Where are we, and where are we going? Review of strategies and new integral proposals in the management of herniated disc

¿Dónde estamos y a dónde vamos? Nuevas estrategias integrales en el manejo de hernia de disco

Abstract

At some point in their lives, 66% of adults suffer low back pain, of which 85% have at least one herniated disc. This disease is the leading cause of disability, reduced working hours and high costs due to persistent pain. Historically, the mainstay of treatment has been based on drugs, leaving imaging studies and invasive treatments as a last resort when there was no observed improvement with the conservative treatment.

The main justification for surgery is an accelerated pain relief compared to conservative therapy (reason of its high practice) but, besides not having a standardized management, there has been no difference in long-term benefits or lower costs. Similarly, there is not a consensus to establish a specific drug, dose or precise exact rehabilitation sessions for the proper management of the condition, so that each case must be individualized.

In recent years, there have been new management strategies based on anti-inflammatories, ozone therapy and proper rehabilitation, with promising results (pain remission in up to 95% of patients) in early stages, but wider dissemination is needed in order to establish them as therapeutic alternatives.

Keywords

er herniated disk; radiculopathy; integrated conservative treatment.
Resumen

En algún momento de su vida, 66% de los adultos padecerán dolor de espalda baja, de los cuales 85% tendrán al menos una hernia discal. Esta enfermedad es la causa principal de incapacidad, disminución de horas laborales y elevados costos debido a la persistencia del dolor. Históricamente, el pilar de su tratamiento ha sido a base de medicamentos, dejando los estudios de imagen y tratamientos invasivos como última opción cuando no hubo mejoría con el tratamiento conservador.

La principal justificación de la cirugía es un alivio acelerado del dolor en relación al tratamiento conservador (razón de su alta práctica) pero, además de no contar con un estándar quirúrgico, no hay diferencias en beneficios a largo plazo o disminución de costos. De la misma manera, aunque existe un consenso donde se establece que tipo de medicamento, dosis exactas o sesiones precisas de rehabilitación para la adecuada recuperación del padecimiento, cada caso debe ser individualizado.

Las nuevas estrategias de manejo integral, combinando terapias a base de antiinflamatorios, ozono y adecuada rehabilitación, han tenido resultados prometedores (remisión del dolor hasta en el 95% de los pacientes) en fases iniciales, pero falta mayor difusión para poder establecerlas como alternativas terapéuticas.

Palabras clave

hernia discal; hernia lumbar; radiculopatía; manejo integral conservador.

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Introduction

Alterations of the intervertebral disc, especially degeneration, reduce the quality of life and are well short of effective therapies. This is a very common condition. It is excessively silent, or it is tolerated because of its chronicity, but has alarming consequences - incapacitating, especially.\(^1\)

In the last three months, approximately 10% of the adult population of the United States (the most studied in this disease due to the condition’s implications in its workforce) has reported back pain irradiating to the lower limbs, better known as “sciatica”, due to the L4, L5, S1, and S2 nerve roots, which join together in the lumbosacral plexus to form the tibial and peroneal nerves, exiting the pelvis in a single trunk as the sciatic nerve.\(^2,3\)

Once trauma is ruled out as the pain’s origin, the cause of vertebral fractures, spondylolisthesis, or lumbar stenosis, 85% of adult radicular-type back pain will be secondary to a herniation of one or more intervertebral discs.\(^3\)

It is well known that intervertebral disc herniation by itself is not a direct cause of root pain, considering its prevalence increases with age, and it is not uncommon to see magnetic resonances finding herniation either asymptomatic or with minimal symptomatology.\(^4\) However, this predisposes the contact of the nucleus pulposus with a nerve root, triggering an inflammatory phenomenon that causes the mechanical effect of compression and referred pain.\(^5\)

Contrary to popular opinion, surgical intervention is not the first (or the main) option in cases of disc herniation, since several studies and reviews have postulated that patients with this condition improved substantially with conservative treatment (up to 87% of cases) in a period of three months after the onset of pain\(^6\) and, even in adequately performed studies of patients with persistent radiculopathy, it is well established that the condition did not improve after surgery.\(^7,8\)

Generally, the natural history of lumbar hernias is favorable, and patients who begin with radiculopathy exhibit decreased symptomatology within a period of six weeks after diagnosis (treated conservatively and through physical rehabilitation). The international guidelines (translated and adapted for our country) establish the recommendation to defer any imaging, invasive procedures, or surgical interventions in patients with lumbar radiculopathy during that time period in the absence of trauma or signs of surgical urgency such as cauda equina syndrome. If there are no improvements in the symptoms during that period, imaging studies should be performed to establish the exact cause and regulate the procedures to follow.\(^10\)

