MYOSKELETAL MEDICINE FOR PHYSIOTHERAPISTS

Textbook of the certified course

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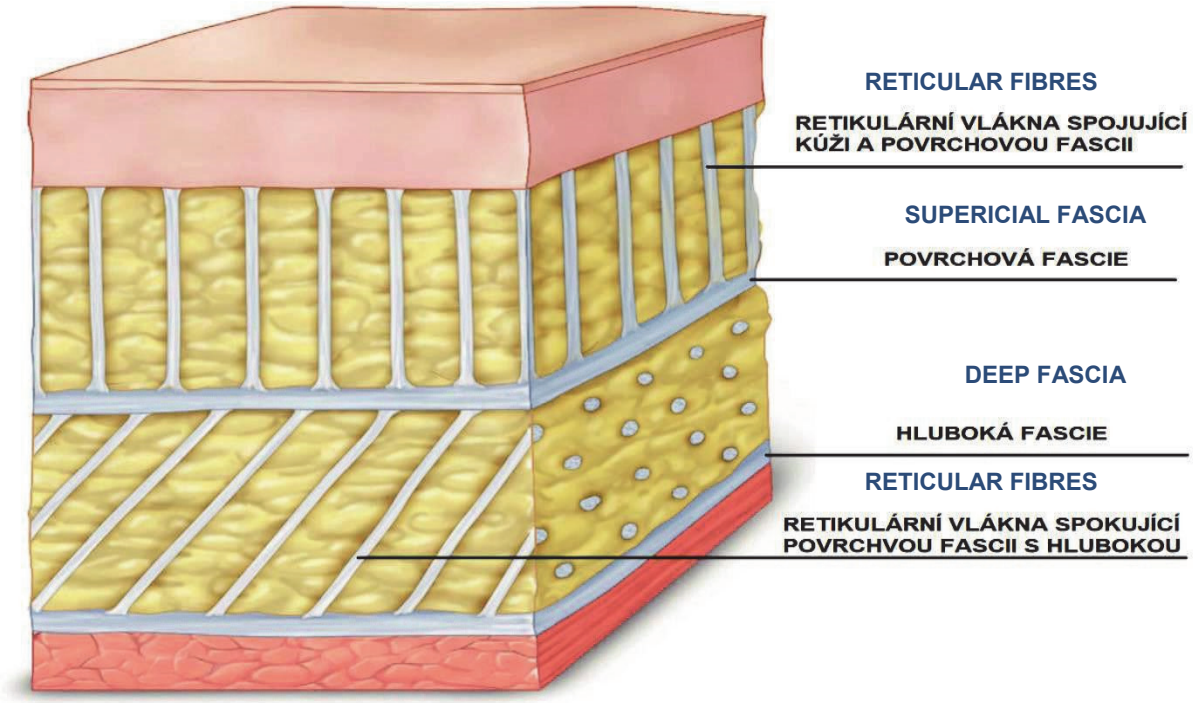
DIAGNOSTICS AND THERAPY OF CONNECTIVE TISSUES

The term "diagnostics and therapy of connective/soft tissues" mainly means examination and therapy of the connective tissue of the skin and subcutaneous tissue, aponeurotic fasciae, own fasciae of muscles, tendons and periosteum.

FUNCTIONAL ANATOMY OF THE SKIN AND SUBSKIN

The skin is a protective barrier between the external and internal environment of the organism. Its other function is regulation of body temperature (thermoregulation) and storage (fat, vitamins etc.), excretory (sebaceous and sweat glands) and resorption functions. Sensory functions responding to thermal (Ruffini corpuscles), cold (Krause corpuscles), pressure (Meissner corpuscles), traction and pressure (Vater-Paccini corpuscles) and pain (free nerve endings) stimuli are of fundamental importance for diagnosis and therapy. This is where the somatosympathetic reflexes that affect the lumen of blood vessels also come from. The efferent innervation of the skin is mediated by the sympathetic part of the autonomic nervous system.

