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KINESIOTHERAPY, KEY TO LUMBAR DISK HERNIA RECOVERY PROCESS

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Abstract

Aim. Lumbar disk hernia is a disorder that is seen very often. It has many causes, but one of the main is the mechanical stress above the intervertebral disks.

This disorder represents the evolutionary history of an injury, which begins through a nuclear degeneration process and it ends through the nuclear expulsion into the intervertebral canal. The statistical and ethiopatogenic elements demonstrate the very importance of the mechanical tear, which can be minimized using two methods: the postural re-education and the muscular development.

The rehabilitation of lumbar disk hernia can be extremely different, depends on the clinician's skills and personal preferences.

The physical exercise, the tonic status of the legs' muscles and the movement in general have a very good impact on the relieving or abolitions of the symptoms and the improving of patients life in general.

Conclusion. Lumbar disk hernia is not always a curable condition and for many people it remains a problem throughout their lifetime. Through various methods, kinesiotherapy provides patients with solutions and relevant information for performing normal activities, self-managing their condition and overcoming the fear of movement. All these result in the increase in the patient's quality of life.

Keywords: lumbar disk hernia, kinesiotherapy, better life quality

Introduction

Despite all the methodological difficulties, we could safely state that lumbago is probably the most widespread reported pain type, probably as widespread as headaches are. Between 50 to 75% of the adult population experienced lumbar pain at least once in their lifetime.

Approximately 40% of them experience an acute episode once a year and 15-20% may experience such an episode randomly at any point in time. Apparently, only 10-20% of the adult population does not manifest lumbar pain at all. (Adams, Manion, Dolan, 1999).

Pain is the main symptom of the lumbar hernia – a degenerative process that develops in several stages. However, not all lumbagos are the same. There is substantial variability regarding the persistence of symptoms, their severity and the degree of functional inability.

Numerous factors have been associated with chronic back pain and failure to return to work. Generally these relate to three different aspects of patient's presentation – clinical, psychological and social factors.

Psychological factors that may have a role in the development of chronic musculoskeletal pain and disability are known as "yellow flags" (McKenzie, 2003).

Individuals that exhibit lumbar hernia are less flexible than those asymptomatic.

The mobility will improve as the patient goes through a rehabilitation process. The disability as well as the functional damage minimisation could be considered a good criteriain identifying those patients treated optimally.

In the lumbar disk hernia, the acute seizures are followed by long periods when the patient experiences fear of pain, general movement and activity restrictions, leading to a reduction in strength and muscular mass for specific muscle groups, „spared" by the patient out of fear of generating a new painful episode.

The analytic tonifying of the hypotonic muscle mass will interrupt this reinforcing cycle and improve the patient's symptoms. (Calotă, 2006).

The treatment offered for lumbar hernia varies considerably. In the medical world, there is no consensus regarding the best therapeutic method, therefore the therapy is selected based on the preference of the practitioner.

The treatment depends more on the practitioner than on the clinical symptoms of the patient.

Numerous studies completed in the last decades regarding the occurrence of lumbar pain across the entire population have brought the attention onto kinesiotherapy as an important

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element in the recovery process.

Moreover, studies have shown that amongst the iatrogenic factors that can lead to the chronicity of the disorder are the exaggerated focus on pain, the over-prescription of rest (there is no healing benefit to resting in bed) and physiotherapy as well as the interruption of daily activities.

Therefore key to managing the lumbar hernia is the patient active involvement in the recovery process through practicing physical exercise specially designed by a practitioner.

Kinesiotherapy helps set the patient on the right path by strengthening his/her weak points and regaining the lost strength. An exercise schedule needs to be conceived in such a way that it takes into account the physical condition of the patient as well as the level of pain.

Ideally, it should balance stretching, muscular tonifying and low impact aerobic exercises (to increase the physical effort tolerance level). Having the right kinesiotherapist and the optimal exercise schedule could make the difference between recovery and chronic pain.

Physical exercise has various physiological benefits for the spine and especially for the intervertebral disk. The various postures and activities that the patient is involved in can influence the dynamic as well as the normal pressures over the disk. As the biggest avascular structure in the human body, the disk is subjected to fatigue, having a reduced ability to heal or remodel.

The posture, movements and daily activities can affect the physiological lumbar curve and its disks. Through daily postures, the spine is mainly involved in flexes and extensions. The symptomatic answer of patients to lumbar loading strategies helps us understand the preferred movement direction and its opposite.

This aspect has important implications in diagnosing and managing the lumbar hernia. (McKenzie, 1979).

There have been scientifically studies exploring the role of repetitive postures sustained through flexion in the aetiology of structural deteriorations.

Therefore, it was shown that the flexion of the trunk could determine the weakening of the fibrous ring if the tension is mainly localized in the posterior side of the intervertebral disk. Also, if the length of the ring fibres increases by 4%, the ring will be deteriorated.

