, 138.) The SNS includes both sensory and motor nerves. The primary motor center of the cerebrum and cerebellum controls and coordinate voluntary movement. Apart from this, inside the spinal cord specific neuronal pathways link sensory and motor neurons to form reflex arcs. (Archer 2007, 70.) Reflexes are instant responses that body uses to adapt to changing environment. Massage can be considered as a part of the changing environment. (Fritz 2009, 139.) Reflexes work without sensory input from brains (Archer 2007, 70). In reflex arc the proprioceptors (=mechanoreceptors) that sense the state of the muscle, its length, tension and rate of lengthening, play a dual role as sense receptor and motor effectors. The proprioceptors in muscles are

muscle spindles and Golgi tendon organs. There are factors which can cause the muscle spindles to become hyperactive. Hyperactive muscle spindles can lead into muscle cramps and spasms. (Fritz 2009,138-139.) It is suggested that factors which can lead to hyperactive receptors and this way to muscle spasm (sustained muscle contraction) are chronic strains or functional adaptations (muscle imbalances), and factors which can result in cramp (short-term temporary muscle contraction) are a combination of dehydration, fatigue and electrolyte imbalance. (Archer 2007, 76.) Now it has been proven that these spasm and cramps are reflexes at spinal cord level. It has been proved that spinal manipulation can stop these reflexes and this way release the pain. (Arponen & Airaksinen 2001, 73.) Furthermore, there is some evidence that also massage can affect the motor excitability in reflex loop. (De Domenico 2007, 128) Usually a reflexive massage stroke has inhibitory and anti-arousal effects on motor tone. The reflexive effect is achieved when a different neurologic signal is substituted by signal originating from the massage stroke. (Fritz, 2005,134.) The evidence and the clinical experience suggest that massage can be used to release the muscle spasms and to relax the muscles by affecting the motor tone. (Arponen & Airaksinen 2001, 73; De Domenico 123-128; Ylinen et al. 1995, 18-19.) On the other hand, motor tone can also be promoted by some invigorating techniques such as tapotements or brisk petrissage (Archer 2007, 39). According to De Domenico (2007, 123) these kinds of techniques can be expected to increase muscle spindle firing, and, therefore, fusimotor output. Archer (2007, 184-185) proposes that the correct treatment procedure for acute cramp is: to compress the cramping place and to activate the antagonist muscle at the same time. Afterwards stretch the muscle slowly and then apply ice on it. In clinical studies massage has been noticed to reduce the uncontrolled movements in Parkinson's disease, to reduce the hypertonicity in the arms and legs in cerebral palsy and to reduce the hypotonicity in the arms and legs in Down's syndrome (Field 2006, 99-120).

Massage can relieve pain, for example, through gate control theory. The idea of the gate control theory is that somatic stimulus such as touch, temperature, pressure and movement causes the burst of afferent signals along large-diameter fibers and the pain signals using small-diameter fibers are blocked when they try to achieve the spinal cord. Thus, the brains receives somatic signal not the pain signal. (Archer

2007, 78-79; Braun & Simonson 2008, 396; Paine 2007, 54.) In the study, emergency department patients reported significantly reduced pain, heart rate and blood pressure after tactile stimulus (Field 2006, 232).

Sensory fibers innervating some muscle and the skin above this muscle are usually coming from the same segment of the spinal cord that is supplying also the motor nerves of this muscle. Therefore, in neurology some massage techniques can be used shortly to stimulate these mechanoreceptors in the muscle and in the skin above this muscle in order to raise the level of central excitability of the motor cells in the spinal cord and this way to facilitate the voluntary muscle contraction. (De Domenico 2007, 223.)

Increased mechanical strain, impaired circulation, trauma, disuse, local inflammatory response, immobility and mental stress can result in trigger points. Trigger points are contracted knots in several muscle fibers that suffer from lack of energy and circulation. Trigger points are highly irritable, thus, it feels really painful upon compression. What is more, each trigger point has its own pattern according to which it refers pain. Trigger points are developed when excessive calcium spill due to a motor end plate dysfunction or sarcoplasmic reticulum tear causes sustain action-myosin bonding. Tender points are also highly sensitive spots in the muscles and painful when they are compressed. However, apart from trigger points, it does not refer pain, nor does it feel like fibrous nodule and does not appear in a taut band of muscle. Tender points are thought to be local muscle spasms which usually appear in muscle attachments. (Archer 2007, 76-78.) Trigger and tender points can be released by massage (Clay & Pounds 2008, 25)

3.5 Neuroendocrine effects

The nervous system and endocrine system together form a feedback loop in which the nervous system regulates the endocrine system, while endocrine system has an influence on the nervous system. The neuroendocrine substances such as neurotransmitters and hormones carry messages that regulate physiologic functions, for example, heart beat. The dysregulation or failure of neuroendocrine substances caus-

es mental and emotional disorders, problems in behavior, and problems in perception of stress and pain. The research indicates that massage can affect the level of many neuroendocrine substances and this way massage can be used as one of the treatment modalities to improve many conditions relating to neuroendocrine substance dysregulation. According to Fritz, the neuroendocrine substances which can be affected by massage are dopamine, serotonin, adrenaline, noradrenaline, endorphins, oxytocin, substance P, cortisol and growth hormone. (Fritz 2009, 130-134.)