The property we are investigating is the extensibility of the skin and subcutaneous tissue. This is mainly due to the elastic properties of the superficial fascia, which divides the fatty tissue into a superficial and deep layer, and individual reticular networks that penetrate the fatty tissue and connect the skin to the superficial fascia and then to the deep fascia.



FUNCTIONAL ANATOMY OF FASCIA

From a histological point of view, fascia is a "dense connective tissue" forming aponeuroses, joint capsules and fibrous structures of muscles (*endomysium, perimysium, epimysium*), ligaments, tendons, sheaths of tendons, nerves, blood vessels and periosteum.

Fascia is important as an anatomical barrier (immunity), stabilizers (e.g. plantar aponeurosis, iliotibial tract etc.), limits of movement (e.g. dorsolumbar fascia) or as a medium transmitting the force of contractile elements of muscles (epimysium). In addition to the above, sensory information from the proprioceptors located in the fascia is essentials for controlling muscle tone and movement.
Thus, any disorder of the fascia negatively affects the overall function of the muscle. Given that fascia always extends over multiple segments, it also significantly contributes to further chaining of functional and structural pathology.

SOFT – TISSUE DIAGNOSTICS AND THERAPY

These structures include contractile and non-contractile tissues of the musculoskeletal system, the diagnostics and therapy of which is of fundamental importance in manual therapy. We can therapeutically influence the skin, subcutaneous tissue, fascia and muscles by stroking, stretching, creasing, pressure or reflexology. Individual methods will be described in more detail below.

SKIN DIAGNOSTICS AND THERAPY

Head discovered on the skin in certain sections of the spine places with increased sensitivity to pin pricks, the so-called hyperalgic zones (HAZ). Today, these places are not searched with a sharp object (this method relies exclusively on the patient's data and reactions), but by palpation methods. We examine hyperalgic zones on the surface layers of the skin using the skin friction (drag) method. It's like we're caressing the skin with our fingertips. In the HAZ area, we then palpate the increased resistance (friction) of the skin. In this area, we also usually find its reduced ductility.

Based on the localization and boundaries of the hyperalgic zones, we infer a disorder in the segment (Head's skin zone), a disorder of the sensory part of the peripheral nerve, root, visceraldisorder, etc.

During the next, more targeted examination and subsequent therapy, we proceed by placing our hands on the examined area. The thumbs are as parallel as possible, they define the examined (treated) area, the other fingers and palms are also in contact with the skin. We slightly increase the pressure of the palms and several thumbs to prevent the hands from sliding on the skin. By pulling the hands away from each other with minimal force, we stretch the limited area of the skin, after reaching pretension (the first increased resistance of the tissues), the hands stop, and then we spring faster and with a slightly higher force in the same direction as when stretching the skin to pretension. We perceive the physiological barrier as elastically flexible. HAZ is characterized by a higher resistence of the skin to stretching.

Skin is a soft tissue, so we can never find a literally hard barrier, but we judge the degree of elasticity. For the assessment between a normal finding and a pathological barrier, the quality of the suspension after reaching the preload is decisive. In most cases, the overall stretchability of the HAZ is also smaller than in the case of a physiological finding, but we do not measure this stretch in any way. In order to perform the technique correctly, it is necessary, where possible, to examine the same area symmetrically on the opposite side (of the same size and in the same direction).

The degrese of elasticity of the skin, subcutaneous tissue and fascia is very individual, and therefore we do not assess the physiology or pathology of the finding based on quantification, but only by assessing the barrier after reaching pretension on both sides of the given examined area. Smaller areas of the skin are examined by stretching with only the fingers. Reduced skin elasticity is also found in the area of active scars. The examination and treatment is the same as the examination and treatment of the skin.

The of technique therapy is the same as for the examination. After reaching the first barrier, however, we just hold this pretension and wait for the so-called release phenomen, when we can perceive the increase in skin elasticity (the hands move slightly away from each other). When performed correctly, we do not increase the force of the pull. The therapy time is determined by the time when we feel the release phenomen, usually within 60 seconds. After the therapy, we should perform a control examination to check the change in elasticity. These general procedures also apply to other soft tissue techniques.

