“OSTEOPATHIC REHABILITATION FOR THE CLINICAL MANAGEMENT OF LOWER BACK PAIN”

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Nonspecific back pain is common, disabling, and costly. Therefore, we assessed effectiveness of osteopathic manipulative treatment (OMT) in the management of nonspecific low back pain (LBP) regarding pain and functional status.

Osteopathy focuses on identifying the root cause of a complaint and providing treatment in order to restore the body to optimal function and movement patterns. Osteopathic practitioners take a detailed patient`s history and assess symptoms by using palpation and physical evaluation tests in an attempt to determine the underlying condition and treat that condition accordingly. There are some instances, however, where diagnosis can be a challenge and where conditions may overlap or contribute to one another. Therefore, it is important for an osteopath to understand the differential diagnosis of the patient's complaint in order to fully understand the patient's condition. Pain is a complex and multifaceted experience that varies in intensity, quality, duration, location, and discomfort. Research has allowed us to recognize that pain is better described as an experience influenced by many factors rather than simply directly related to the nature and extent of tissue damage (McGrath, 1994). An osteopath understands that pain is subjective and therefore treats it holistically, applying therapy to individual pain manifestations. A pain scale is established with the patient at the first meeting and reinstated after each procedure and at each visit.

A. INTRODUCTION

Physical health is important and is considered healthy when the body is behaving as it used to be. Designed for a purpose. We cannot always control what affects our physical body. but we It can help our body function properly and prevent injuries. lifestyle, such as our eating habits, Emotional health, physical activity level and behaviour. human anatomy and Physiology, like genetics, is beyond our control, but can be addressed through our treatments.

If it is detrimental to your physical health, you may need to change your environment. Health services help prevent, detect and treat disease. Rest, healthy eating, exercise,

Proper hygiene and regular check-ups, staying emotionally healthy, smoking, alcohol abuse or drug abuse. Determining the cause of a problem is a basic initial step to effectively solving the problem. Other diseases of the shoulder joint often cause pain in the same area and also It is caused by nerve stimulation in the neck and orientation of the abdominal organs.

B. HISTORY OF OSTEOPATHY

Andrew Taylor Still (1828-1917) The Frontiers Osteopathy was discovered by the American Andrew Taylor Still, who was a country doctor. Still was the son of a Methodist preacher and was familiar not only with spiritual guidance, but also with simple traditional medicine. He spent the first decades of his life in the wild natural surroundings of the borderland to the virgin West. Although Still’s education was extremely rudimentary, he was a very close observer of nature during this period and acquired a unique functional knowledge of anatomy.

Setbacks

Still played an active military and political role in the American Civil War on the side of the opponents of slavery. His fate took a decisive turn in 1864, after his return from the war. Three of his children died within a few days during an epidemic of meningitis. Shortly after, a fourth child died of pneumonia, even though he had consulted the best doctors and

preachers in the area. Still was so disappointed that he abandoned “heroic medicine” and all religious institutions, in the attempt to find a better form of medicine. He started to take an interest in the spiritual movements of his time: American transcendentalism, phrenology, mesmerism, magnetism, and also bone setting, as practiced by the medicine men of the Shawnee Indians. Still also attentively studied highly complex philosophical treatises, such as those written by Herbert Spencer, the founder of evolutionary theory, and current developments in European medicine. In this period, he also acquired knowledge of mechanics and electricity. Still's open mind towards spiritualism was particularly controversial. Seances, an Indian medium and his later membership in a freemason lodge all bear witness to his broad interest in this area too. However, few of his critics were prepared to acknowledge that, however eccentric his behaviour was, he applied what were for the period the strictest scientific standards. Everything that could be implemented in practice and which appeared to be of use to his patients was integrated into his osteopathic system and the rest was rejected - totally independent of current fashions, expert opinions, traditions or specialized literature. Still thus embodied the ideal of a neutral empiricist.

The Osteopathic Philosophy

The result of Still’s long and intensive search was the discovery of a new medical philosophy osteopathy, whose date of birth he describes to be 22 June 1874. This was centred on the perfect creation as the expression and work of an unnameable higher power. The individual structures and the functional connections both within and between them were subject to harmonious laws.

Still also applied this conviction to man. He developed the concept of the triune man - the triply differentiated unity of man - with the unity of body, spirit and soul. He recognized this as creation’s perfect self-healing mechanism. The optimal function of “God’s pharmacy” therefore essentially depends on the supply and removal of nervous energy, blood and lymph, to and from the body. If these pathways are blocked, this hinders the self-healing mechanism and the corresponding organs become sick. Still regarded the spinal column as the centre of peripheral supply and this is why he looked for displaced vertebral bodies in most diseases, even internal diseases. He assumed that malposition of the vertebral bodies inhibited the function of surrounding nerves and vessels and attempted to reposition them specifically by gentle manipulations. Manipulation of a bone (Greek: osteon) assured supply and removal, the self healing mechanism could become active again and there was a positive effect on the disease. Still regarded treatment with drugs as proof of a lack of confidence in the powers of nature and categorically rejected this, just as he rejected premature surgery. According to Still, the osteopath was simply a mechanic with complex ideas and the perfect creation was the healer. As a consequence, the osteopath was never directly responsible for the cure, but was simply the intermediary between the patient and the freely acting creation.

C. PHILOSOPHY OF OSTEOPATHY

Philosophical Foundations of Osteopathy

Where there is life, there is motion. Osteopathy appreciates the significance of even the smallest motion within all the tissues and cells of the body, and applies this understanding in its unique form of medical care. Simply put, when the body’s motion is in balance, a state of health exists. When this motion is disturbed, health is affected and a state of disease can arise. It is the osteopathic physician’s highly developed sense of touch that allows the physician to

palpate (feel) this motion and, through skilled hands, to administer osteopathic manipulative treatments.

