Lumbar disc herniation:
Evidence-based guidelines

Introduction:
Since the early 2000s, several international guidelines have been written to establish the "state of the art" for the management of lumbaradiculous syndromes. This by various organizations and societies listed below.

We would like to point out that the majority of guidelines in the literature focus on the lumbar pain component rather than radicular pain. For this reason, we will focus on lumbar pain in another section and focus here on the radicular component caused by disc herniation.

Methods:
The purpose of this document is to establish a synthesis of relevant elements useful in the management of patients suffering from lumbar disc herniation. Herein, we concentrated on the following four published guidelines from recognized scientific societies in Europe and the United States.

1) 2012 : North American Spine Society (NASS), USA(1)
« Diagnosis and Treatment of Lumbar Disc Herniation with Radiculopathy »

This article consists of a review of the literature and an expert consensus and is organized by degree of recommendation according to the existing level of evidence. A structured presentation of the pathology and the recommendations (guidelines) is provided. The definition of the pathology, the clinical, radiological and electrophysiological diagnostic methods are provided. The therapeutic modalities include different conservative treatments (type of drugs, physiotherapy, and spinal manipulations), interventional techniques such as different types of steroid injections, percutaneous management by herniatoma, nucleoplasty, ozone therapy, endoscopic management, and other interventional techniques such as acupuncture and TENS. The determination of prognostic factors such as age, duration of symptoms and the impact of other co-morbidities on the clinical outcome in the short, medium and long term is discussed. Finally, the surgical management, timing of the procedure, predictors of
surgical outcome and operative technique (microdiscectomy versus sequestrectomy, tubular versus open approach, microscopic versus macroscopic approach) are outlined.

2) 2013: British Pain Society, UK(2)

« Low back and radicular pain: a pathway for care developed by the British Pain Society »

The work of the authors in this article is more focused on lumbar pain than radicular pain. Nevertheless, a flowchart is proposed for the management of radicular pain with or without neurological deficit.

3) 2018 : Deutsche Gesellschaft für Neurologie, Germany(3)

«Leitlinien für Diagnostik und Therapie in der Neurologie Lumbale Radikulopathie, Herausgegeben von der Kommission Leitlinien der Deutschen Gesellschaft für Neurologie»

This work also includes a very good survey of the management of disc herniation with radiculopathy. Well structured, it summarizes, based on the degree of evidence in the literature, the management of herniated discs with radiculopathy, from its clinical neurological presentation, to the radiological diagnostic techniques with the required laboratories and electrophysiology. They conclude with the different modalities of therapeutic management.

4) 2020: Deutsche Gesellschaft für Neurochirurgie, Germany(4)

«Leitlinie zur konservativen, operativen und rehabilitativen Versorgung bei Bandscheibenvorfällen mit radikulärer Symptomatik»

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This work provides guidelines for conservative, operative and rehabilitative care for herniated discs with radicular symptoms. It gives a good appreciation of the clinical values of spinal symptomatology (cervico-thoracolumbar) with associated radiculopathy. It summarizes the different possible clinical presentations according to the level reached, the associated differential diagnoses, and proposes an algorithm of management from the clinical diagnostic measures, to the different modalities of treatment according to the retained diagnosis (drug and non-drug therapies, surgical, acupuncture, psychotherapy, electrotherapy, thermotherapy and hydrotherapy). The different modalities of local injections, operative techniques and the temporality of these interventions according to the degree of urgency.
**Discussion:**

**Definition:**
Based on the above, the broad definition of disc herniation with radiculopathy seems to be universal. It is a displacement of intervertebral disc material from its normal localization that can cause lumbar pain, radicular pain and neurological deficits depending on its anatomical location.

**Natural history:**
The majority of patients will present a spontaneous favorable evolution with reduction or even disappearance of the symptomatology due to a shrinking/regression of the acute disc herniation over time. However subset of individuals can develop chronic symptoms.