DIAGNOSTICS AND THERAPY OF THE SUBSKIN

For the examination of subcutaneous tissues, we use skin waves according to Leube – Dicke, which are created by dipping a finger perpendicularly into the skin and moving it perpendicularly to the course of the dermatomes. We can also use the well-known Kibler's fold.

During the therapy, we treat places of increased resistance by forming a horseshoe-shaped "C" or "S"-shaped skin fold between our fingers, and after reaching the barrier, we wait for the release phenomen. It is important to stretch the eyelash with minimal force (not to press) until the barrier is reached. We also treat scars extending into the subcutaneous tissue in the same way.

DIAGNOSTICS AND THERAPY OF THE FASCIA

The basic property that we investigate in fascia is the displacement of the individual layers against each other. We perform this technique by applying pressure to the examined area with our palms and fingers (or just fingers) (the deeper the structures we want to examine, the more pressure we use) and moving the tissues over the surface of the body. The principle is the same as the examination and treatment of the skin. We move the hand to the pretension and then spring it. During therapy, we hold in pretension and wait for the release phenomen.

TECHNIQUE OF STRETCHING IN WOOL (FOLDING TIISSUE)

This technique used on the subcutaneous tissue (HAZ) is also suitable for scars, muscles and tendons. The goal is to stretch the fascial tissues, we use it in the case of pathological shortening of muscles, when simple stretching (stretching technique) may be impossible, because a direct pull is very painful and causes a defensive contraction of the muscle. When stretching in wool, the method of grasping is determined by the size of the tissue being stretched, from a tweezers hold to a full hand grip. We always try to apply pressure on the largest possible surface so that the grip is not painful or uncomfortable.
We use two methods:

1.) Stretching into an "S". The hands act perpendicular to the longitudinal axis of the stretched tissue, each in the opposite direction. The maximally stretched part lies between the hands (fingers).

2.) Stretching into a “C”. We bend the stretched tissue into an arc, when both thumbs press into the center of the concavity. With this technique, the maximum stretch is in the middle of the arc on the convex side.

When examining with this technique, we stretch to pretension, but then we no longer stretch, we only monitor the amount of possible stretching. The therapy is the same as for other soft tissues,we wait for the release phenomen from the barrier.

SKIN FRICTION EXAMINATION (SKIN DRAG)

Patient position: He (she) is lying on their back.
Position of the therapist: He (she) stands next to the couch facing the patient's head.
Execution: The therapist places the hand with the fingertips on the nape of the neck or upper back next to the spine, slowly moving the hand caudally to the lower back.
Errors: Great fingers pressure. Slow or fast movement of the hand along the back.
Comment:HAZ can generally be examined all over the body using skin friction. This is especially important in the back area. We can perform the examination gradually with one hand on both sides or with both hands at the same time.

SKIN STRETCHING

Patient position: He (she) lies on their back or on their stomach depending on the location being examined.
Position of thetherapist: Stand as close as possible to the examination site.
Execution: The therapist places the hands so that the thumbs, which are as parallel as possible, define the examined (treated) area, the other fingers and palms are also in contact with the skin. It will slightly increase the pressure of the palms and multiple thumbs to prevent the hands from sliding on the skin. Pulling the hands away from each other with minimal force, it stretches the examined area of the skin, after reaching the pretension it springs back. Smaller areas of skin are examined by stretching using only the fingers.
Therapy: Waiting barrier technique.

INTERDIGITAL SKIN AREAS

Patient position: He (she) is lying on their back.
Position of the therapist: He stands by the examined limb.
Execution: The therapist grasps two adjacent fingers (hands or feet) so that the thumbs reach the metacarpals (metatarsals). He slightly separates them from each other and then performs an examination or treatment of the skin in the interdigital space with the tipsofthethumbs.
Therapy: Waiting barrier technique.
Errors: Stretching the skin is done only by spreading the fingers.
Comment: Interdigital HAZ findings may occur in root syndromes. According to their location, we can determine the root irritation segment. Stretching of the HAZ is particularly important for residual symptoms in rootsyndromes, when the root is no longer compressed. It is often used together with soft tissue treatment between the metacarpals (metatarsals).