These treatments can relieve disturbances of motion and enhance the vitality and function of the patient. Although osteopathy employs the practice of manual medicine, it is not just a set of techniques. It is a philosophy and a science based on the application of sound principles. Initially conceived during the late nineteenth century by Dr Andrew Taylor Still, the founder of osteopathy, these principles have been consistently validated by scientific research.

The philosophy and science of osteopathy principles

1. Structure and Function are Interrelated

From the smallest cell to the largest bone, all of anatomy is alive and in constant dynamic, rhythmic motion. Blood flows, lymphatics drain and cerebral spinal fluid fluctuates. The heart beats and the ribcage expand and contracts with each respiration. Each and every organ gently moves as it functions. Each and every structure has its own inherent rhythmic activity. This is the living anatomy that osteopathic physicians feel with their hands. When this motion becomes impaired, the tissues will not function as they were intended. As a result of this altered motion, symptoms develop, and disease may even occur. Dr. Still described this process in the following way, “Disease is the result of anatomical abnormalities followed by physiologic discord.” Dr. Still described the body as being like a machine. It has interrelated parts that need to be in proper position and to move correctly for optimal function. For example, taking a deep breath may be difficult if the ribs, diaphragm or parts of the spine do not move well. When breathing is impaired, lymphatic drainage (necessary for clearing congestion and inflammation) will also be impaired. This may lead to the development of asthma or respiratory infections.

A dramatic example of how well osteopathic physicians understand the importance of the structure and function relationship is the influenza epidemic of 1917-1918. Approximately 30,000,000 people died worldwide. In the U.S., osteopathic physicians treated their patients with osteopathic manipulation and were quite successful in decreasing mortality from the disease. In fact, while hospitals run by MD’s reported a 30 to 40 percent mortality rate, osteopathic hospitals reported a mortality rate of less than one percent.

2. The Body is a Single Dynamic Unit of Function

There are many unifying systems within the body. The circulatory system supplies blood to every tissue and organ. The nervous system connects and integrates all of the body’s functions. A third unifying system is comprised of a connective tissue matrix called fascia. The fascia is a continuous sheath of living tissue that connects the body front to back, head to toe. It surrounds every muscle, organ, nerve and blood vessel. A primary function of this fascial system is to support and lubricate. Thus, the circulatory system, the nervous system and the fascia all help to organize the body into a unified continuous whole. No single part exists independent of the whole. When even a small part of the body does not function optimally, the entire person is affected.

Consider the circulatory system. Dr. Still stated, “The rule of artery and vein is universal in all living beings, and the osteopath must know that and abide by its rulings, or he will not succeed as a healer.” 3 Dr. Still used these words to describe the essential need for optimal fluid exchange. When blood and other fluids flow freely, the tissues can perform their physiologic functions without interference. When injury or disease occurs, the result can be a

twisting or compression of all tissues, including the circulatory system. The blood and fluid flow becomes obstructed and areas of the body may become under- nourished and vulnerable. This effect may be a significant factor in causing disease. It is similar to trying to water a garden with a kinked hose. The water will not flow properly and the garden will not receive its proper nutrition.

Understanding this concept of functional unity allows osteopathic physicians to diagnose and treat their patients as a functional whole. This may explain why an osteopathic physician may treat an area that is fairly distant from the area of pain or injury.

3. The Body Possesses Self-Regulatory and Self-Healing Mechanisms

The human body is always working to maintain a state of balanced function. For example, blood pressure, blood sugar and the heart rate are actively kept within a normal range. When there is a laceration or tear in the tissues, a physician can assist by cleaning the wound and bringing the edges together, but healing occurs by the action of inherent forces and processes within the body. Dr Still stated, “All the remedies necessary to health exist in the human body.” He understood that within the tissues, there is an inherent wisdom, a wise all-knowing restorative force, an intelligence within every cell that keeps the body well. When a state of discord arises, this healing force acts to restore functional balance and harmony. Sometimes the body’s self-healing forces can be impaired or impeded by disease or structural imbalance. The osteopathic physician is trained to augment these intrinsic mechanisms to help the body to better and more quickly heal itself.

4. Rational Treatment is Based on Applying These Principles

Osteopathic treatment applies these principles with a sound and thorough knowledge of anatomy and physiology. An osteopathic medical approach to treatment typically integrates osteopathic manipulation to restore structural freedom in the tissues, enhance fluid flow throughout the body, and creates the optimal setting for healing to occur.

D. TREATMENT OBJECTIVE

To relieve aches and pain, restore most favourable mobility (or motility), which match up, in principle, to a distinctive physiological state in each individual. The treatment of all predisposing mechanical problems, at an early stage in their appearance, so that deterioration is prevented. In the case of a restricted shoulder function due to strain, untreated the reduced movement will lead to degenerative change or arthritis in the shoulder joint.

2 FUNDAMENTALS

The basic anatomy in this section is reduced to the lumbar spine although the osteopathic approach postulates the consideration of all anatomical structures in the body. In order to provide the anatomical and physiological background to the osteopathic principles and approaches I will refer to important anatomical and physiological facts in detail in section 2.2 (Functional anatomy, physiology and pathology of the spine) and the case study section.

2.1 Basic Anatomy of the Lumbar spine

2.1.1 Vertebrae

The lumbar spine consists of normally five lumbar vertebrae. Each of them has an anterior vertebral body, which consists of a very compact anular epiphysis surrounding the spongiosa, a dorsal vertebral arch, whose pedicles and laminae are relatively short but strong and extend into an almost horizontal quadrangular spinous process. The vertebral foramen lying within the arch is triangularly shaped. The transverse process is small and thin. The angle of the inferior border may represent the tip of a costal element and the lateral end the tip of the true transverse process. The inferior articular process, with vertical convex articular facets, faces anterolaterally. The superior articular process, with vertical concave articular facets facing posterior medially, has a rough mamillary process on its posterior border. The superior vertebral notch lies in between the vertebral body and the superior articular process, building, together with the inferior vertebral notch of the articulating upper vertebrae, the intervertebral foramen: the passage for the radix, the nerve root of each segment.