Unfortunately, this rule is not always followed. Under the justification of faster pain relief (compared to conservative therapy), surgery is suggested as the first option for most patients who request it, or who urgently seek a solution to their condition. This is done without considering risk factors specific to the surgical intervention, or the minimal (or zero) advantage it has compared to the magnitude of long-term pain recovery, plus an increased rate of complications characteristic of the intervention, and longer overall disability time.\(^7,11,12\)

Similarly, due to the prevalence and high costs of the disease in an adult population at the height of productivity (diagnostic costs, specific therapy, work compensation, days of work absence, and lack of productivity), and insufficient evidence regarding the most adequate approach, we continue to work with different combinations of treatments and complementary therapies to improve the quality of life of the patients and to reduce the costs and times of incapacity.\(^13\)

Considering all of the above, we made a systematic review of the current literature in the UpToDate database, the Cochrane Library, and the American and Mexican guidelines concerning the treatments for lumbar intervertebral disc hernia radiculopathy currently available, taking into consideration the levels of evidence in the studies, and the recommendations secondary to these. A
review was also made of the different alternative approaches that have historically been carried out and of the new comprehensive strategies offered to treat them correctly with high expectations of remission and symptom relief.

**Treatment of the herniated disc**

Over the years, and with the advent of new drugs or therapeutic interventions (whether surgical or intrathecal/intradiscal procedures), multiple studies have been performed comparing them with traditional therapies (as well as comparing conservative and surgical treatments), and the vast majority did not show a significant difference in final results at one year and at four years of follow-up regardless of the medications or surgical techniques used.7,8,14,15

Similarly, in the surgical field, they continue to make comparisons between different surgical techniques in order to find the most effective one with fewer adverse effects, but no particular procedure has demonstrated enough of an advantage in all areas to be called “the gold standard.” Although there is doubt about which surgical procedure to follow (both discectomy and microdiscectomy have the same post-surgical results in medium and long term), minimally-invasive procedures have boomed recently, though they still fail to show significant advantages over traditional procedures, on top of which there is a requirement for trained staff and centers with capabilities to perform them, resulting in higher costs that do not justify the benefits obtained.16

Regarding the eternal dilemma between surgery or conservative therapy, the two therapeutic modalities have been compared. Irrespective of the surgical technique chosen, the results do not show much more of an advantage against the conservative treatment in terms of pain relief and improvement in function three months after treatment,17 or in the long-term follow-up of four years,18 or eight years19 (without taking into consideration surgical risks, need for reinterventions, or complications typical of the procedure).

For almost 10 years, Peul et al. have shown that, although the recovery rate is higher with surgery (4 weeks v. 12 with conservative treatment), 5% of the patients in both groups continued to experience pain and lack of recovery after one-year follow-up, regardless of the treatment they received.7

Likewise, there is no exact consensus on the use of rehabilitation devices such as spinal traction to control the disease, having to individualize them for each patient based on their symptomatology, with no change in the natural evolution of the disease, and with little evidence of benefits.20

There is insufficient evidence, as well, to support a quantifiable improvement of symptoms with the use of nonsteroidal anti-inflammatory drugs (NSAIDs) or the use of epidural steroid injections. Results that vary from patient to patient and there is no change in the natural history of the disease, but there are different reports of adverse effects.21,22

And, on another note, the use of opioid analgesics should be restricted and limited to patients with severe lower-back pain followed by strict supervision. A higher rate of fractures of the hip, humerus, or wrist, has been reported secondary to falls caused by overdosage (voluntary and involuntary) due to the use and abuse of this family of medications because of the profound suppression of pain and anesthesia they provide, as well as their toxicity after a prolonged use.23

Adequate rehabilitation with supervised exercises (which may include physiotherapy and chiropractic treatment) has been shown to prevent weakness, improve mobility, and alleviate the symptomatology.24

Controlling risk factors to improve adherence to the treatment (such as smoking cessation, weight loss, and regular exercise), as well as an adequate following of the therapies, and a clear understanding of their condition, have proven to be of enormous importance in patient recovery. Similarly, attacking the underlying inflammatory component of the root disease (with a targeted therapy) has been linked to better results, but
the little evidence found in the literature is observational and inconclusive.\textsuperscript{25}