In a literature review by Field T et al, gathered up the studies which examined how the massage therapy affects dopamine, serotonin and cortisol levels. Serotonin and dopamine are neurotransmitters. Serotonin has been proved to diminish pain and appetite, to regulate moods and sleep patterns and to stimulate smooth muscle contraction. Dopamine has also been discovered to relieve pain. Dopamine is also necessary in voluntary movement and clear thinking. Cortisol is a hormone which is released in response to stress. As a natural anti-inflammatory it can accelerate tissue breakdown and prevent tissue repair. In literature review, Field T et al. explored that massage therapy reduces cortisol levels on average by 31%. Levels were assayed either in saliva or in urine. In serotonin levels the average increase was 28% and in dopamine levels 31%. These substances were assessed in urine. The literature review included studies on depression (including sex abuse and eating disorder studies), pain syndrome studies, and studies on stress due to pregnancy, aging or job, research on autoimmune conditions such as asthma and chronic fatigue, and studies examining how massage therapy affects immune system in medical conditions such as HIV and breast cancer. (Braun & Simonson 2008, 396) The studies examining how massage affects medical conditions with immune deficiency such as HIV and breast cancer, the researches found out that massage increases the level of natural killer (NK) cells and this way it improves the immunity. It was suggested that the level of natural killer cells increased because the amount of cortisol which suppresses the NK cells decreased. (Field 2006, 157-175.)

It has been discovered that massage therapy reduces substance P, the pain triggering neurotransmitter, among people suffering from fibromyalgia. However, massaging fibromyalgia clients should be gentle and slow, because too rapidly and vigorously

applied massage can easily increase the fibromyalgia pain. (Field 2006, 145-147; Fritz 2009, 131.)

The release of endorphins has been widely used to explain why massage releases pain (Field 2006, 145-147). However, this is difficult subject to be examined and the evidence around is conflicting so far (Field 2006, 205; Lowe 2009, 69).

3.6 Effects on growth

Many studies show that infants gain more weight if they have been massaged during their hospital stay. Some studies also indicate that massage for pre-term infants can result in faster length gain, in stronger bones and in less sleep disturbances. It is believed that the massage enhances the food absorption process and this way body's prerequisites to grow are improved. For example, it is thought that massage helps to release the food absorption hormones and to increase the gastric motility. (Field 2006, 41-60)

3.7 Effects on pain

Massage can release pain in many ways. Massage washes out pain metabolites such as kinins, decreases swelling, changes the neuroendocrine substance mixture, balances autonomic nervous system and reduces muscle spasms, activate trigger points, and tender points. (Arponen & Airaksinen 2001, 71-78; De Domenico 2007, 126; Fritz 2009, 130-143; Fritz 2006, 441-442); Furthermore, the effectiveness of massage for pain relief has been explained by using the gate control theory and also the psychological effects that massage provides (Arponen & Airaksinen 2001, 71-73). In addition, massage can be used to release nerve entrapment (situation in which soft tissue puts pressure on nerve) and this way to diminish nerve irritation and pain (Fritz 2009, 143). The research articles confirmed that massage has been used as a beneficial treatment modality to reduce, amongst others, post-surgical pain, sub-acute back pain, symptoms of migraine, fibromyalgia pain, DOM soreness and chronic pain (De Domenico 2007, 126-127; Field 2006, 233-253). According to Fin-

nish treatment procedure recommendations, there is grade B evidence to prove that massage used together with therapeutic exercises and guidance relieves sub-acute back pain and increases the physical well-being. In addition, for chronic back pain the massage together with therapeutic exercises and guidance might be useful (grade B evidence). (Käypä hoito: Aikuisten alaselkäsairaudet.)

