

Dynamic Stabilization as a Surgical Technique in Patients with Disc Pathology, Alternatives to Microsurgery

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1. Introduction

The Pathophysiology of pain due to irritation, compression or stretching of the sacral plexus roots (in particular L5 and S1) depends on degenerative, inflammatory, congenital, traumatic, psychogenic, tumour or vascular factors.

In the majority of patients who come to the outpatient clinic for lower back pain or lumbosciatic, conjure several of these problems; mainly the first five mentioned (The three most common organic causes are:

- Syndrome myofascial: Pain and muscle contracture by sudden stretching of muscle fibers

paravertebral, with tearing of fibers and fascias. Muscle spasm is created (by intrafusal fiber injuries) that extends to neighboring muscles. This is the most frequent cause of pain in the lower back, with acute episodes that can become chronic.

- Compression radicular by chronic narrowing of the recess and the lateral canal and / or the central canal at several levels, due to osteophytes and hypertrophy Facet (spondylosis/ arthrosis) degenerative and inflammatory; known as “Stenosis of the lumbar canal”, “Rachisthenosis “or” Chronic stenosis acquired from the canal. “ More frequent in patients aged 40 years and over.

- Acute compression or sub-acute of one or more rarely two roots, by a hernia (rupture and dislocation) of the intervertebral disc nucleus pulposus. This is most frequent in patients under 40 years.

In some patients, a hernia in the prolapse stage may not progress and spontaneously decrease the pain, until it is compatible with your usual tasks, permanently. Apparently, the nucleus pulposus fragment herniated dehydrates and atrophies. Thus, the compressive and inflammatory component of the root, the fibrous annulus and the posterior longitudinal ligament. This may also be the cause of the cure in some patients after epidural blockages with corticosteroids and analgesics.

Although sometimes it is spoken of compression of the root by

the hernia in the lateral channel (vertebral foramen), it is in the lateral recess where prolapse usually has the greatest effect the root that will exit through the lateral channel of the lower level. Only in rare variants, the hernia moves upwards to compress the root of the same level in the lateral canal, which is in the upper third of the foramen; or a “hernia Laterodistal” affects the root after its exit from the lateral channel, in the distal lateral compartment. Lateral recess is understood as; lateral recess, a medial space to the pedicles and to the superior facets; lateral to the central channel and to the Dural sac and posterolateral to the vertebral bodies and disks, where the roots run obliquely towards down and out when leaving the collective case of the tail and before entering the lateral channel. In the inferomedial border of the pedicles, the roots rotate outward and slightly forward, more the outer edge of the pedicle and behind the angle posteroexternal body and disc.

Herniated disc (operated on or not) decreases the cushioning capacity and mobility of the vertebral segment. This has an unfavorable effect due to overload, in the discs of adjacent spaces and can increase one’s predisposition to discopathy.

Once the radicular compression due to herniated disc has been checked via imaging and the attempts to conservative treatment (including epidural blocks with methylprednisolone or other corticosteroids and lidocaine), in a patient with recurrent manifestations of pain, paresthesia or functional deficit, considerable as

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incompatible with their lifestyle or work obligations, the surgical decompression of the root is decided. Preferably during a painful period of the patient and if his general state of health allows it. In case of motor or sphincter deficit, this operation can become somewhat urgent.

The surgical technique has evolved since 1934, when Sypert et al. [1], Mixer et al. [2] opened the dura to locate the disc prolapse. The development of imaging and the use of the surgical microscope in neurosurgery (end of the years 60), allowed the start of minimum access and micro-technical procedures with magnification. In the second half of the 70s, Caspar et al. in Germany [3]; Yasargil in Switzerland [4] and Williams [5] in the United States, they described techniques and minimum access and microcirugia to minimum access and microsurgery for the lumbar disc exeresis.

These techniques have as their aims to cause the least possible anatomical and physiological damage to the structures of cover (skin, fasciae, muscles, ligaments, vertebral joint system and posterior bony arch); to create the lowest levels of possible lumbar instability, prevent epidural and cutaneous scars and fibrosis and allow for the rapid reincorporation of the patient to his usual work (average 45 days, if the patient's work does not involve lifting loads or doing push-ups).