**Clinical presentation:**
The typical clinical presentation includes lumbar radiculopathy, with or without associated sensitive/motor deficits encompassing specific myotomes or dermatomes. In more severe forms, a cauda equina syndrome may be observed. Lasegue’s sign (positive leg raise test) and crossed Lasegue’s sign are recommended for use in diagnosing lumbar disc herniation with radiculopathy. Other clinical signs (e.g. accentuation of pain by coughing, hyperextension test, absence of reflexes and others) may be useful but there is not enough literature to confirm their power to discriminate in between the presence or absence of radiculopathy due to a herniated disc.

**Spinal Imaging:**
In a patient with concordant clinical presentation, MRI is considered the gold standard diagnostic modality to confirm the presence of lumbar disc herniation. If there is a contraindication to MRI, then the second test of choice is CT or myeloCT to confirm the presence of a herniated disc.

The use of imaging techniques is indicated in case of particularly severe pain, therapy-resistant or the presence of a neurological disorders.
Electrophysiology:

Electrophysiology has limited efficacy for diagnosis but may be useful to confirm other associated comorbidities. Motor evoked potentials (MEP) and somatosensory evoked potentials (SEP) have limitations for the diagnosis of disc herniation because of their lack of sensitivity and specificity. Electromyography also with the (F-waves and H-reflexes) have a limited usefulness because they are not specific to radiculopathy due to a disc herniation, but may be useful in differentiating radiculopathy due to disc herniation to other comorbidities.

Treatment:

Nonsurgical treatment should initially be considered for all patients without any neurological deficit. Surgical treatment is indicated in cases of acute or progressive motor deficits or cauda equina syndrome. Some may consider surgical treatment in patients with pain refractory to a maximal analgesic management.

a) Non-surgical treatment:

Analgesic:

The majority of lumbar disc herniations can be controlled without surgical treatment. Different drug treatments can be used without a defined treatment of choice due to the lack of studies demonstrating the superiority or inferiority of one molecule over another. First-line analgesia including non-steroidal anti-inflammatory drugs (NSAIDs) and Paracetamol are useful. Cox-2 inhibitors are approved for the treatment of acute and chronic severe pain when other analgesics are contraindicated or not sufficiently effective. There is a lack of evidence speaking for or against the use of iv glucocorticoids, even though they are used for their transient benefit. Potent analgesics such as opioids can be used but only for a short time and for patients with severe pain who do not respond to first line analgesia. NASS has specifically addressed the use of 5-HT receptor inhibitors in the treatment of lumbar disc herniation with radiculopathy, stating that the level of evidence is insufficient to make treatment recommendations for their use. Antidepressants are generally used only in patients with chronic pain.

Physical exercise and spinal manipulation:

Bed rest should only be prescribed in the acute phase, as long as mobilization is not possible due to the pain. Encouragement to maintain or resume normal activities of
daily living should be part of the treatment concept. Sports therapy should not be used in the acute phase.

There is insufficient evidence that physiotherapy can be used as a treatment, but it’s often used to help patients assess their capacity to regain their daily activities and reduce their debility due to absolute inactivity. Spinal manipulation by professional physiotherapists or chiropractors may be effective, nevertheless, due to the lack of high-quality studies, no high evidence-based recommendations can be made. Regarding method-specific physiotherapy treatment techniques, there is no convincing evidence so far and therefore no specific recommendations.

Epidural steroid injection:

The epidural steroid injection is an interventional treatment which may be useful for short term pain relief, more specifically the transforaminal epidural steroid injection technique. Nevertheless, there is a lack of evidence to show superiority or inferiority of one injection approach over another (for instance interlaminar versus transforaminal) in the delivery of epidural steroids. Local injection thus achieves a diagnostic statement about the pain-causing site/anatomical structure, a local pain reduction by reduction of nerve excitability (washout effect of inflammatory mediators). In principle, a distinction is made between interventional diagnostics and interventional therapy. The exact localization of the needle tip is important; it must be detected visually by imaging techniques such as fluoroscopy or ultrasound. Steroid injection can also be performed on CT, but radiation exposure for the patient is significantly higher. This might be particularly taken in to consideration for young patients. There is also less precision of needle placement in CT and the risk of complications is increased, since it is hardly possible to see the contrast agent distribution in the live image and thus to detect dangerous intravascular contrast distribution.