4 MASSAGE TECHNIQUES, AND THEIR EFFECTS

Any given massage technique has usually multiple effects and the effects are a result from several mechanisms operating simultaneously. The effects can be local affecting the treated site or occur throughout the body. (Andrade & Clifford 2001, 12) In order to perform massage correctly, it should be thought which therapeutic effect each hand movement provides and how it helps the client to restore his function (Andrade & Clifford 2001, 2). Once the therapist is knowledgeable of which kind of therapeutic effect the next hand movement should provide and he/she knows the anatomy, it easier for him/her to choose a suitable massage technique and adjust the components of each massage stroke so that wanted therapeutic effects are achieved (Arponen & Airaksinen 2007, 25-26). The components that each massage stroke has are: direction, speed, pressure, rhythm and the length of the stroke. (Braun & Simonson 2008, 397)

In literature relating to massage, the authors divide the massage techniques into different categories in a great variety of ways. The categorizing can base on anatomical, operational and heuristic factors as well as on therapeutic effects and outcomes which certain massage technique provides (Andrade & Clifford 2001, 13). In addition, inside different massage concepts there are differences how some specific massage technique is called. For example, kneading can be different massage technique in different massage concepts (Cassar 2004, 37-39). A huge challenge in our work was to make the massage concept, techniques and terms used in Finland and in our physiotherapy education to correspond the concept, techniques and terms used in authoritative massage literature written in English. Arponen and Airaksinen (2001, 95)

also mention that there are still some differences how the massage techniques are called and how they are performed. Moreover, they add that standardizing the massage term used in massage therapy would made the research carried out in the field of massage more valid and global.

In our education tool we present the techniques which are included in basic sports massage concept. With these techniques the therapist is able to intervene in multiple medical conditions with massage. When it comes to the stroking techniques used in basic sports massage, Par Archer proposes that basic sports massage concept combines the classic/Swedish massage strokes with rhythmic compressions and active assistive release. The classic/Swedish massage concept which is widely used in Finland and abroad has been developed, described and refined by several prominent figures such as Pehr Ling, Dr. Johann Mezger, Albert Hoffa and Dr. James Mennel over the past two centuries. Nowadays, this basic classic/Swedish massage concept consists of five styles of massage strokes: effleurage, compression techniques such as kneading and petrissage, tapotement and vibration/shaking. (Archer 2007, 24.) This is the same concept as massage teachers Saari et al. exhibit in their book. The only difference is that Saari et al. have separated vibration and shaking from each other. Moreover, Saari et al. have categorized transverse massage techniques under the sports massage concept. (Saari et al. 2009, 76.) Furthermore, we wanted to add still one technique, friction massage, to our education tool. For example, Mel Cash (1996, 45-47) exhibits this technique as a part of sports massage. The picture below sums up these techniques.

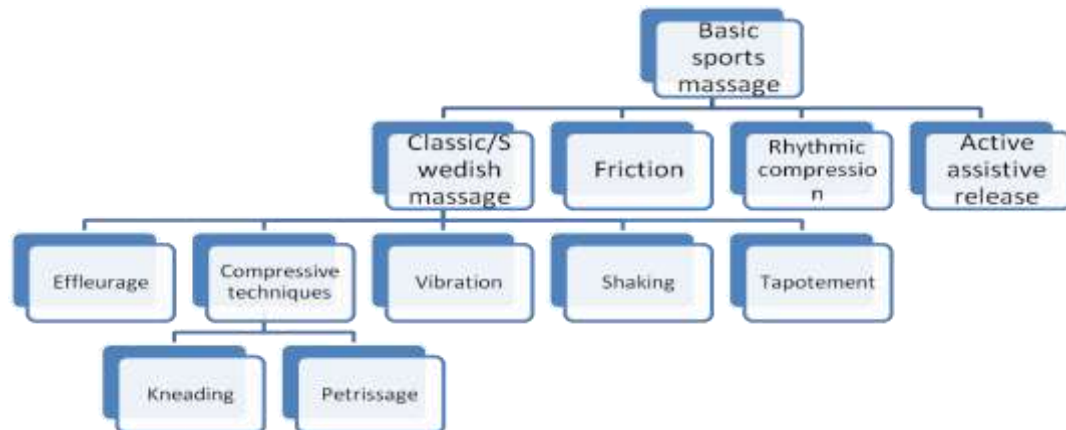


Figure 1. Massage techniques belonging to basic sports massage concept

4.1 Effleurage

In general effleurage can be defined to be any stroke in which the hands glide or slide over the superficial tissue (Archer 2007, 25). However, some authors in massage separate effleurage and stroking from each other (De Domenico 2007, 70-79; Hollis 1998, 10-13). They define that the difference between effleurage and stroking is that in effleurage the gliding movement is performed with increasing pressure in the direction of flow in the veins and lymph vessels whereas in stroking the gliding movement can be performed at any direction. Some authors don't make difference between effleurage and stroking (Cash 1996, 35-40; Saari et al. 2009, 76-77). However, they address that when the limbs are massaged the pressure strokes which cause the increase in flow in the veins and lymph vessels should be performed usually towards the heart. This way the non-return valves which prevent back flow of blood won't be harmed (Cash 1996, 15-16). The effleurage stroke can be applied in different ways by using the combinations of two variables: direction and pressure. Thus, effleurage stroking can be applied across the muscle fibers (transverse) or parallel (longitudinal) to them, and the pressure of the stroke can be aimed to affect superficial or deep tissues. (Cash 1996, 35-40.) The way how the stroke is applied affects greatly the effects it provides. However, in the literature, the effects of the effleurage