**Conservative alternatives used historically**
This is a condition in constant study. Whenever new health therapies arise, it is inevitable to test their effectiveness in conditions where the patient can benefit, and lumbar hernias are no exception. The results are variable (most of them range from regular to good) in different well-studied approaches in clinical trials or meta-analysis to determine their benefits. The techniques are listed below:

**Glucosamine, herbal therapies, and biological agents**
The use of glucosamine has been extensively studied in inflammatory joint disorders, being particularly useful in knee and hip problems. However, data about its use for lumbar radiculopathy is scarce, and no differentiations were found either in pain or quality of life changes in patients using glucosamine versus placebo, so their use is limited to joints with wide range of motion.\textsuperscript{26}

Regarding the use of herbal therapies, several systematic reviews of clinical trials with different compounds (mainly Capsicum frutescens –chili pepper–, Harpagophytum procumbens –devil’s claw–, Salix alba –white willow bark–, Symphytum officinale –comfrey root extract–, and lavender oil) resulted in short-term improvement of the symptoms in the follow-up. With no ability to determine medium- or long-term benefits due to the limitations of the studies, they cannot be compared directly against the traditional drugs and can only be recommended as therapeutic adjuvants.\textsuperscript{27}

Since the advent of the use of biological agents to control various conditions of rheumatic and autoimmune origin, and knowing there is an inflammatory component in disc herniation radiculopathies, the use of anti-TNF-alpha drugs (particularly infliximab, either parenteral or intradiscal) has not been shown to be superior to placebo in terms of pain management when followed-up at three months and at one year; therefore, its use is not recommended in the modality described.\textsuperscript{28,29}

**Rapid relief with physical therapies: chiropractic stimulation, acupuncture, and massage**
Chiropractic spinal stimulation involves the movement of a joint beyond its usual range of motion but without exceeding its anatomical limit (the so-called “para-physiological” zone), with low- or high-intensity lever movements. The effectiveness of this type of therapy has been seen mainly in the short term. It modestly improves root pain in the initial 12-week period but, without showing differences in the annual follow-up, its use should be seen as a merely adjuvant therapy.\textsuperscript{30}

As for acupuncture, the westernization of this millenary practice has sought to standardize its use (either as an integral therapy or as adjuvant in the treatment of various ailments), obtaining similar results as those of spinal stimulation (moderate improvement in symptomatology and function during the first three months). The meta-analysis could not determine, however, whether the benefit was due to the activity exerted by the inserted needles or merely by the placebo effect. So, the indication is that its use may be more beneficial in people who hold a high expectation of obtaining a benefit from this treatment in a short period of time.\textsuperscript{31}

Similar to acupuncture, massages exert a therapeutic effect in the short term by relaxing muscle fibers and improving mobility. Due to the various massage techniques used, there has been no clear benefit in the medium or long term (there was improvement the first 10 weeks with massage sessions, but it decreased as time progressed and there was no improvement at one-year follow-up), so it is recommended as a relaxing therapy with short-term benefits.\textsuperscript{32}

**Physical modalities: interference therapy, diathermy, low-level laser, ultrasound, and nerve stimulation**
The patient plays an important factor in the use of these types of stimulation therapies. They can have rapid benefits, but their use must be individualized
and combined with other treatments for greater patient benefit.

Inferential therapy consists of the application of an alternating current of medium frequency, modulated to produce frequencies up to 150 Hz to stimulate nerve roots. It may help a very select group of patients, but it has not been possible to standardize it for a general benefit.33

A similar treatment with comparable results is the application of short-band diathermy, which consists of raising the temperature of the deep tissues by electromagnetic radiation applied in a range of 10 to 100 MHz, but, unlike the previous one, a clear benefit in pain improvement has not been found.34

In regards to low-level lasers, they consist of the application of a light with a wavelength of 632 to 904 nm, directed at the pain area. The trials showed a superior improvement of pain at the year of follow-up, but this decreased in patients who exercised, so a greater benefit can be found in patients who are incapacitated by their condition.35

Although widely used for musculoskeletal pain syndromes, the use of ultrasound has not been well evaluated for disc radiculopathy. As for deep tissue heating, it is usually used in combination with other physical therapy modalities, so it has not been possible to establish a clear benefit as a single therapy and is not recommended as such.36

Nerve stimulation (both transcutaneously and with the insertion of percutaneous needles into the dermatomes of the nerve root) involves the application of electrical stimuli by means of electrodes, with the aim of improving the symptoms by modifying the perception of pain. Although both types of stimulation may offer benefits, a marked superiority has been seen with the use of percutaneous stimulation, though there has been no long-term follow-up of the symptomatology.37

**Combined treatments: optimizing results**

There are no trials that evaluate an optimal sequencing of therapies, so the decision to choose one therapy over another relies upon the treating doctor and the patient’s expectations, seeking practicality, and taking into consideration costs, convenience, and the availability of the resources and trained personnel required for each specific therapy.