2.1.2 Disc

The intervertebral disc lies in between two corpuses and consists of the anulus fibrosus, a ring containing collagen fibres on the outside and mostly fibrous cartilage on the inside, which centres the nucleus pulposus. Absorbing compression and shock forces and the disc allows motion in the spine. It retains tension in all ligaments of the vertebral bodies and increases the stability of the spine. Both longitudinal ligaments, which also support the discus' position, build a functional unit together with the discus, being tightly connected with the posterior longitudinal ligament and in loose contact with the anterior longitudinal ligament, and are referred to as intervertebral symphysis.

2.1.3 Ligaments of the spine

Anterior/posterior longitudinal ligament. The anterior longitudinal ligament (ALL) and posterior longitudinal ligament (PLL) run anteriorly respectively posteriorly along the surfaces of the vertebral bodies. The ALL broadens towards the lumbar spine and attaches on anterior surface of the vertebral bodies. The PLL divides into a superficial layer, which originates at the body of the second cervical spine (axis) as a prolongation of the membrana tectoria and reaches down to the intervertebral disc between the third lumbar vertebrae (L3) and L4, and a deep part depicting prolongation of the cruciform ligament of the atlas reaching down the sacral canal. In adults the lumbar PLL is fused to the annulus fibrosus of the vertebral disc and gives room for veins coming out of the vertebral bodies.

Ligamenta flavum

The ligamenta flavum attach on the vertebral arches and consist of elastic fibres, delimiting the intervertebral foramen medially and dorsally. They extend from the facet joint capsules to the spines posteriorly where the ligaments from both sides unite partially, leaving spaces in between for veins connecting the internal and posterior external vertebral venous plexus. They limit the flexion and assist erecting the spine from a flexed position.

Interspinous ligaments

The short interspinous ligaments connect the spinous processes, attaching along each spine from the root to the apex. In the lumbar region they are broader and thicker than at other levels of the spine

Supraspinous ligament

The supraspinous ligament connects the tips of the spinous processes from C7 to the sacrum, consisting of superficial fibres, extending over three to four, and deep fibres extending over two to three vertebrates. It is only lightly attached to the spines at the levels of L3-5 but thicker and broader in the lumbar spine and fuses with neighbouring lumbar fascia

Iliolumbar ligament

The iliolumbar ligament attach on the transverse process of L4 and L5. The posterior part of the ligament connects L4 with the posterior border of the iliac crest. The posterior part runs form L5 to the anterior border of the iliac crest, the Linea terminalis of the ilium and has connections to the quadratus lumborum muscle.

2.1.4 Muscles

The back muscle complex attaching on the lumbar spine can be primarily consist of a series of layers. Only the deeper back muscles are true intrinsic and characterized by the innervation of the posterior rami of the spinal nervestherefore termed as erector spinae. Those intrinsic muscles can be also divided into deep, sometimes termed as erector spinae (Gray's 2005) and superficial layers, sometimes termed as transversospinalis (Gray's 2005).The superficial muscle group consists of the iliocostalis, longissimus and in some literature also Important muscles, concerning the biomechanics of the spine and low back pain, attaching on the lumbar spine are also the psoas major flexing the hips respectively erecting the trunk from a lying position and slightly helping in sidebending the vertebral column, the quadratus lumborum lowering the 12th rib and sidebending the trunk, the posterior inferior serratus lowering the ribs and not less important the posterior part of the diaphragm. spinalis (Gray's

2005) , which act in extending and laterally flexing the vertebral column. The deeper muscle group consists of an oblique and a straight system. Oblique muscles are the semispinalis, multifidus and rotator muscles and act single-side innervated rotating and innervated on both sides extending. The straight muscles are the interspinales, intertransversarii and spinalis and act innervated on one side as side benders and innervated on both sides as extensors.

2.1.5 Fascia

The fascial layers in the lumbar region consist of the thoracolumbar fascia and the continuous prevertebral plane. The thoracolumbar fascia surrounds the whole intrinsic muscle group and consist of three layers. Posteriorly it is attached to the spines of the lumbar and sacral vertebrae and the supraspinous ligaments whereas the middle layer is attached to the tips of the transvers processes of the lumbar vertebrae, the intertransverse ligaments, the iliac crest and the lower border of the twelfth rib and the lumbocostal ligament. The anterior part of the thoracolumbar fascia is attached to the anterior surfaces of the lumbar transverse processes behind the psoas major, the iliolumbar ligament and the iliac crest and covers the quadratus lumborum. Since the all-fascial layers build a system it is important to mention the psoas, iliac, renal and lateroconal fascia which are closely related and attached to the lumbar vertebrae.