Percutaneous intradiscal procedures:

The "percutaneous procedures" are intended to attempt, among other things, to cause a loss of volume of the intervertebral disc (especially the nucleus by the so-called shrinking mechanism). This in order to reduce the pressure on surrounding nervous structures and thus improve the pain and neurological symptoms. Possible procedures include chemonucleolysis (injection of chymopapain, a proteolytic enzyme), laser discectomy (vaporization of disc tissue), nucleoplasty, intradiscal electrothermal therapy, and radiofrequency ablation (high-frequency electric current). Nevertheless, all known studies currently show only a poor evidence class and do not provide sufficient evidence at present. To further clarify the place of percutaneous techniques,
randomized, controlled trials on the use of percutaneous techniques in patients with disc herniation with radiculopathy need to be performed.

TENS, ultrasound, low power laser, acupuncture, electrical stimulation, bracing:
There is a lack of evidence to make a recommendation for or against the use of these techniques.

Psychological and behavioral therapy:
The results of the studies available to date indicate a strong involvement of psychological factors in the chronicization of back pain. Patient diagnosed with psychological distress such as depression or somatization have worse outcome. Accordingly, patients with psychological risk factors should be identified already in the subacute phase. If psychosocial risk factors are present, in a patient with subacute radicular pain, cognitive behavioral therapy might be considered.

b) Surgical treatment:
The most studied standard surgical approach is discectomy under a microscope using an interlaminar approach (also called dorsal approach) to the spine. The primary surgical goal is the reduction of leg symptoms and not to influence back pain. The use or not of a microscope seems to offer equivalent results, but the use of a microscope appears to be universally preferred because it offers a better visibility of the surgical site and allows the surgeon to be less traumatic.

In addition to the microsurgical technique for decompression of radiculopathy due to lumbar disc herniation endoscopic (full-endoscopic, percutaneous) techniques are also used. The frequency of available studies indicates an increasing worldwide spread of these techniques. Endoscopic nucleotomy/sequestrectomy, has been used with success for the treatment of lumbar disc herniation with radiculopathy in selected patients, however, the risks and benefits between this approach and standards techniques has not been well established.

Meantime, there is insufficient evidence to support management by a tubular surgical approach over a standard interlaminar surgical approach.

The difference between radical microdiscectomy or sequestrectomy alone does not appear to show a difference in terms of reherniation rate. However, sequestrectomy seems to have better long-term clinical results, especially in young patients.
In patients with severe and disabling symptoms, surgical management seems to be advantageous over the medium and long term (1 to 4 years) compared to conservative treatment. Thus, surgical management is recommended within 6 months in patients presenting a disabling clinic and not responding sufficiently to conservative treatment. This will allow a faster recovery and a resumption of activities of daily living and work.

The NASS states in their recommendations: “Pain and neurological deficits regress more rapidly in patients who have undergone early surgery than in patients who have not undergone surgery or who have undergone surgery at a late stage”.

However, despite a faster improvement with surgery, some studies show no clear advantages of surgery over a conservative approach in medium and long-term results. Extensive, high-quality clinical studies indicate a clear correlation between the outcome of surgical treatment and a preoperative symptom duration as short as possible. Basically, the question of the superiority of the surgical or conservative approach seems to be unresolved or answered just to a limited extent.

There is insufficient evidence to recommend the additive implantation of an interspinous spacer in microsurgical disc surgery. An additional effect in terms of improvement of radiculopathy and reoperation rate does not seem to exist.

**Conclusion:**

Guidelines are an aid to clinical practice and literature-based support. Nevertheless, they should not be applied rigidly, but a case-specific and patient-centered management, according to the judgment and appreciation of the physician, is preferable. It should be kept in mind that certain patients and certain specific conditions may fall outside the criteria outlined in these recommendations. Guidelines should be seen as an aid, not a barrier, to ideal patient management.

**References:**