are usually given in a one box even though, for example, superficial and deep effleurage techniques provide different effects. (Findlay 2010, 63-64.) In this thesis transverse stroking techniques have been discussed in its own chapter.

The superficial effleurage is usually applied with palms. For deeper techniques forearms, fists, knuckles, braced thumbs and fingers and heel of the hand can be utilized. Light effleurage is widely used at the beginning of the massage session to warm up the muscles, to spread the lotion, and to palpate and assess the condition of the soft tissues. Light effleurage is also used after some more aggressive techniques to flush away the by-products and as integrating strokes when transferring from one body part to another and at the end of the treatment. (Saari et al. 2009, 76-77.)

Deep effleurage/stroking techniques can be used to identify deep lesions and should be performed slowly, so that the therapist has enough time to assess the condition of the tissue and the client has enough time to adapt to the applied pressure (Cash 1996, 39; Riggs 2007, 28-29). Longitudinal deep strokes are started by first applying compression and under the compression a short stroke is applied along the muscle fibers. (Cash 1996, 39) In order to be able to follow the alignment of the muscle fibers the therapist should have a good knowledge of the muscle anatomy. In addition, it is important to remember to massage also the tendon and muscle tendon junction areas and not just the muscle bulks. The tendons are usually massaged towards the muscle bulks. (Ylinen et al. 1995, 56-58.) Deep longitudinal strokes are very effective to stretch the muscle fibers longitudinally (Cash 1996, 39). This could be enhanced by placing the massaged muscle in pre-stretch position (Ylinen et al 1995, 61). Comparing to stretching where muscle fibers are only stretched longitudinally, in longitudinal muscle stroking the muscle fibers are also widened transversally at the same time when they are stretched longitudinally (Ylinen et al. 1995, 27-29).

Stripping is one kind of longitudinal stroking technique. Stripping is performed by applying a gliding pressure along the muscle fibers from one attachment to the other. Stripping is an effective way to deactivate the trigger points. (Clay & Pounds 2008, 24-25; Andrade & Clifford 2001, 200-201.)

4.2 Pressure techniques

In pressure movements the soft tissues are either lifted away from the underlying tissues or compressed against them. This way the soft tissues are displaced, twisted and bent. (Cassar 2004, 37.) The purpose of the pressure techniques is to separate and mobilize tissues and thereby, for example, stretch posttraumatic scar tissue and reduce adhesions and increase range of motion in joints and limb segments and this way improve normal function (Findlay 2010, 63; De Domenico 90-91). Kneading and petrissage are the most used pressure techniques.

4.2.1 Kneading

Kneading is performed so that using the circular movement the soft tissues are compressed against the underlying bone or just next to it. The aim of this pattern is to lengthen and broaden the shorten segments in soft tissues. Technique in which the soft tissues are compressed against the underlying bone, the therapist should be cautious because if too much pressure is applied into the soft tissues, they can be harmed. The circular motion is applied rhythmically so that the pressure is strongest when the therapist leans on his/her hand and smallest when the movement continues backward. In general, the more superficial broad contact kneading strokes, for instance, by palm are used first to soften the superficial layers and afterwards the more specific pressure, for example, by thumbs is used to affect the tissues more deeply. (Cassar 2004, 38; Saari et al 2009, 77-78.)

4.2.2 Petrissage manipulations

In petrissage techniques, the superficial tissues are separated from the underlying tissues (Archer 2007, 26). In a lift up technique, the muscle is first grasped and squeezed between the thumb and other fingers and then lifted up and released. This technique is usually performed rhythmically so that one hand at a time grasps and lifts up the muscle and immediately when this hand has finished its movement the other hand repeats the same movement for the same muscle. Then by alternating the

position of hands the whole muscle is treated from the origin to insertion if possible. (Saari et al. 2009, 78.) The grip should be wide enough so that the client does not feel that the grip is pinching. (Murtoaro & Vuotoniemi 1997, 25). The aim in petrissage massage is to relax the muscle by improving the elasticity and fluid circulation (Asmussen 1998, 22). However, if the muscle is very tense, the grip can be too painful to conduct. The petrissage techniques load the muscles of forearm a lot and therefore the technique should not be overemphasized. (Saari et al. 2009, 79.) Brisk petrissage techniques loosen tissues and stimulate muscles whereas slow petrissage techniques promote muscle relaxation (Archer 2007, 39).