2.1.6 Neural structures

The spinal cord (medulla) with all its nerve and blood supply is covered by the dura mater arachnoid and pia mater which extend form the foramen magnum to the second sacral vertebra where it extends to the as a fine cord, the filum terminale, and finally fuses with the posterior periosteum of the first coccygeal segment. The spinal dura mater builds the epidural space together with the tissues of the vertebral canal. The outer layer of the arachnoid mater is closely applied to the inner dura mater and encloses the spinal cord with the and its nerve roots to the point where they pass through the intervertebral foramina. The subarachnoid space cointains intermediate layers of the arachnoid and the cerebrospinal fluid (CSF) which is built by the choroids plexuses in the lateral, third and fourth ventricles in the brain and flows from the ventricular system down into the subarachnoid space and along the spinal cord. The closest layer to the spinal cord itself is the pia mater. Whereas the medulla ends at he level of L2 in the conus medullaris and is continued by the filum terminale, the nerve roots of each segment below run within the cover of all three mater layers to the segment where they pass through the intervertebral foramina. From there on the nerves are covered with the epineurium, which fuses with the dural sheaths. The peripheral nerve branches of the lumbar spine, building the lumbar plexus, are: iliohypogastric and ilioinguinal (L1), genitofemoral (L1/2), lateral femoral cutaneus (L2/3), femoral and obturator (L2-4 dorsal and ventral) and the accessory obturator nerve (L2/3).18 The sacral plexus is built of: the superior gluteal (L4-S1), inferior gluteal (L5-S2), posterior femoral cutaneous (S1- 3),perforating cutaneous (S2-3),sciatic (L4-S2), common peroneal (L4-S1), tibial (L5-S1) and pudendal nerve (S2-S4).

2.1.7 Vascular supply

Concerning the osteopathic approach the arterial supply and venous and lymphatic drainage are a very important factor since it influences the quality of the tissues and the potency of the body to self-healing.

Arteries

The arterial supply of the lumbar vertebral column is provided by paired branches of the aorta, the lumbar arteries, passing around the vertebral bodies, first giving off periosteal and equatorial branches to the body itself, then continuing into a major dorsal branch and giving off a spinal branch (the spinal artery) which enters the intervertebral foramen.

The ongoing dorsal branch supplies the facet joints, the posterior surface of the laminae and the overlying muscles and skin of the back. The spinal branch divides again into a postcentral, prelaminar and radicular branch of which the first mainly supplies the vertebral bodies and periphery of the intervertebral disc. Postcentral branches of adjacent levels anastomose beneath the PLL and supply the anterior epidural tissues and dura. The prelaminar branches build a posterior anastomotic plexus on the wall of the vertebral canal and supply the majority of the vertebral arch, the posterior epidural tissues and dura, and the ligamnetum flavum. The radicular branches supply the nerve roots and the spinal cord.

Veins

Equally to the artery systems the vessels of the venous plexus of the vertebral column anastomose segmentally and longitudinally to build the anterior and posterior external vertebral plexus and the anterior and posterior internal vertebral plexus and finally drain, as well as the spinal cord, to the intervertebral veins which accompany the nerve roots through the intervertebral foramina. The lumbar veins either meet with ascending lumbar veins in front of the transverse processes or, running around the vertebral bodies, directly end into the inferior vena cava.

2.1.8 Lymphatic drainage

Most of the lymphatic vessels of the lumbar vertebral column follow the arteries and drain to the lateral aortic and retro-aortic nodes. The sacral part drains to the lateral sacral and internal iliac nodes. The lymphatic system upwards the vertebral column continues in the thoracic duct extending from the level of the second lumbar vertebra to the base of the neck. At the first and second lumbar level lies the confluence of the lymph- the cysterna chyli at the level of the thoracolumbar vertebrae.

2.2 Functional anatomy, biomechanical considerations and their osteopathic relevance

The possible movements of the spine are flexion, extension, sidebending and rotation. The largest range of motion in the lumbar spine is by far flexion/extension (60°/35° according to Allbrook and David) and sidebending (20° according to Tanz). The rotatory movement in this region is clearly the smallest with only 5° (Gregerson and Lucas).

Within the lumbar spine, the largest amplitude of flexion and extension is found in the segments of L4/L5 and L5/S1 24, causing a maximum of pressure and strain forces onto the discs, which might be on of the reasons for the high incidence of discopathies in this region. In the function of the spine Schmorl differentiates between a passive segment and moving segment built by the vertebra. The intervertebral discus, the intervertebrale foramen, the intervertebral joints, the ligamenta flava and the interspinal ligaments build the moving segment. The vertebra can be seen as a lever with the intervertebral joint building its centre of

rotation. In this function the pedicle build the link between the anterior and posterior pillar. This system allows absorbing and transferring the axial pressure forces, which are directly and passively absorbed by the discus and indirectly and actively absorbed by the intrinsic back muscles

2.2.1 The pelvis

The pelvis consists of the sacrum and the two iliac bones, each of them articulating with the sacrum in the sacro-iliac joint (SI), and should be seen as a part of spine. The symphysis builds the anterior articulation of the pubic bones.

The two iliac bones are considered to be functionally assigned to the lower extremities whereas the sacrum builds the prolongation of the spine. The whole pelvic ring is a strongly ligament-stabilised structure, inducing the importance of these structures in treating lumbar and pelvic dysfunctions

Although the strong ligamentous attachment in the SI joint and the symphysis does not allow a large range of movement, the mobility in these joints is functional vital for the whole pelvis and lumbar spine region. The terms nutation / contra-nutation name the anterior / posterior movement of the base of the sacrum versus the ilium and imply functionally the sacro-iliac movement and possible dyfunctions according to Greenman, in the sense of a single / bilateral nutation anterior / posterior or torsion anterior / posterior. The movements of the ilium are anterior / posterior rotation around a transversal axis and internal / external rotation around a transversal axis implying possible dysfunctions of the ileum according to Greenman in the sense of an ileum anterior / posterior, inflare / outflare and shear dysfunctions (ilium superior / inferior). The pelvic girdle is part of the shock-absorbing system in the body and has static and dynamic functions. The static system lies within the clever osseous architecture of the ilium, sacrum and hip joint. The dynamic system (in the pelvis) is built by the myofascial system: the muscles of the pelvis and hip (pelvic floor, obturator muscles, pififormis muscle), the ligaments (sacroiliac ligaments, sacrotuberal ligament, sacrospinal ligament, iliolumbal ligament) and the fascial system. Defects in the connective tissue activate theses myofascial chains through neuronal signals to protect the injured tissue with the aim to balance the body.