STRETCHING OF THE SUBSKIN / SCARS

Patientposition: He (she) lies on his back or on their stomach depending on the location being examined.
Position of the therapist: Stand as close as possible to the examination site.
Execution: Depending on the nature of the subcutaneous tissue or scar, the grip is chosen. We stretch in two basic ways into "C" and "S" (see the technique of stretching in a wave).
Therapy: Waiting barrier technique.
Errors: Too much pressure of the wool between the fingers.
Comment: Stretching in woolis primarily a therapeutic technique for an already detected HAZ or scar.

The video also shows a demonstration of the traditional Kibler's lash, which, on the other hand, is primarily a diagnostic technique – but its repetition can also have a therapeutic effect.

The technice increases the elasticity of the reticular network in adipose tissue and superficial fascia.

STRETCHING IN THE WAVE - MUSCLES

Patientposition:He (she) lies on his back or stomach or sits - depending on the examined locality.
Positionofthetherapist: Stand as close as possible to the area under investigation.
Execution: The therapist grasps the muscle between the fingers or with the palm of the hand, depending on the size of the muscle, and stretches it into an "S".
Therapy: Waiting barrier technique.
Errors: Excessive muscle tension.
Comment: We do not use the "C" technique on the muscles because it would mean inappropriate pressure of the thumbs on the muscle and a possible defensive contraction.

When examining the stiffness of the muscle, we only test the degree of stretching into a wave and we no longer spring from the pretension. The technique is aimed at increasing the elasticity of the aponeurotic and epimysial fascia of the respective muscles.

STRETCHING IN THE WAVE – ACHILLES TENDON

Patientposition: He (she) is lying on their stomach. The foot is off the table or the lower leg is supported and is in semiflexion.
Position of the therapist: He stands at the patient's feet**.**
Execution: The therapist grasps the Achilles tendon with both hands with the thumb and forefinger, as flat as possible. Performs stretching in the wave.
Therapy: Waiting barrier technique.
Errors: The pressure of the fingers is too strong and causes pain.

STRETCHING IN THE WAVE – SOFT TISSUE UNDER THE ACHILLES TENDON

Patient position: He (she) is lying on their stomach. The foot is off the table or the lower leg is supported and is in semiflexion.
Position of the therapist: stands at the patient'sfeet.
Execution: The therapist places their thumbs in the space between the lower leg and the Achilles tendon. The thumbs are passed by a few centimeters and pressed against each other to form an "S" shaped wave. It is also possible to apply pressure with only one thumb (extending to "C")
Therapy: Waiting barrier technique.
Errors: The pressure of the thumbs is too strong and causes pain.

THORACOLUMBAR FASCIA

Patientposition: He (she) is lying on their stomach, his head resting on his forehead.

Position of the therapist: He (she) stands next to the couch towards the patient's head or feet, depending on the intended direction of movement. During therapy, it is better to stand on the treated side.

Execution: During the examination, the therapist places both hands on the back symmetrically to the left and right, parallel to the spine (fingers point cranially or caudally). On the examined side, he presses slightly against the chest and then shifts to pretension and then springs. The examination is carried out on each side separately. Areas of examination in both cranial and caudal directions are from the shoulder blades to the lumbosacral junction. During the therapy, he puts one hand on the treated area and the other under it (he just leans on the patient to improve his stability, it's not fixation!). With the therapy hand, push slightly ventrally and move into pretension. Next, he waits for the release phenomen. After completing the therapy in the basic direction, it can change the direction of displacement diagonally.

The same technique can be performed on other areas of the chest and pelvis.

Lateral fascia of the chest: The patient lies on the stomach, the active hand of the therapist is placed on the lateral side of the chest in a cranial or caudal direction, the other is placed on the back to improve stability.

