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The Extension Treatment

Investigations and Evaluation
Using the
Horizontal Electromotor Extension
TRAComputer

1. The Lumbar Spinal Extension Treatment

1.1. Current therapy forms

The lumbar spinal extension treatment traces back to old healing methods, such as the so called "builders' grip", which were already applied correctly for centuries in acute lumbago or blockage of the thoracic spinal section, discharge and pain relief, when not even long-term healing was brought forth.

The methods were then later adopted and applied, improved and incorporated in a general healing schedule by different medical directions and osteopaths or chiropractors (see also textbooks on manual medicine and chirotherapy as well as orthopaedics).

The significantly improved investigation, mobilisation and handling techniques in the last 30 years in manual medicine have also shown fundamentally and significantly improved results in the spinal dysfunction therapy.

Also, on account of the perceptions concerning the neurophysiological connections between joints, articular capsules, the ambient soft part structures and musculature and the so-called neurological afferent and efferent pathways with a regulatory circuit between these structures, new therapeutic approaches and techniques could be developed.

All structures, required to synergise so that a joint can actively and passively move, were first summarised in the term "arthron". By saying this, the meaning is:

a) Bones, cartilage and synovial fluids, articular capsule with stratum synoviale, ligatures and menisci.

b) The arranged muscles with sinews and fasciae

c) The verval and humoral systems facilitating performance and intactness of the "arthron".[11]

Anaesthetic mobilisation was also intermittently used, especially in lumbago and intervertebral disc affections, or prolapses. This method was, however, replaced by better treatment options.

Since the beginning of 1984, we have owned an extension couch with a computer-controlled towing device associated with a diathermy equipment.

We have performed X-ray studies under the control of an image convertor and the diapositive results to verify the extension efficiency.

[1] H.G. Wolff: neurophysiologische Aspekte der manuellen Medizin-Chirotherapie, volumes III– IV.

1.2. Indications

The indications for the cervical spinal extension are multi-faceted; in this case they are also especially mild cervical spinal dysfunctions and muscular tensions, blockage of the thoracic spinal joints, more severe muscular dysfunctions with contractions especially in the deep neck muscles, i.e. the dorsiflector as well as conditions following distorsion and remaining functional disturbances after trauma.

In this case, the cervical spinal position in mild antiflection to open the joint facettes in approximately 25 - 30 antiflection and the mildly kyphositic position in the lumbar spinal area, in this case supported by a flection footstool, on which the shanks are placed in bent hip and knee joints. The lumbar spine is automatically mildly kyphositic and the joint facettes opened by this means.

The indications for lumbar spinal extension treatment are of highly diverse types, starting with the minimal painful dysfunctions with simple muscular tension to the intervertebral disc protrusion and prolapse obtained by computer tomography and myelography, without significant neurological malfunction in the lower extremities. Precise details of the indications, treatment or also accompanying high-frequency diathermy (microwave) have been described by our leading masseur and physiotherapist, Mr. Wiemer.

1.3. Special instructions

Traction experiments conducted before 1959 in the cervical, thoracic and lumbar regions shows that the intervertebral discs are exposed to a highly heavy loading. The tensile forces in a traction

can be approximately 113 daN at the intervertebral discs of the cervical column,

can be approximately 210 daN at the intervertebral discs of the thoracic column,

can be approximately 410 daN at the intervertebral discs of the lumbar column,

until tearing occurs. In this case, the lumbosacral intervertebral disc is the weakest link in the lumbar intervertebral disc chain.

Since significantly weaker tensile forces are applied during extension treatment and no rotational components are concomitantly involved in the treatment, the extension treatment can be, with few exceptions, carried out without risks.

Radicular compression is especially to be observed by cervical, thoracic or also lumbar intervertebral disc prolapses, neurological or muscular diseases, destructive spinal diseases caused by tumours, arthritis. The atlanto-axial dislocation of rheumatics as well as lumbar spinal lysis or spondylolisthesis is especially also observed and, finally, not the increasingly worsening osteoporosis and osteomalacia.

The horizontal position of the patient, accompanied by extensive muscular relaxation, which brings considerable advantages as compared to the tilted planes or bevelled bias or even the Perl instrument, is of high significance for the extension success. The advantages versus the cervical extension instruments in the vertical, such as the Glisson's sling, are especially sensational. In this case, no considerable cervical spinal extensions could be proven according to the investigations conducted by Prof. Junghans in 1959 In contrast: in different tested subjects, muscle tension led to joint gap length reduction, although the Glisson's sling is frequently still arranged and applied until nowadays.

It is also significant for the therapy success that the extension is applied intermittently and not pulsatingly, which also corresponds to the concepts of the so-called muscle facilitation and inhibition technique with the post-isometric muscle relaxation.

1.4. Investigations

We first carried out investigations on a patient with low functional disturbances in the lumbar spinal region, without neurological malfunction symptoms nor indications of more severe intervertebral disc degeneration or inflammatory disease. The extension was carried out using 20 daN and 40 daN, with approximately 75 kg of the patient's own weight, according to the position already described above. Greater tensile forces appeared insignifcant to us according to the current experiment, for example as shown by Judowich or in Jungmann's studies in volume 9 of "Die Wirbelsäule in Forschung und Praxis“ (The Spinal Column in Research and Practice"), Hippocrates edition, Stuttgart.