2.2.2 The foot

Regarding biomechanical influence factors of the lumbar spine it is indispensable to take the lower limb into count. I think, the fact that that myofascial chains are the basis for all static and dynamic functions in the body marks the importance of assessing all anatomical structures involved, which is in the case of lumbar pain also the lower limb. In static and dynamic, the foot is the first structure to be confronted with the mission to reduce on coming shock forces and dispense it onto the whole body, so that, provided the fact that the myofascial system is in balance, the stress onto a single region is diminished. The foot arch is held up by the plantar aponeurosis, ligaments and muscles.

My conclusion is that in this sense a good function of the foot arch predetermines the balance of the knee, hip, pelvis and therefore also the lumbar spine.

2.2.3 The fascial system

Although anatomists define fascia as dissectible fibro-elastic tissue, from an osteopathic point of view fascial layers are the sustentacular part of the connective tissue and involve ligaments, tendons, meninges, and all tissues queuing the body cavities. They coat every muscle, the inner structures of the cranium, cervical, thorax, nerves, vessels, all organs and delimit them. Fascia blends into the pleura, pericardia and peritoneum and connects bones, muscles and tendons. As part of the

fascial system counts also the horizontal diaphragms (plantar aponeurosis, pelvic diaphragm, respiratoric diaphragm, cervico-thoracal diaphragm, tentorium cerebelli). Therefore, it can be seen as one continuing structure throughout the whole body and can create dysfunctions or pass on restrictions to adjacent or distant regions, causing not only immobility, but also compression of blood/ lymphatic vessels and nerves that are passing through, along or in between fascial layers, inducing poor metabolism in other tissues. There is also a close relationship to the central nervous system through the Vater-Pacini bodies, which give afferent information and have great influence on neuromuscular reflexmechanisms.

I think the close relation of all fascial layers in the body makes it easier for me to understand how dysfunctions can passed on into further regions. schematically shows the fascial connections of the lower extremity, which provides a picture of possible dysfunctional behaviour caused by lesions in the lower extremity.

2.2.4 Attachments of the spinal dura

Present literature concerning the attachments of the spinal dura has quite large osteopathic relevance, regarding the fact that craniosacral osteopathy is supposed to influence dura tension.The ligamentum nuchae is part of the functional region of the cervical spine and is an intermuscular septum, which runs from the external occipital protuberance to the spinous process of C7. Although Platzer mentions a continuation of the ligamentum nuchae into the thoracic and lumbar spine by the supraspinous and intraspinous ligaments Gray’s Anatomy rules out the structural distinction.

The more interesting aspect concerning the lumbar spine is probably the fact that Dean and Mitchell (2002) found direct fibrous attachments between the ligamentum nuchae und the spinal dura on the atlanto-occipital and atlanto-axial level.

Interesting, concerning dural fixations and their potential role in low back pain, are Trolard’s ligament, a link between the dura mater and the posterior longitudinal ligament on lumbar and sacral levels, Hoffman’s ligamenta dorsolateralia, linking the anterior radix and the anterior vertebral canal, and the opercula of Forestier, covering the intervertebral foramina laterally from the spinal ganglion and having contact with laminae and disci, rarely found in the newer literature but verified by Van Dun and Girardin (2006). They concluded that ‘the attachments perceived between spinal dura and its surroundings may be considered to be the remains of an original unitary tissue, which will differentiate into full-grown ligamentous structures according to the unique functional heritage of the individual’.

3 DEFINITION OF LOW BACK PAIN

3.1 Definition

In modern medical literature low back pain is defined in a non-specific and specific and an acute and chronic form. Whereas the specific low back pain (SLBP) is defined by a morphologically detectable aetiology (i.e. vertebral fractures, tumours, disc herniations, spinal stenosis, spondylolisthesis or inflammatory processes), the non-specific low back pain (NLBP) covers the large group of LBP syndromes without clear aetiology. Acute low back pain is defined by less than 4 weeks and chronic low back pain by persisting symptoms over a time frame of more than 3 months.

3.1.1 Radiculopathy

Radicular low back pain is defined as nerve-root compression with irradiation into the pelvis/leg. Further clinical signs are the loss of sensibility in the corresponding dermatome, paresis of the characteristic muscle of the affected segment, reflex deficits, a positive Lasegue-sign and pain triggering through compression, sneezing and coughing. The differentiation to a pseudo-radiculopathy lies mainly in the neurogenic deficits.

3.1.2 Non-specific low back pain

Scientists still debate about the term ‘unspecific low back pain’ because it only describes the fact that, at this stage, most of the back pain syndromes cannot clearly be assigned to a certain structures and therefore a specific therapy is precluded. Therefore a new trend in medical science, represented for example by Bodguk and Aprill, is to assign this group to a specified source of pain, like discogenic pain, facet syndrome and sacroiliac joint pain, using higher differentiated diagnostic methods.

Discogenic pain is defined as a nociceptive pain syndrome with its source in the outer part of the annulus of the intervertebral disc- an internal disc disruption (IDD). The MRI scan in this case shows a so-called high-intensity zone (HIZ) in the dorsal annulus, which is of unknown content and is speculated to be degraded nucleus material or an inflammatory process in an annulus fissure. Studies have shown that discogenic pain is quite common (40%) but degeneration of the discus is apparently more of genetic origin than of hard physical work or a constant sitting-position at work. HIZ are also frequent in persons without back pain and do not state whether the disc causes pain

The facet syndrome is defined as pain caused by the facets of the zygapophysial joints through an incarcerated or stretched capsule, an inflammation of the capsule or synovia, a subluxation of the joint, restricted range of movement caused by muscle-hypertension and degenerative changes. However, like most of all other unspecific low back pain syndromes a clear assignment of certain back pain symptoms to these joints is not possible. Degenerative changes in the joint frequently occur in elderly people but are often also verifiable in asymptomatic patients and clinical consequences out of an evidence of a facet joint related pain syndrome are rare.