In wringing technique the superficial tissues are pressed away from the underlying tissues rather than lifted up. The wringing is performed so that the hands are placed on the different sides of the muscle mass, and then at the same time by pushing with one hand away from the therapist and pulling with the other hand towards the therapist the muscle tissue is lifted up and twisted. Wringing suits well for larger muscle masses. (Archer 2007, 26-27; Cassar 2004, 39; Saari et al. 2009, 78-79)

4.3 Percussion/Tapotement

“Percussion techniques are made with alternate hands striking the skin in very rapid succession (Cash 1996, 48).” Percussion is mostly used in the end of massage period just before stroking. When used correctly, percussion can strengthen the relaxing effect of massage. However, compared to other massage techniques, the mechanical effects of percussion are not that effective. (Saari et al. 2009, 80.) Percussion can be used in two different ways; as a relaxing technique at the end of a massage or as a muscle awakening technique for athletes just before or in the middle of sport performances. The relaxing percussion is executed with steady and slow rhythm whereas the muscle activating technique is done in a rapid pace and in shorter periods than relaxing. (Asmussen 1998, 24-25; Murtoaro & Vuotoniemi 1997, 25; Saari et al. 2009, 80.) The percussion is carried out with the movement coming from the elbow keeping the wrist and fingers relaxed. When fingers and the ulnar side of the palm hit the skin the movement in elbow should immediately pull the wrist up leaving the im-

pact to the muscles and skin as short as possible. This percussion technique is called finger percussion. It is possible to carry out percussion also with cup technique, fist technique or finger tip technique (Asmussen 1998, 24; Cash 1996, 48-50; Murtoaro & Vuotoniemi 1997, 25; Saari et al. 2009, 83).

4.4 Shaking

Shaking technique is mostly used when the therapist wants to relieve tension in a single muscle, in a muscle group or in the muscles of the whole limb. This technique is mostly used at the end of massage to maximize the relaxation effect or when manipulating a problem area to relax the tensed or painful muscles after kneading or petrissage techniques. When utilizing this technique to the lower limb, the other hand takes a grip from the calcaneal bone while the other hand supports from the foot. The limb is given a small traction after which the limb is shaken with a small up and down movement. The movement should not be more than a few centimeters wide and especially the quadriceps muscles should move along the shaking movement. If the calf muscles want to be involved more, the lower limb being shaken, should be flexed from the knee and the foot supported on the treatment table. In this maneuver the shaking is focused on the knee after which the calf muscles should move along the movement. (Saari et al. 2009, 79.)

4.5 Vibration

In vibration technique the physiotherapist applies pressure to the skin with the palm or the tip of fingers after which he contracts the muscles in upper limb to cause vibration to the applied muscle. This technique affects deep muscles and is very relaxing and as mentioned in the chart it is most significant technique to relieve pain (Asmussen 1998, 25; Murtoaro & Vuotoniemi 1997, 26; Saari et al. 2009, 83). Vibration is conducted for five to ten seconds and can be repeated for two to three times. This technique is the most difficult one from the basic techniques and also the heaviest. Because of this the technique is not that popular to use. Moreover, a holistic massage can be easily carried out without the usage of vibration technique but when

doing a therapeutic massage it is suggested to do this technique if the client has tensed and aching muscles because of the relaxing and pain relieving effects (Saari et al. 2009, 83-84).

4.6 Friction

Friction massage applies both compression and stretch to the tissue. In friction stroke the stretch can be directed across the muscle fibers, linearly or circularly. (Cassar 2004, 44-45.) Friction differs from the deep stroking so that in friction massage the movement is not gliding on the skin and it is merely used in a particular spot to soften the hardened tissue and to break the adhesions and fibrotic tissue (Findlay 2010, 63). Friction massage also causes local hyperemia and disperses pathological deposits. In friction massage therapist uses mostly his/her fingers and thumbs so that he/she is able to apply deep and specific pressure into the soft tissues. The venous return does not have to be applied in friction massage because friction massage movements are so local. (Cassar 2004, 45.) Transverse friction technique is used especially to treat lesions in tendons and ligaments, and small fibrotic areas in muscles (Ylinen et al. 1995, 64-66). Some authors guide to apply the pressure transversally both back and forth where as some authors guide to apply the pressure in one direction only. (De Domenico 2007, 100-101; Cassar 2004, 46.) One modification from linear friction massage technique is pin and stretch technique. To perform this technique the body part/muscle is first positioned either in a neutral or shortened position, then the soft tissue is “pinned” by placing pressure on it, for example, with forearm. After this the body part is lengthened to achieve the stretch effect in soft tissues. (Archer 2007, 29.)