Ventral fascia of the chest: The patient lies on his back, the therapist examines the shift of the fascia on the front of the chest in various locations, including the sternum (outside the breast area). The direction of displacement is cranially and caudally, possibly also diagonally.

Gluteal Fascia: The patient lies on his stomach, the therapist places his hands on the buttocks and examines or treats the shift in the cranial and caudal direction.
Therapy: Waiting barrier technique.
Comment: The technique loosens the "sticking" of the aponeurotic fascia with the muscle's own epimysial fascia, whichlies beneath it. This is due to an increase in the viscosity of hyaluronic acid, which allows these fascial layers to slides moothly.

CLAVIPECTORAL FASCIA

Patient position: He (she) is lying on their back.
Position of the therapist:He (she) stands on the treated side**.**
Execution: The therapist's hand, which is closer to the patient's head, holds his upper limb in slight abduction. With the other hand with out stretched fingers, the therapist palpates the ribs from the lateral side in the axilla area (fingers must be outside the pectoral muscle). Then he moves his fingers and with them the fascia along the chest towards the sternum. During the examination, after reaching the preload, it brakes, during the treatment, it waits in the preload.
Therapy: Waiting barrier technique.
Errors: Finger pressure into the muscles.
Comment: The examination is performed in the entire area of the fascia (two to three locations) and the direction of stretching is performed not only perpendicular to the axis but also slightly caudal or cranially.
This technique frees up the space between the pectoralis major fascia and the clavipectoral fascia, surrounding the pectoralis minor muscle and the chest bones.

SURFACE CERVICAL FASCIA

Patient position: He (she) sits on a chair or on a lounger.
Position of the therapist: He (she) stands behind the patient. With one hand she grabs his head so thatit he fixed well and prevented her from turning. The other hand is placed on the neck so that the fingers point to one side and the thumb to the opposite (in the direction of the planned examination).
Execution: The therapist lightly clasps his hand on the neck (overall - thumb, fingers and palm) and moves the fascia around the axis of the neck in the direction of the thumb.
Therapy: Waiting barrier technique.
Errors: Insufficient fixation of the head. Excessive pressure with the fingers or thumbs on the neck muscles.
Comment: The technique releases the shift between the aponeurotic fascia of the neck and the epimysial fascia of the superficial neck muscles.

SURFACE CERVICOTHORACAL FASCIA

Patient position: He(she) sits on a chair or on a lounger.
Position of the therapist: He stands behind the patient. He places his palms on the area of the upper trapezius so that the fingers point forward and the thumbs almost touch in the area of the CTh transition.
Execution: The therapist applies gentle pressure against the chest. Then he performs a rotational shift of the fascia around the axis of the spine, while at the same time prompting the patient to actively resist turning the trunk.
Therapy: Waiting barrier technique.
Errors: The therapis tdoes not work with the entire surfaces of the palms and fingers. The therapist allows the patient to simultaneously rotate the trunk.
Comment: The technique releases the shift between the aponeurotic fascia of the upper chest and the epimysial fascia of the trapezius muscle.

FASCIA OF THE SCALP

Patient position: He (she) sits on a chair or on a lounger.
Position of the therapist: He stands next to the patient and fixes his head with one hand.
Execution: The therapist reaches through the hair to the skin with the fingertips of the other hand and examines the shift of the scalp against the skull. It starts at the junction of the neck and the hairy part of the head and progresses all over the head. The therapy is carried out in a similar way, waiting in pretension for the phenomen of release. An alternative technique is to grab the hair at the roots and clench the hand into a fist. This will cause the skin to pull back slightly. The hair pull always goes in the direction of the barrier.
Therapy: Waiting barrier technique.
Errors: The therapist's fingers slide through the hair. The therapist pulls the patient's hair painfully.
Comment: The technique improves the shift between the skin layer, the subcutaneous layer and the superficial fascia of the head (galea capitis). Or also between the superficial and deep fascia of the head (epicranial fascia).