A computer-generated intervertebral disk model has shown that the posterior area of the ring cracks once the flexion is associated with compression.

Maintaining the lumbar spine in a flexed position for long could lead to the distortion or malformation as well as the breaking of the fibrous ring that can be followed by the extrusion of the disk matter.

Flexion coupled with compression, with or without the lateral inclination or rotation, could cause the disk prolapse, either suddenly or gradually.

However, this phenomenon does not occur easily and the structural failure in the intervertebral disk usually results in the internal deteriorations of the ring rather than the prolapse of the disk matter.

As compared to flexion, maintaining a posture of extension during work hours is quite unusual, though prolonged orthostatic periods tend to increase the lordotic curve. However, repetitive peaks in loading the lumbar spine in extension are quite frequent in sports such as cricket, gymnastics and jumping.

To summarize, the postures that imply the physiological lumbar lordosis decrease the pressure and the degenerative risk in the intervertebral disk, expose the ligaments to less pressure and, though they increase the loading on the zygapophysial joints, they are not considered a danger for the spine.

A kyphotic posture maintained for a long period of time increases the inter-disk pressure, which diminishes the amount of inter-disk liquid, decreasing the degree of nutrition, altering the cellular synthesis and the intervertebral disk biomechanics culminating with its degeneration, generating therefore lumbar pain.

In the morning, the intervertebral diskshows more resistance to flexion due to the high volume of fluid contained in the intervertebral disk that also increases its diameter. As compared to later moments in the day, the stress caused by the flexion of the trunk is 300% for the intervertebral disk and 80% for the neural arch ligaments (Pheasant, 1998).

Consequently, we could say that there is an increased risk for structural deteriorations when bending in the morning.

An experimental model, using a bovine intervertebral disk, has demonstrated that, both the loading on flexion as well as an increased hydration of the intervertebral disk are key factors determining the fragmentation and fragments movement of the pulpous nucleus.

The intensity of the inter-disk pressure is influenced by various factors: muscular activity of the trunk, posture, body weight, intervertebral disk size, the degree of disk degeneration and the external weight applied.

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Posture is only one of the components of the equation. All studies have reported a substantial decrease in spine pressure when the spine is off-loading or weight-less.

Generally the sitting position causes more inter-disk pressure than the orthostatic position. The extension also increases the pressure, however, much less so than flexion does.

Orthostatism / Walking

In a sagittal plane, some activities qualify as flexion, others as extension and others as flexion and extension. Orthostatic postures such as standing and walking are basic extension activities.

While standing up straight, the lumbar curve is accentuated as compared to a sitting position when the lumbar curve is considerably reduced and the spine is much more flexed. Walking increases extension while the inferior limb situated posteriorly rotates the pelvis accentuating the lumbar lordosis.

Sitting position

When moving from standing to sitting with no support, the lumbar curve decreases by up to 38%, the pelvis rotation being responsible for 28% of that.

The sitting posture with the back relaxed causes the most pronounced lumbar flexion, crossing the inferior limbs flexes the lumbar spine, while sitting with the back up straight causes less extension than orthostatism.

The factors that influence the lumbar curve while sitting:

- Factors that increase the lordosis: the anterior rotation of the pelvis, the hip extension, a backrest that has a posterior inclination, the lumbar support
- Factors that increase flexion: the posterior rotation of the pelvis, the hip or knee flexion, the crossing of the inferior limbs

The backrest can diminish flexion but the McKenzie type lumbar support has a larger and more significant influence by increasing the lordosis angle.

The pelvis rotation is an important variable determining the lumbar curve degree while sitting.

The posterior rotation, as present while sitting with the back relaxed, causes lumbar flexion while the anterior rotation (sitting with the back up straight) generates the extension of the lumbar spine.

Using the lumbar roll directly facilitates the increase in the lordosis curve ensuring a larger anterior rotation of the pelvis.

The angle created between the spine and the inferior limbs also has an effect over the lumbar curve due to the tension created in the posterior muscles of the thighs.

The increase in the flexion of the hips rotates the pelvis backwards resulting in the flexion or stretching of the lumbar spine.

Therefore, the sitting position with the knees above the hip line, typical for armchairs or car seats, causes the stretching of the lumbar spine.

Bending

Bending the trunk forward is an obvious flexion activity. A complete bending causes significantly larger movement amplitude for the lumbar spine than in the case of the sitting position. The more the person bends forward, the bigger its resulting momentum.

The magnitude of the flexion momentum is a result of the trunk weighing over the spine and the distance from the spine to the gravitational line that presses on the trunk, also known as the momentum arm.

The higher the value of the momentum arm (e.g. when the person bends from orthostatic position carrying weight in his/her hands), the larger the force that presses on the spine.Lowering the centre of gravity by flexing the knees diminishes the degree of lumbar flexion and the momentum arm. (Frank, Kerr, Brooker,1996).