Sacro-iliac joint pain is quite common cause for back pain although there are no valid and reliable clinical tests and anamnestic indication for existing SIJ pain. The distinct diagnosis can only be through radiological-controlled blocks of the joint and are also quite successful for therapeutic intervention, as is in this case also manual therapy.

3.2 The mental factor

In the anamnesis of low back pain patients, my questions concerning their private and professional situation and triggering events of acute pain phases often refer to a significant correlation between emotional stress and a worsening of the patients' physical condition which gives reason to conclude that poor mental condition negatively influences the physical state of the patient or even the other way around, a chronic physical handicap impairs the mental state.

Studies have shown that in patients with chronic low back pain the fear of pain triggers a high incidence of motion and weight loading avoidance resulting in a constant progress of negative conditioning and over a long-term leading to immobilisation. The patients are then caught in a pathological behaviour pattern concerning their problems and the body's attempt of self-healing fails. The importance of psychological factors and their influence on chronic pain has been a frequent issue in studies in the last years.

3.3 Low back pain- a complex clinical picture

The reason for the fact that low back pain still brings up so many controversial opinions about the sources of pain in conventional medicine might lie in the complexity of this clinical picture. From my point of view the structural findings described in literature are often the result of many influencing factors onto the patient's body over a long period of time.

Acute pain very often disappears after a few days or weeks and is, if treated at all, mostly quite responsive to conservative therapy like pain medication and physical applications.

In my experience, patients with chronic low back pain have a long history of acute episodes, which they only mention when they are explicitly asked for because a connection between these episodes in a time frame of years and the chronic pain now is often not taken into consideration. Even in patients with a lumbar disc herniation and neurogenic symptoms, undergoing invasive nerve-root decompression, the rate of relapse (postnucleotomy-syndrome) is, with 10-30% (Fritsch et al. 1996), high. Zöllner et al. have shown that a nucleotomy has an influence on the biomechanical behaviour of the lumbar motion segment in the sense of an increased range of motion, possibly leading to instability of the segment.

Defined risk factors for chronic pain are a higher age, negative attitude of the patient to his disease, professional overload, poor bodily condition and the fact that the multi-causal genesis is often ignored from the physician.

I think these facts already imply that low back pain is of a complex functional genesis and even if there is a defect structure involved, from my osteopathic point of view the key to help

the patient lies within treating the whole system including functional imbalances on structural and fluidic levels and certainly paying attention to his emotional and professional situation.

4 Osteopathic techniques

Out of Stills philosophy and its resulting principles and their experience osteopaths all over the world developed numerous models to explain lesion patterns and find techniques to treat them. Some of them are disproved by biomechanical studies and therefore osteopaths are often criticized to cling to their myths in osteopathic treatment.

In this section I will give a quick view on osteopathic treatment methods in order to understand the intention of the treatment actions in the case presentation.

4.1 Direct and indirect techniques

Dysfunctions in general can be treated with direct and indirect techniques. Direct means a correction into the direction of the restriction whereas in indirect techniques the osteopath follows the tissues into the direction of the least resistance until the body releases this pattern

4.2 Structural osteopathy

Joint mobilisation (direct)

The aim of this technique is to regain the full range of movement by a slow and repetitive mobilisation of the restricted joint into the restricted direction of the motion and thereby to improve the circulatory processes of blood and lymph system and reprogram the proprioceptors in the joint and surrounding tissues.

HVLA (direct)

High velocity low amplitude thrusts have the purpose to regain full range of movement in the joint, to normalise the muscles-tonus by reconstituting the physiological activity of the proprioceptors and to improve the intra- and extra vascular fluid transport, with a short specific impulse into the restricted direction.

Recoil Techniques (direct)

In recoil techniques the osteopath gives a short and quick impulse onto the area of the most resistance with compression and vibrations.

MET (direct)

The Muscle energy techniques of Mitchell aim at a rebalancing of the muscular system by applying post-isometric relaxation, isotonic contraction or isolytic contraction techniques.

Strain-counterstrain (indirect)

Jones (1981) found out that a restricted joint can be released by passively leading it to a pain-free position and maintaining this position for 90 seconds before the osteopath brings it back into neutral. The base model for this treatment is also a reprogramming of proprioceptors. Tender points in the muscles serve the diagnostic and treatment-control.

Functional release technique (indirect)

The base of this technique goes back to Still and was later formed into a concept by Bowles and Johnston. The aim is to reach a release in the treated lesion through inducing motion and reacting on the body's' resistance with a change of the direction of the movement to ease the tension until all restrictions are loosened.

Fascial and ligamentous release techniques

W.G. Sutherland's concept of direct and indirect techniques to treat dysfunctions that are mainly of traumatic origin is based on ligamentous, articular release (indirect) and myofascial release (direct). The principle is to give compression/decompression into the joint or fascia until the joint/fascia is easy to move, exaggerating the distortion to the point of the least resistance of the tissue and then, holding this position, balancing the bones, membranes and fluids until the cranial rhythm (tide) returns to the traumatised region.