The distances between the lumbar spinal vertebrae 3 and 4 at the front and rear edge spinal vertebrae (top and bottom) were measures, producing the following results:

The lumbar column, collaterally at the spinal vertebral height of 25 mm in the resting position:

Distance between the lumbar spinal vertebrae 3 and 4: ventral: 8.1 mm dorsal: 6.8 mm Distance between the lumbar spinal vertebrae 4 and 5: ventral: 8.7 mm dorsal: 8.7 mm

Extension of 20 daN:

Distance between the lumbar spinal vertebrae 3 and 4: ventral: 9.2 mm dorsal: 6.4 mm Distance between the lumbar spinal vertebrae 4 and 5: ventral: 10.7 mm dorsal: 6.4 mm

Extension of 40 daN:

Distance between the lumbar spinal vertebrae 3 and 4: ventral: 13.0 mm dorsal: 8.7 mm Distance between the lumbar spinal vertebrae 4 and 5: ventral: 16.3 mm dorsal: 9.8 mm

i.e. on the ventral side, there is an extension between 5 mm and 8 mm. On the dorsal side, due to the tilt at 20 daN or rather a constriction at 2 mm, with further extension of 40 daN followed by repeated widening at 1– 2 mm versus the results produced. Similar results are produced in a patient without significantly painful functional restrictions of the lumbar spinal column. The precise evaluation is still being carried out.

According to the study, the intervertebral disc is overstretched by approximately 25 %. The applied tensile forces are, however, much too weak to inflict a more severe injury in this case (see also the above-mentioned details). The reason why it still leads to a more severely ventral broadening and not a relatively more severe widening of the foramina intervertebralia could be associated with the ligament structures as well as the muscles (see also H. Erdmann: "Biomechanische Voraussetzungen des Hexenschusses" ("Biomechanical Prerequisites of the Lumbago") in "Manuelle Medizin heute", 1985). Significantly lower tensile loadings are required for the lumbar as well as for the cervical spinal column, as given by Judovich. It is established here that a tensile force of at least 11 daN is required to achieve a measurable separation of the vertebrae.

In our studies, it could be shown that with a tension of 4 daN – 9 daN, a low to significant enlargement of the intervertebral disc height as well as that of the joint gap length could be achieved, which is of special significance to the more delicate paravertebral structures in the cervical spinal area. With a tension of 9 daN, the maximum extensibility of the intervertebral disc already appears to be reached, whereas the joint facettes are still further stretched with the surrounding capsules and ligaments. Whether the cervical and lumbar spinal musculature, especially also the short intervertebral musculature, which plays a role in other elongation, and the so-called post-tetanic fascial connection also contributes in this case, the current investigation methods cannot be addressed. The vertebral arch could also be deformed with the spinous processes, which are, however, described by Farfan, also play a role during rotation.

1.5. The spinal extension effect

According to Baumgartner, who would like to view the extension treatment indication closely limited to the nerve root compression syndrome, the extension effect is traced back to the four following factors:

a) The tightened annular fibres restore a protrusion.

b) Position and extension effect enlargement of the foramen intervertebrale.

c) The accompanying static oedema can be drained off and

d) The radicular compression reduced by the absolute and relative spatial dilation.

The extension effect in cervical and lumbar spinal dysfunctions, as a result of degenerative modifications or also acute blockage, possibly lies in the inhibition of nociceptive afferent nerves of the joint capsular mechanoreceptors on account of the distension. According to H. Erdmann, the purely mechanical distraction of the joint facettes is also not the actual therapy success since the lumbar spinal vertebral curved joints do not function in a tight fit, but rather in a traction manner, i.e. the effective forces outside the joint area, the muscle masses forming the joint sheath and the passive deformability of the spinal vertebral series determine the direction of the joint deflections in the lumbar movement segments. According to us, all reversible functional disturbances within this spinal column section are indications for the cervical and lumbar extension treatment, whereas Baumgartner simply considers the radicular compression syndrome as an indication.

The manual extension treatment in the lumbar and cervical sectors is also certainly a better method, with which the patients' subjective sensation can also be addressed rather than the mechanical extension. However, due to the lack of time of doctors and physiotherapists trained specifically in this field, the ever growing number of patients to be treated is not treated adequately. The careful preliminary examination of the patients and contraindication observations for the extension treatment as well as the proper position and continuous supervision during extension treatment are expected to prevent seriously erroneous treatments.

1.6. References

— H. F. Farfan Biomechanik der Lendenwirbelsäule Die Wirbelsäule in Forschung und Praxis Volume 80

— Eder und H. Tilscher Schmerzsyndrome der Wirbelsäule Die Wirbelsäule in Forschung und Praxis Volume 81

— Baumgartner Die Bedeutung von Massage, Extension und manueller Therapie in der orthopädischen Praxis Orthopädie 7, 221 – 230 (1978)

— Stretch – extension Communication of Medizin Elektronik Lüneburg KG

— Karel Lewit Manuelle Medizin 3rd edition, 1978

— Frisch Manuelle Medizin heute Methoden und Erfahrungen – eine Bilanz Springer edition, 1985

— Gottfried Gutmann Funktionelle Pathologie und Klinik der Wirbelsäule Volume 1 Die Halswirbelsäule

— Zeitschrift Manuelle Medizin series from 1981 – 1985