The Decubitus

The shape of the curve in decubitus depends on the adopted posture. There are three available basic positions: the supine position (lying down), lateral decubitus and prone position (ventral decubitus).

In the lateral decubitus, the lumbar spine can be either in flexion or in extension, depending on the position of the inferior limbs.

By increasing the flexion in the hips and rotating the pelvis backwards simultaneously, the physiological lordosis is relaxed. The foetal position is one of extreme flexion while the lateral decubitus having one or both hips extended tenses the spine, extending it.

The lateral decubitus also causes a few degrees of lateral translation to the side on which the person is lying. In the supine position (dorsal decubitus), the lumbar curve is dependent on the position of the inferior limbs.

With knees and hips extended, the anterior muscles of the thighs rotate the pelvis forwards increasing the lordosis while with the knees and hips flexed, the pelvis rotates backwards and the spine relaxes. For most individuals, the prone position (ventral decubitus) causes lumbar extension.

Considering all the aspects of the lumbar spine mechanics and physiology, through kinesiotherapy we can achieve an efficient recovery from lumbar disk hernia.

It is assumed that the movements having the greatest influence on the levels of pain will also have the greatest influence on the pathology and pain generator and can be used to improve or worsen the condition.

The movements that usually have the greatest effect on pain are flexion and extension, although sometimes it is side gliding. For this reason, the repeated movement testing on lumbar disk hernia patients initially only uses sagittal plane movements.

Except in the case of an obvious lateral shift, where frontal plane movements are necessary and sagittal plane movements are initially undesirable, sagittal plane movements are always explored first.

Frontal plane movements are introduced if sagittal plane movements worsen or peripherals symptoms. Lateral forces may also be introduced if sagittal plane forces do not improve the symptomatic or mechanical presentation.

Different effects are produced when the test movements are performed in standing compared with lying positions (McKenzie, 2003).

The effect of postural habits has long-term implications on the human shape. The commonly observed posture of protruded head, rounded shoulders and flattened spine may become habitual.

As ages advances, permanent postural set may occur – head protruded, shoulders rounded, dowager's hump, loss of lumbar lordosis and the erect posture replaced by a slight stoop. This is likely to be accompanied by considerable tissue adaptations.

Positions that are frequently adopted, such as flexion, are maintained, while movements that are rarely performed, such as extension, become steadily more difficult to achieve. Long term postural neglect can lead to adaptive tissue shortening, causing dysfunction syndrome (McKenzie, 2003).

Protruded head positions and stooped postures are not simply and inevitable consequence of ageing. Movement that is lost because of tissue adaptation could have been retained had affected soft tissue been regularly stretched. If end-range movement is neglected, eventually that movement is lost forever. Postural sets that arise from long-term postural neglect and tissue adaptation result from postural habit as much as the consequence of age. Loss of function can be prevented if end-range movements are regularly performed and posture corrected throughout life (Twomey, Taylor, 1994).

So, adaptive shortening implies loss of function and movement. Whenever shortened structures are placed on stretch, they will induce discomfort or pain.

Furthermore, the decreased movement must inevitably lead to impairment of nutrition in the intervertebral disk, contributing to the disk degeneration.

The shortening of soft tissue caused by poor postural habit and inadequate exercise can be prevent by regular postural correction and adequate performance of the relevant exercises.

Performed in a controlled manner, progressively, gradually, the physical exercises will increase the nutrients distribution at the intervertebral lumbar disk and soft tissues level maintaining their health and well functioning.

Consistently followed, the kinesiotherapy programmes help prevent the rigidifying of the spine joints, muscle hypotonia as well as the reduction in acute episodes recurrence or the decrease of their severity and duration.

Physical exercise can create a continuum that favours the decrease or even the disappearance of the physical and psychical discomfort that sets in due to the lumbar disk hernia.

The patient perceives his illness as an obstacle in his normal daily life routine. The physical exercise programmes are useful if designed specifically to each patient condition; correctly executed, at a suitable pace, with an optimal number of repetitions over the entire range of motion.

The kinesiotherapist will ensure those working conditions are met.

Conclusion

To conclude, the purpose of the kinetic programmes in the case of lumbar disk hernia is that of diminishing the pain, improving the functionality of the spine and educating the patient so that acute episodes are prevented.

One of the strongest risk factors for a future episode of back pain is a past history of back pain – such patients need education and information to reduce the risk. Biomechanical variables are risk factors in back pain onset, but also are notable in perpetuation and aggravation symptomps.

Many of these relate to postures of flexion; the ubiquitous nature of this posture has been noted (McKenzie, 2003).

Lumbar disk hernia is not always a curable condition and for many people it remains a problem throughout their lifetime. Through various methods, kinesiotherapy provides patients with solutions and relevant information for performing normal activities, self-managing their condition and overcoming the fear of movement. All these result in the increase in the patient's quality of life.

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