Table 1

Common OMT Techniques for the Management of Chronic Pain.[17]

Technique Name	Description	Indication
High-velocity/low amplitude thrust	Rapid force of brief duration traveling a short distance, applied into a restrictive barrier.	Somatic dysfunction of an articulation.
Muscle energy	Patient's muscles are activated upon request, from a precisely controlled position, in a specific direction, and against a distinctly executed physician counterforce.	Somatic dysfunction of a myofascial structure.
Direct myofascial release	Dysfunctional myofascial tissues are loaded and a restrictive barrier is engaged with a constant force.	Somatic dysfunction of a myofascial structure.
Indirect myofascial release	Dysfunctional myofascial tissues are loaded and guided toward the position of greatest ease.	Somatic dysfunction of a myofascial structure.
Counterstrain	Specific positioning about a tender point intended to induce spontaneous release.	Presence of a tender point (small, hypersensitive point in myofascial tissue that does not have a pattern of pain radiation)
Cranial treatment	Techniques applied to the cranial bones intended to address dysfunction of the primary respiratory mechanism.	Somatic dysfunction of the primary respiratory mechanism.
Visceral manipulation	Techniques directed to the viscera or their supportive structures	Impaired mobility or motility of a visceral system and its related elements.

4.3 Visceral osteopathy

The aim is to treat the mobility and motility of the abdominal organs and its surrounding tissue, especially the abdominal fascial system- the suspension of the organs. Hereby direct and indirect techniques are required to improve the circulatory quality in the abdominal tissues and consequently the function of the organ.

4.4 Craniosacral osteopathy

The principles of the craniosacral osteopathy are the motility of the brain and spinal cord, fluctuation of the cerebrospinal liquor, mobility of intracranial and intraspinal membranes, mobility of the cranial bones and the involuntary mobility of the sacrum. The aim of these techniques is a balance of the primary respiratory mechanism, whose physiologically cycle is 6-10 (Sutherland) times per minute, and release dysfunctions in the cranial bones, membranes and fluids and so revitalise the system.68 In this case study the midline plays a major role in the assessment and treatment of the patient. James S. Jealous defines it as a bioelectric

potency, developing out of the chorda dorsalis, building a primary line of orientation for the orientation of structure and function in an organism. In practise it is a good way for me to locate the point of imbalance in the body and can be transferred to structural, fluidic, metabolic and energetic levels to balance the organism and support the patients potency of self-healing.

5 MANAGEMENT OF LBP IN OSTEOPATHY

The management of low back pain (LBP) in osteopathy cannot be stated generally since the approach to every patient is individual. However, I think, according to the principles of osteopathy the multi-causality of low back pain, as described in section 3.2, is probably the key to a successful treatment. Handling psychological factors like professional and/or private stress, the personal attitude to the body's reaction on stress and the compliance of the patient in therapeutic actions are for me just as important as dealing with the structural and circulatory lesions.

5.1 Expert interview with an Osteopathic Doctor

For an expert opinion concerning low back pain in general and in particular as presented in this case study, I took an interview with Dr Khalil Srour an experienced osteopath and physiotherapist DPT, to get a statement on his personal point of view on this topic out of his experience.

1. How long have you been working as an osteopath and how did you get to become an osteopath? I have been working as an osteopath for over a decade now, and I made the decision to transition into this field after recognizing that my prior education and experience in physiotherapy didn't fully cover all the approaches and techniques I needed. As I delved further into osteopathy, I discovered the value of linking various elements together in treatment, and I have found this to be an incredibly rewarding and effective approach to helping my patients.

2. You are also a MD and physiotherapist practitioner. Do you mainly work osteopathic or do you apply other therapeutic interventions as well? If so, what are they? As a physiotherapist osteopath, my approach to patient care is rooted in the principles of osteopathy. This perspective allows me to identify dysfunction within the body and determine its root cause. However, when it comes to treatment, I employ a range of techniques that are tailored to the individual needs of each patient. My treatment approach typically involves a combination of joint and soft tissue techniques. This mix of techniques allows me to address a wide range of issues and achieve the best possible outcomes for my patients. I believe in taking a holistic approach to healthcare and working with my patients to develop personalized treatment plans that address their unique needs and goals. I believe that by using a range of techniques and taking a personalized approach to treatment, I can help my patients achieve optimal health and wellness.

3. Due to the low number of studies proving the efficiency of osteopathic treatments, osteopathy is quite often contentious in medical spheres. What is your opinion about it? I totally agree that some studies have not proven that osteopathy to be effective, but it is important to look beyond the scientific evidence and look at it from a different palpable and quantified perspective. Osteopathy is a holistic approach to healthcare that takes into account the patient's needs, preferences, and lifestyle, so when discussing the efficacy of osteopathy, we need should be aware and focus that the main aim of osteopathy is focused on golden standards and objectives, first it relies on patient satisfaction, patient satisfaction is a crucial factor to consider. Many patients report feeling significant improvements in their symptoms and overall health after receiving osteopathic treatment, even if scientific studies have not found conclusive evidence of its efficacy, but patients are satisfied and have noticed it. Second osteopathy is an individualized approach that recognizes that every patient is unique.

Osteopaths take the time to understand their patients' needs and concerns, and tailor their treatment plans accordingly. This personalized approach can lead to better outcomes for patients. Third, osteopathy is used in combination with other therapies to achieve better results. For example, some patients may benefit from a combination of osteopathic treatment, medication, and lifestyle changes to manage their symptoms and fourth, osteopathy can improve patients' quality of life even if it does not lead to a significant improvement in their medical condition. By reducing pain, improving mobility, and promoting relaxation, osteopathy can help patients feel more comfortable and engaged in their daily activities. To conclude what was mentioned above, while scientific evidence is important, it is not the only factor to consider when evaluating the efficacy of osteopathy. Patient satisfaction, an individualized approach, combining therapies, and quality of life are all important aspects to consider. By taking a holistic approach to healthcare, osteopathic physicians can help patients achieve better outcomes and improve their overall health and well-being.