**New comprehensive strategies**

In an effort to find a faster, more effective, and less costly recovery option for patients and companies (in terms of decreasing times of incapacity and absenteeism), the new conservative strategies obtained an accelerated recovery of patients in a more effective and less invasive way. Each has promising results, but with the inconvenience of not having controlled clinical studies to compare them with other drugs or surgery due to patients’ perception and favoritism of a particular type of treatment. This can delay the establishment of these therapies as part of the integral treatment of herniated disks in order to displace the traditional therapies.

These treatments cover therapeutic routes and drugs that, on paper, have a superior effectiveness over traditional therapies, but have not secured a follow-up of their patients or made their own comparative structured studies.

**Anti-inflammatories in measured doses: the principle of homotoxicology**

A treatment strategy that had a great boom in the late twentieth century was the use of high-potency anti-inflammatory drugs in minimal therapeutic doses or diluted administration to control the inflammatory component of the disease while avoiding the toxicity of those drugs.

All the studies in this area searched for the right drug in the exact dose to treat the various events derived from an inflammatory component, giving way to the advent of homotoxicology as a way to apply drugs in carefully measured doses based on simple dilutions and serial and supervised administrations of the medication (without becoming doses or principles of homeopathy), based on the different toxic substances released by the body during the various stages of the inflammatory process,
obtaining a therapeutic effect in a select group of diseases as well as minimizing the toxicity with the use of this group of anti-inflammatories.\textsuperscript{38}

Unfortunately, the way in which homotoxicology studies were done was based on tests with different dosages of the medicines to achieve an effective and safe dose, which is why their studies were not comprehensive due to the adverse effects that the patients could have, and their use had been limited to drugs whose effectiveness had already been proven and which were currently allowed by the different regulatory agencies of each country.

Local ozone therapy and its effectiveness

With the advent at the beginning of this century of different therapies based on hyperbaric oxygen and ozone for the recovery of different inflammatory or surgical conditions, another type of local therapy with paravertebral oxygen-ozone has been studied since 2003.\textsuperscript{39} The results were quite encouraging in terms of patient recovery and the reduction of pain and radiographic changes characteristic of disc hernias (assessed with imaging studies and the analog visual scale of pain), so its use is now considered as an excellent individual therapy and, better still, as adjuvant in the different conservative treatments of herniated disc, with minimum to zero adverse effects, excellent patient tolerance, and reduced costs of operation, so, to date, comparison studies continue based on this component with different combinations.\textsuperscript{40}

Combination of therapeutic alternatives: are we getting closer to the treatment of the future?

It has been observed that by using our previous knowledge in combination with different treatments available, a high rate of remission in patients has been achieved by a synergy of anti-inflammatory drugs in homotoxicological doses, with the adjuvant use of ozone-based therapy and adequate rehabilitation (including thermotherapy, electro-stimulation, hydrotherapy, and ultrasound) at the same time, reducing the amount of pain and increasing functionality for patients undergoing these therapeutic combinations (with a rate of improvement of over 95\% of patients), which heralds a new outlook in the recovery of herniated disc radiculopathy benefitting patients, employers, and the health sector. At the same time, there is still a need for more diffusion, and for comparisons with the currently established treatments in the international guides in order to regulate them either as a complement or a substitution of the traditional treatments (whether conservative or surgical).\textsuperscript{41}

Conclusion

The treatment of lumbar hernias is a field in constant study and growth, where new methods are sought to treat them with greater effectiveness and lower costs, establishing new strategies that aim at the improvement of the treatment while clarifying its study. The daily search for ways to grow as an integral therapy in the treatment of the herniated disc has been sought in both the surgical and conservative areas. Conservative treatments show a tangible superiority in regards to remission of pain, duration of treatment, diminished invasion, and reduction of costs and times of recovery, so it seems that the traditional treatment of the herniated disc as we’ve known it is about to change in the not too distant future.

Conflict of interest

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