For example, in pre-event massage it is possible to use technique called superficial friction. In superficial friction client's skin is rapidly rubbed with palms to enhance blood flow and to create heat to the treated area (Braun & Simonson 2008, 409).

4.7 Rhythmic compression

In rhythmic compression the therapist applies pressure on the muscle with a loose fist or open palm. In this technique the belly of the muscle is pushed towards the underlying bone causing a rhythmic compression. The rhythmic compression technique is done without any emollients to enhance the grip. Loose fist technique is recommended over the open-palm method whereas the therapist can maintain a neutral wrist position and apply deeper pressure when handling the larger muscle areas such as gluteal muscles. The loose-fist is formed by squeezing the thumb gently to the index finger and the tip of fingers in to the heel of the hand thus creating a firm flat surface across the fist and prevents hyperflexion of the therapist's hand. If possible, double fists should be used to affect a larger muscle tissue area. The fists should be kept close to each other thus making a one large unit. It is highly important that the therapist compresses the tissue directly to the bone without pushing the muscle mass off to other side which may cause mild damage. The pressure is applied to the muscle until resistance is felt. When the tissue starts to resist, the pressure is released allowing the tissue to rebound and expand slightly after which the pressure is applied once again. The pressure should be stronger with every push but not too much to allow the muscle rebound. Every time the pressure is relieved the contact between the therapist's hand and the affected area should still stay. The pressure that applies to the skin should be a product of therapist's body weight, not only by pumping with the elbows and hands only. The purpose of this technique is to warm up the muscles, to flush the muscles, to relax, to deactivate hypertonic muscles and muscle spasms. (Archer 2007, 34-36; Findlay 2010, 50-51.)

4.8 Transverse techniques

Transverse techniques are widely used in sports massage. This is because these techniques are extremely modifying to the muscle no matter how much the force is used. Transverse techniques are recommended to use with the therapeutic massage techniques when the client is an athlete, physically active person or some other kind of customer whose muscles can endure and demands heavily modifying techniques. Using these techniques to an elderly client demands cautiousness and mild usage of

strength. (Saari et al. 2009, 134-135) When transverse massage is used the muscle should be in a neutral position and no pre-stretch is allowed. (Ylinen et al. 1995, 62) Transverse techniques include transverse effleurage, transverse rhythmic compression and transverse stretch technique. Transverse stretch technique is a similar technique as rhythmic compression but the technique is carried out so that the compression is applied into the muscle fibers transversally and the compression is held statically for five to ten seconds. This technique is proved to be effective against chronic anterior compartment syndrome. (Saari et al. 2009, 135)

4.9 Active assistive techniques (active release techniques)

In active assisted techniques the broadening or lengthening of the muscle tissue is achieved by combining friction stroke with active muscle contraction. Due to active muscle contraction, the soft tissues can be released at a much deeper level and in areas not directly under the hands of the therapists.

In active assistive broadening the body part is placed so that the muscle being massaged is in a neutral or lengthened position while the therapist places his hands at either the proximal or distal end of the muscle. The client is asked to actively shorten the muscle (concentric compression) while simultaneously the therapist strokes across the normal muscle fiber direction by applying a down-and-out pressure thus intensifying the broadening action of contraction. The same process is repeated until the full length of the muscle has been broadened. This technique is done without any emollient. (Archer 2007, 37.)

In active assistive lengthening the body part being massaged is positioned so that the muscle is in a short position. The therapist places his hands at the distal end of the muscle belly. The client is asked to lengthen the muscle slowly and actively while the therapist applies simultaneously a linear friction parallel to the normal muscle fiber direction to intensify the lengthening action of movement. This technique is done without any emollient. (Archer 2007, 37-38.)

5 ERGONOMY

A good ergonomic position is crucial for the therapist to maintain his best work ability throughout the years. The therapist can influence on his/her own ergonomics with the treatment table he uses but the rest depends on the therapist's skill to learn good body mechanics.

The therapist should stand close to the treatment table and the table should be placed so that the therapist can freely go around the table thus reducing the need for reaching far away from the body. The back is supposed to be kept straight and aligned with ears, shoulders, hips and the heel of the back foot thus avoiding too much strain on the lower back and other parts of the body. The therapist should also maintain good core stability. The hips and feet should point to the stroking direction. The feet are kept shoulder-width apart from each other. The proper axillary angle is between 45 and 65 degrees, and it never should exceed 90 degrees. In order to protect his/her own wrist joint the therapist should make sure that the wrist angle between the posterior surface of the hand and the forearm would be no less than 110 degrees, for example, when effleurage massage technique is applied. (Braun & Simonson 2008, 380-385; Cash 1996, 46; Clay & Pounds, 15-19; Fritz 2009, 214-229.)