Yet, what happens when we face a patient who presents a lumbar disc herniation in a patient under 40 years of age and who performs continuous efforts and flexions and who, after performing the mandatory symptomatic treatment, previously commented, does not show any improvement in his symptomatology and cannot lead a life and work continuously?

The sample comprises 30 patients who were operated on with two different ideas; The Dynamic stabilization with peek rod between January and December 2013. Another group with Microsurgical technique (30 patients) Pre and post-surgical Oswestry questionnaire was carried out, resulting in figures, which varied from 56.8 to 21.4% respectively. Pre and post-surgical simple x-ray studies have been analyzed. Possible Modic and intervertebral disc rehydration changes have also been evaluated. The standard surgical approach via the lumbar midline for Dynamic Stabilization and Standard Microsurgical Technique has been used in this process.

The pathology intervened was determined based on the classification of the degenerative pathology established by G. Dubois, based on what is known as the Kirkaldy-Willis degenerative cascade dating from 1978. The pathology corresponds to degenerative disc disease. The pathology operated on was degenerative discopathy.

2. Results

The results regarding the improvement of the clinic after 4 years of evolution mark a trend in favor of the dynamic stabilization as in the return to professional activity. Almost the same when performing the MRI check after three years of its evolution there is a marked hydration (**Figure 1**) in the treated segment by dynamic stabilization when compared to the microsurgery group (**Figure 2**).



Figure 1: Dynamic stabilization at level L4 L5 in which the hydration of the treated segments can be observed. Together with the recovery of the height of the vertebral segment.



Figure 2: Micro-surgical technique, disc dehydration is observed together with the loss of height of the treated segment, being stage 3 of Kirkaldy-Willis, Farfan.

3. Discussion

In 1995, a dynamic neutralization system for the treatment of degenerative disc disease was implanted for the first time. Dubois et al. [6] named this system Dynesys (dynamic stabilization system). In 1998 they published their first results on 50 cases and in 2000 their update on 150 cases. In these works, the authors, in addition to presenting the technique, show their indications based on the classification that they themselves establish of lumbar degenerative pathology according to the scheme of degenerative diseases of Kirkaldy-Willis, excluding the primary disc pathology, the hypomobile disc disease and structural deformities [7].

The unsatisfactory results with the microsurgery technique in this group of patients have generated the development of alternative treatments for degenerative disc disease; one of them has been the later dynamic stabilization. In this regard, Senegas [8] reported a procedure referred to as ligamentoplasty in which a ligament implant in patients with recurrent herniated discs was

utilized; the improvement was noticeable in comparison with that obtained by discectomy, all in the preservation of intervertebral height and in the absence of back pain: with the implant the low back pain in 80% of patients and 92.5% in ciatalgia.

Another method for the treatment of disc disease degenerative consists in the posterior dynamic stabilization based on the transpedicular placement of peek Rods system;

A series of 30 patients with, degenerative disc disease or lumbar hernia were studied with a minimum follow-up of 38 months. In our study, the pain according to the visual analogue scale for lower back pain decreased from 7.4 to 3.1, the sciatica of 6.9 to 2.4 and the Oswestry lumbar disability index from 55.4 to 22.9%.

When a microsurgery technique is performed in a young patient and with professional activity that entails carrying out efforts and bending continuously, sometimes we do not take into account that this will happen with the passage of time in the operated segment, which left its natural evolution approximate what was described by Killkardy et al [7]. Global alteration of the complex [7]

- loss of height of the disc space
- Interespinoso ligament laxity and capsule
- Facet join degeneration
- Vertebral collapse
- instability of the segment

The dynamic stabilization with transpedicular screws and peek bars allows for the mobility of the segment to which a lumbar discectomy is performed due to herniated disc, allowing movements of flexion and extension within normal ranges and the preservation of the disc height after four years [9,10,11], with a notable clinical improvement, the lumbar disability evaluated with the Oswestry scale and the pain evaluated with the visual analog scale decreases.

4. Conclusion

The micro-surgical technique has a significant role to play in the treatment of the herniated disc, yet with the passage of time and greater knowledge of the biomechanics of the lumbar region, it seems that the choice of dynamic stabilization should always be present in the group of patients who formed the basis of our study.

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