FASCIA OF THE EAR AND GLABLES

Patient position: He (she) sits on a chair or on a lounger.
Position of the therapist: Stands.
Execution - earfascia: Thetherapistplaces a hand close around the ear and slides the fascia in different directions from its center.
Execution - glabellafascia: The therapist grasps the root of the nose under the skin. It pulls it away from the skull and moves it or rotates it.
Therapy: Waiting barrier technique.
Comment: The technice improves the shift between the skin layer, the subcutaneous layer and the superficial fascia of the head (galea capitis), or between the superficial and deep fascia of the head (epicranial fascia).

STRETCHING OF THE LATERAL FASCIAS OF THE TRUNK

Patient position: He (she) is sitting on a deck chair.
Position of the therapist: He stands behind the patient.
Execution: The therapist rests the patient's back against his chest and creates a hypomochlion with his thigh at the level between the ribs and the pelvis on the untreated side. On the patient's side, he fixes the pelvis with one hand behind her ridge, with the other hand he elevates the patient's upper limb and fixes it by grasping the arm and chest. With this hand, he bends the patient's trunk towards the untreated side in top retension.
Therapy:PIR
Errors: Insufficient fixation of the pelvis on the treated side. Insufficient fixation of trunk and pelvis on the untreated side.
Comment: The technique stretches the aponeurotic fascia in the area of the lateral part of the trunk and the epimysial fascia of the muscles that are simultaneously stretched (m. quadratus lumborum, m. latissimus dorsi, mm. intercostalis and others).

DEEP FASCIAS OF THE LIMB

LOWER LIMB

Patient position: He (she) is lying on his back. The treated lower limb is bent and rested with the foot on the mat.
Position of the therapist: He (she) is standing next to the lounger.
Execution: The therapist grasps and squeezes the soft tissues around the longitudinal axis of the limb in the area of the thigh and lower leg with both hands. It then performs a rotational movement of the muscles and soft tissues around the longitudinal axis of the limb. During examination (treatment) in the area of the lower leg, the therapist faces the patient, while treating the thigh the opposite.
Therapy: Waiting barrier technique.
Comment: During the examination with this technique, we move the soft tissues and muscles into pretension and assess the size of this shift (we do not perform the springing from pretension technique). Therapy is already standard, waiting in anticipation.

The technique relaxes the movement between the aponeurotic fascia of the limb and the epimysial fascia of the respective muscles and mainly aims to relax the fascial connection between the muscles, bones of the limb and intermuscular septa.

UPPER LIMB

Patient position: Sitting or lying down.
Position of the therapist: He (she) stands next to the patient.
Execution: The therapis tgrasps the patient's upper limb distally from the examined (treated) area. He places the other hand on the treated part of the limb, presses and performs a rotational movement of the muscles and soft tissues around the longitudinal axis of the limb in the area of the arm or forearm.
Therapy: Waiting barrier technique.
Comment: The technique relaxes the movement between the aponeurotic fascia of the limb and the epimysial fascia of the respective muscles and mainly aims to relax the fascial connection between the muscles, bones of the limb and intermuscular septa.

SUPERFICIAL FASCIA IN THE INQUINA AREA

Patient position: He (she) is lying on his back.
Position of the therapist: He (she) stands next to the couch facing the patient's feet.
Execution: The therapist places his fingers in the inquina. Examines and treats the fascia in th emediocaudal direction.
Therapy: Waiting barrier technique.

"SOFT HEEL" FASCIA

Patient position: Lies on stomach, knee in 90° flexion.
Position of the therapist: He (she) stands next to the couch on the side of the treated limb.
Execution: The therapist grasps the patient's foot with one hand so that he fixes the heel bone with his fingers. With the thumb of the other hand, he creates pressure just above the heel bone and pushes the fat pad towards the imaginary center of the heel. The examination is carried out from. several places - from the dorsal, medial and lateral edgeoftheheel.
Therapy: Waiting barrier technique.
Errors: The pressure is not directed parallel to the heel bone, but into it.
Comment: We examine and treat the mobility of the fat pad under the heel bone. There is a release of motion between the fat pad of the heel and the plantar fascia underneath.