A good work body mechanics is acquired by standing firmly with both feet on the ground and by changing the weight from one leg to another to maintain the proper blood flow on the lower limbs. In a symmetric stance knees are slightly flexed, hips and feet are on a line and the muscles worked right in front of the therapist. In asymmetric stance the front leg maintains balance and the back leg supports the weight of the therapist. The feet should be placed about shoulder-width apart from each other across the stroking direction and approximately a half steps apart from each other in stroking direction. The knee of the front leg should be in a flexed position and the knee of the back leg should be positioned somewhere in the last 15 degrees of extension but not in hyperextension. If the therapist wants to add more force, he/she should move his/her back leg further backwards. If the therapist tries to produce a huge amount of force through his muscles of the upper extremity, it can cause

joint malfunctions and other stress injuries. Therefore, therapist should remember to keep his/her shoulders relaxed and scapulas rotated downwards. The joints through which the weight is passed should be kept relatively straight but not locked. (Braun & Simonson 2008, 380-385; Cash 1996, 46; Clay & Pounds, 15-19; Fritz 2009, 214-229.)

6 MASSAGE STYLES

6.1 Holistic massage

Holistic massage is carried out with calm and superficial techniques. The force that the physiotherapist produces to the skin is light and the goal in holistic massage is to relax the client with pleasant and relaxing techniques. An easy way to improve the relaxation is to play peaceful music in the background.

While doing holistic massage it is important that the client stays in the same position during the whole treatment period. This increases the overall relaxing of the client. Compared to therapeutic massage, holistic massage period does not try to search for problem areas but to make the client feel good and to prevent discomfort in muscles. Holistic massage as well as therapeutic massage is usually performed from distal to proximal along the venous return. After giving holistic massage to a part of the body, the therapist rarely returns to the area except the ending techniques of massage such as effleurage, percussion and shaking. (Saari et al. 2009, 89.)

6.2 Therapeutic massage

Therapeutic massage is usually a massage to a certain problem area of the body. In therapeutic massage there is a certain pattern. In the beginning of the treatment the massage lotion is spread all over the area being treated after which the client is accustomed to the touch of the therapist while at the same time warming up the skin and muscles in the area. Moreover, during this procedure the therapist examines the

tensed areas with different stroking techniques. This helps the therapist to create an image of the area and find out in which muscles should be concentrated more and in which condition the affiliated area is. This helps the therapist to make plans for the time usage of the massage and time to consider which techniques should be used. (Saari et al. 2009, 89)

6.3 Massage for fluid circulation enhancement

Massage for circulation enhancement resembles holistic massage whereas in both styles the techniques used are mostly light wide strokes. Special feature in fluid circulation massage is that the limb being massaged is tried to be supported in a vertical position to improve the fluid circulation. This massage style should be started from the proximal end of the limb. This method aims to create space to veins and lymph vessels so that the extra liquid heading up from the distal parts of the limb have a channel to exit the extremity. The techniques that should be used are wide, peaceful, pumping and long strokes which are most supportive for circulation in veins and lymph vessels, shaking could also be used for this purpose. Force used should be moderate but enough to activate the fluid circulation. In fluid circulation enhancing massage style it is normal to return to the area that has already been dealt with for three or four times if time allows. Once the quadriceps and hamstrings area has been dealt with the therapist should continue with the shin area after which advancing to the ankle and the sole of the foot. (Saari et al. 2009, 90.)

6.4 Sports massage

Sports massage is way to enhance the performance level of an athlete. Since the athletes train a lot and spend most of their time concentrating on sports they have to have good maintenance of their body as it is their working tool. The general misleading thought of sports massage is that it differs from therapeutic massage applied to non-athletes. The techniques do not differ so much, it is the ability of the therapist to vary the dosage, timing and amount of pressure based on the needs of the athlete to help the athlete most to recover from hard training. This requires a good understand-

ing of periodization for a sport; in particular, the therapist must know the repetitive cycle that an athlete will go through several times during one year to prepare for peak performance during competition. The therapist should be aware of what point of this cycle the athlete or team is in order to apply the proper skills and, thus, assist the athlete with preparation and recovery. (De Domenico 2007, 266-275.)