4. Concerning the treatment of chronic therapy-resistant low back pain in general: Do you think that an osteopathic treatment can help the patient and why? Osteopathy is a manual therapy that involves using techniques such as stretching, soft tissues release, and manipulation to improve the function of the musculoskeletal system. It is an effective approach in helping patients with chronic pain rebelling to traditional treatment, and it is important because it offers a non-invasive, drug-free approach to pain management. Osteopathy can be a helpful alternative for these patients, as it focuses on treating the underlying causes of pain rather than simply masking the symptoms with medication. One of the key benefits of osteopathy is that it can help to improve circulation and reduce inflammation in the affected areas of the body. This can help to alleviate pain and improve mobility, which can have a significant impact patient. Additionally, osteopathy can help patients to develop better posture and body mechanics, which can help to reduce the risk of future injuries and pain. Osteopathy practitioners also work with patients to develop personalized exercise and stretching programs that can help to further reduce pain and improve function. Overall, osteopathy can be an effective tool for patients with resistant chronic pain. By addressing the underlying causes of pain and providing non-invasive, drug-free treatment options, osteopathy can help patients to manage their pain and improve their overall health and well-being.

5. In your experience, what are the most common mistakes in an osteopathic treatment of patients with low back pain? Osteopathic treatment can be an effective approach for treating and managing low back pain, but like any medical treatment, it's important to be aware and apply the treatment whenever your clear out the yellow and red flags to avoid mistakes or missteps that can reduce its effectiveness or sometimes can lead to serious injuries. I will list some common mistakes that osteopaths may make when treating patients with low back pain:

1. Treating the area of pain, Osteopaths should consider the patient's whole body when treating low back pain. The spine is connected to many other body parts, and tension or dysfunction in these areas can contribute to low back pain, from tip to toe every part should be examined and taken into consideration.

2. Dependence and focus on manipulation, manipulation can be an effective treatment for some patients, but it's not appropriate for everyone. Osteopaths should consider to use and

choose from a range of other treatments, such as soft tissue techniques, exercise, and lifestyle modifications.

3. Wrong assessment, one of the most common mistakes is not taking a thorough history of the patient's low back pain and other relevant medical conditions or accidents or even deformities. This can lead to misdiagnosis or inappropriate treatment.

4. Excess of strength while manipulating, because manipulation should be performed with appropriate force, speed, and direction. Too much force or the wrong direction can cause injury or worsen symptoms.

5. Misaddressing an underlining cause for low back pain that can have many underlying causes, including poor posture, muscle weakness, and disc herniation, the key of success should be to work to identify and address these underlying causes rather than just treating the symptoms.

6. How would you estimate the presupposition (hypothesis) of the patient for a successful treatment? The most important part to reduce the risk of failure and increase the best outcome is to obtain a comprehensive understanding of a patient's medical history and current symptoms before applying any treatment technique. This can provide valuable insight and guide the selection of appropriate osteopathic techniques. focusing on obtaining a rich history and a good questioning approach, we can gather information about the patient's past and present medical conditions, lifestyle factors, and other relevant details that may impact their health. This information helps to identify any contraindications or precautions that should be taken into consideration when planning treatment. Additionally, a detailed history can aid in the identification of any biomechanical dysfunctions or imbalances that may be contributing to the patient's symptoms. This information can inform us what to choose and which selection of techniques to address on these specific issues, in a more targeted and effective treatment plan. Taking a good history and question approach will establish a strong relation of trust between the osteopath and the patient. This creates a trustful therapeutic environment that affect patient and engage their participation in their own care, which is crucial for achieving the best possible treatment outcomes. In conclusion, taking a good history and question approach is an essential component. It enables us to understand the unique needs and concerns of each patient, identify any contraindications or precautions, and tailor a treatment plan that addresses the root causes of their symptoms. This approach promotes better patient outcomes and fosters a positive therapeutic relationship between the patient and the osteopath.

7.From your point of view, what are the main causes for the symptoms of the patient?

Low back pain ca be caused by spinal degeneration and injury.

- Muscle or ligament strain. Repeated heavy lifting or a sudden awkward movement can strain back muscles and spinal ligaments. ...
- Bulging or ruptured disks. ...
- Arthritis. ...
- Osteoporosis. ...
- Ankylosing spondylitis, also called axial spondyloarthritis.

8. What do you think are the factors influencing the symptoms of the patient the most in her daily life? Back pain can range from a muscle aching to a shooting, burning or stabbing sensation. Also, the pain can radiate down a leg. Bending, twisting, lifting, standing or walking can make it worse. The way she is utilizing her body to do repetitive motion causing strain on specific muscles leading to lower back pain. As there was no cause of incident that caused the lower back pain

9. In your opinion, was the success of the osteopathic treatment satisfying within this period of time? Yes and the patient felt a difference within the first session of treatment. As I have personally been overseeing the case with Miss Samuels. According to patient, some days felt better than others but the pain has been manageable for the past 3 months but has been pain Free, as she attends her session with Miss Samuels for maintenance sessions

10. How would you estimate the patient's prognosis and do you think that an osteopathic treatment can lead the patient to be free of pain?

Miss Samuels was very thorough in her assessment with regards to her Subject. We gather information about the patient's past and present medical conditions, lifestyle factors, and other relevant information. With the regards to this patient as she never had Osteopathic treatment before and it has shown that osteopathic treatment can lead the patient to be pain free life.

CONCLUTION

Osteopathic manipulative treatment is most often used by patients with low back and neck pain. Although OMT is considered safe, based on millions of patient encounters over more than a century, there is generally limited evidence on its efficacy for chronic pain. However, there is substantial evidence from systematic reviews, a large clinical trial, and observational studies to support its use in patients with chronic low back pain. Consequently, the only clinical practice guideline established by the American Osteopathic Association supports the use of OMT to treat chronic low back pain in patients with somatic dysfunction. Given this and other national guidelines relating to non-pharmacological treatments for chronic pain, it is unclear why osteopathic physicians do not report using OMT more often.

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