Sports massage can be done pre-event, during event or after event. There are some differences in the techniques whereas the muscles need different kind of simulation according to if they are in the recovery phase or if the body is preparing for a sport event. (Cash 1996, 63-64.) Anything from two days before the event to two minutes to event can be counted as pre-event massage. Two days before event the massage can be deep and relaxing so that the athlete gets the maximum recovery benefit from the treatment. As the event draws closer, the massage should be more specific to the sport and the needs of an athlete. The event-based big muscles are the principal ones to treat and the easiest way to find out these muscles is to ask the athlete which muscles are painful the most after the physical performance. In pre-event massage it is important to know if the athlete wants to feel “fired up” or relaxed, this determines in a great deal the techniques that should be used. If the athlete wants to feel relaxed, the techniques should include shaking and rocking rather than percussion and deep muscle techniques. With percussion the athlete can be woken up and the muscles can be stimulated. These techniques should be done with rapid movements to get the proper stimulation for the muscles. (Cash 1996, 63-64.)

Post-event massage is very useful whereas most athletes tend to forget warming-down because of pure exhaustion, elation or perhaps disappointment. In picture, post-event massage replaces the warming-down routine as it can achieve the same effect by reducing muscle waste and stretches the tissues. The treatment method is the same as general sports massage, however more thorough and slow. In possible acute injury areas care must be taken and therefore plenty of superficial stroking should be used first to identify these areas even though the athlete probably points out them. Ice can be placed on these areas while massage techniques are used around and away from the area. After a brief moment of ice on the affected area it can be removed and light massage applied to the injured area to diminish the excessive

swelling. After this the ice can be replaced on the site. Even though massage to an injured area is thought to be contraindicated, the ice/massage/ice method very soon (minutes) after the injury has been shown to be extremely effective. After the post-event massage, passive stretching is recommended to the main muscles thus adding the stretching to the muscles if the athlete has stretched or if the athlete has neglected stretching, this will make up for it. (Cash 1996, 63-64.)

7 PROCESS OF THESIS

The idea for our thesis came from our teacher. She had noticed a need for an education tool to enhance the learning during independent study hours. As nowadays soft tissue mobilization has so many different concepts and techniques, it was difficult at the beginning to determine what the techniques are that we want to teach in our educational DVD. Of course, at the beginning we did not have a clear picture of all possible available soft tissue techniques so it took a considerable amount of time to familiarize ourselves with the subject. Also the many terms in English caused problems.

As there are a lot of techniques around in the field of soft tissue mobilization but very few studies on the subject, it was difficult to find evidence of the effects of the massage. During the making of this thesis our knowledge of this branch of physiotherapy developed a lot both in theory and practice. We also gathered up a decent amount of massage practice hours. Making the video clips for DVD was challenging because of the many options for each massage style and of our little experience in video making techniques. However, the outcome of our DVD was more or less what we originally wanted to achieve in spite of the many things that could not be included.

8 DISCUSSION

Many of the techniques we chose for our DVD are easily implemented and adapted in the work of physiotherapist so they do not have to think that carrying out massage is something separate from the rest of therapy. Moreover, the possession and usage of different therapy techniques offer variability to the work of physiotherapist and can therefore add the physiotherapist's interest towards his/her work.

When we wrote down the theory part we noticed that many massage books explain the effects that massage provides superficially. Therefore, we had to go through many anatomical facts before we were able to understand what physiologic changes happen in the body during the massage treatment. Moreover, some of the massage effects that are mentioned in massage books do not have evidence behind. Thus, we had to ponder which effects we can mention in our massage DVD. What is more, the limited amount of text what can be written down in massage DVD made it a bit difficult to open up the certain terms sufficiently.

The theory part can be utilized in education so that at the beginning the lecturer fluently goes through the theory part to be able to provide the students with a general picture of massage effects. Afterwards, the lecturer discusses with students how massage can be used in physiotherapy to improve the treatment results. In case the students want to know more about the effects and terms mentioned in DVD, they can have deeper study on the DVD during the independent study hours included in the soft tissue mobilization course. The students can test their knowledge also by carrying out the quiz included in the DVD.

The technique part can be used in lectures so that at the beginning the theory part and the demonstration video clips of the massage technique are showed from our DVD. After that, the lecturer demonstrates the same technique in practice. Moreover, the students can increase their comprehension of some massage technique even more when they watch the massage styles part from the DVD during their independent study hours.

When the format for our DVD was chosen we thought what the simplest format to implement is. Thus, we ended up to have PowerPoint presentation with wmv type of video files. The video files could include narration so that content on the videos would open up with less effort. In addition, the background lights and angle of view is not the most convenient in every clip.

The plan is that on this year's autumn our fellow student adds video clips concerning the upper body to our DVD. In future, a similar kind of educational DVD could be done to support the learning in the advanced soft tissue mobilization course. Moreover, the DVD demonstrating the proper and safe ergonomics in different manual therapy applications would prevent the physiotherapists from musculoskeletal problems and this way improve their ability to continue at their work for older age.

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