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Lumbar disc herniation: treatment

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DESCRIPTION OF THE EVIDENCE COLLECTION METHODOLOGY

Articles in the MedLine (PubMed) database and other research sources were reviewed, with no time limit. The search strategy used was based on structured questions in the (P.I.C.O.) format from the initials: Patient, Intervention, Control and Outcome.

The descriptors used were:

QUESTION 1: (Intervertebral Disk Displacement OR Disk herniation OR Sciatica OR Lumbar Prolapse) AND (muscle relaxants OR cyclobenzaprine OR diazepam OR benzodiazepines OR carisoprodol OR tizanidine OR tetrazepam)

QUESTION 2: (Disk herniation OR Intervertebral Disk Herniation) AND (Anti-Inflammatory Agents, Non-Steroidal OR NSAIDs OR aspirin OR indomethacin OR diclofenac OR piroxicam OR tenoxicam OR meloxicam OR phenylbutazone OR ibuprofen OR naproxen OR nimesulide OR Cyclooxygenase 2 Inhibitors OR valdecoxib OR celecoxib OR etoricoxib)

QUESTION 3: (Intervertebral Disk Displacement OR Sciatica) AND (Analgesics, Opioid OR Narcotics OR Morphine OR Oxymorphone OR Hydromorphone OR 3-(3-dimethylamino-1-ethyl-2-methylpropyl) phenol OR Morphine Derivatives OR Oxycodone OR Hydrocodone OR Fentanyl OR Tramadol OR Codeine OR Buprenorphine OR Methadone OR Dextropropoxyphene OR Levorphanol OR Meperidine OR Pentazocine OR propoxyphene napsylate OR Sufentanil)

QUESTION 4: (Intervertebral Disk Displacement OR Sciatica) AND (Antidepressive Agents OR Antidepressive Agents Tricyclic OR venlafaxine [Supplementary Concept] OR duloxetine [Supplementary Concept] OR Amitriptyline OR Imipramine OR Nortriptyline)

QUESTION 5: (Intervertebral Disk Displacement OR Sciatica) AND (Gabapentin)

QUESTION 6: (Intervertebral Disk Displacement OR Sciatica) AND (Acupuncture Therapy OR Acupuncture)

QUESTION 7: (Intervertebral Disk Displacement OR Sciatica OR Disk herniation OR Lumbar prolapse) AND (exercise therapy OR exercise)

QUESTION 8: (Intervertebral Disk Displacement OR Disk herniation OR Sciatica OR Lumbar Prolapse) AND (Hyperthermia, Induced OR Diathermy OR ultrasonic therapy OR shortwave therapy OR ultrasound OR infrared rays OR microwaves OR Transcutaneous Electric Nerve Stimulation OR TENS)

QUESTION 9: (Intervertebral Disk Displacement OR Disk herniation) AND (Lumbar vertebrae OR Postoperative care ORRehabilitation)

QUESTION 10: (Intervertebral Disk Displacement OR Disk herniation) and (Lumbar vertebrae OR Preoperative care ORRehabilitation)

QUESTION 11: (Sciatica OR Intervertebral Disk Displacement) AND (Outcome Assessment AND Recovery of Function)

QUESTION 12: (Intervertebral Disk Displacement OR Sciatica) AND (Behavior Therapy OR Cognitive Therapy)

QUESTION 13: (Intervertebral Disk Displacement OR Disk herniation) AND (Lumbar vertebrae or Health Education)

QUESTION 14: (Intervertebral Disk Displacement OR Sciatic) AND (Anesthetics, Local or Nerve block).

These descriptors were used as correlations according to the proposed theme of the P.I.C.O. questions. After analyzing this material, articles relative to the questions were selected that yielded evidence on which to base the present guideline.

QUALITY OF EVIDENCE AND STRENGTH OF RECOMMENDATIONS:

A: Experimental or observational studies of highest quality.
B: Experimental or observational studies of lower quality.
C: Case studies (uncontrolled studies).
D: Opinion with no critical evaluation, based on consensus; physiological studies, or animal models.

OBJECTIVE:

To provide information about the treatment of lumbar disk herniation.

PROCEDURES:

Therapeutic rehabilitation interventions for the main clinical manifestations that compromise the quality of life, function, and daily life activities of patients with lumbar disk herniation in the biopsychosocial ambit.

CONFLICT OF INTEREST:

The authors have no conflicts of interest to declare.

INTRODUCTION

Herniated disc is a musculoskeletal disorder responsible for sciatica and occurs due to rupture of the annulus fibrosus, following the displacement of the central mass of the intervertebral disc into the dorsal or dorso-lateral disc spaces.[1] Considered a frequent reason for injury-related work leave[2], it mainly affects individuals between 30 and 50 years of age[3], representing 2-3% of the general population. The prevalence is 4.8% in men and 2.5% in women over 35. The average age of the first attack is 37 and in 76% of cases there is prior history of low back pain within the previous ten years.[4-5] Being overweight, smoking, driving and aging are considered risk factors.[6] Now under discussion is the role of genetics in the pathophysiology of the pain.[7] It is known that sciatica pain is the sum of several components: herniation and disc degeneration, as well as spinal canal stenosis,[8] i.e. mechanical and inflammatory factors.[9] The treatment of first choice is conservative (non-surgical)[10] and aims to: relieve pain, increase function and slow the progression of the illness.[11] The objective of this guideline is to evaluate the different types of treatment which currently exist for sciatica with lumbar disc herniation.

INCLUSION CRITERIA

Adult men and women over age 18;
No congenital disease;
No rheumatic disease;
No neurological disease;
No infectious disease;
Surgical treatment in accordance with the question.

EXCLUSION CRITERIA

Cervical or thoracic herniated disc;
Chronic nonspecific low back pain;
Other causes of low back pain.

1. What is the efficacy of muscle relaxant in the treatment of lumbar disc hernia?

A 5 mg dosage of Diazepam twice daily associated with physical therapy and analgesics showed less than 20% equivalence ($CI_{95\%}$ = -15 to 24, $p < 0.05$) in the centralization of referred pain when compared to the same treatment with placebo, after 7 days treatment. Patients under conservative treatment without benzodiazepine had their hospital stay reduced by 2 days ($p = 0.008$)[12] **(A)**.

A 2 mg dosage of tizanidine twice daily for the first 3 months, combined with 100 mg tramadol per day for the first 2 months and 1200 mg ibuprofen per day in the first month has less than satisfactory results in improvement in pain (measured by visual analogue scale (VAS) up to the first month of follow-up, when compared to epidural injection of 80 mg of methylprednisolone ($p < 0.05$). However, between 3 and 6 months follow-up there is no significant difference in pain improvement between the two groups ($p > 0.05$)[13] **(A)**.

Recommendation

The epidural injection of methylprednisolone at a dose of 80 mg is more effective than tizanidine 2 mg 2 times a day combined with conservative treatment in reducing pain in the first month. There is no evidence to prove the superiority or analgesic efficacy of muscle relaxants compared to conservative treatment for acute lumbar disc herniation.

2. What is the efficacy of anti-inflammatory treatment for lumbar disc hernia?

The use of meloxicam (7.5 mg), diclofenac (50-150 mg) and piroxicam (20 mg) shows no significant pooled effect for overall pain, and leg pain, in a 2 week or shorter period. ($CI_{95\%}$ = -10.2 to 0.4; $p < 0.07$) Combined treatment with meloxicam 7.5 mg/day, piroxicam 8 mg/day, and lornoxicam 20 mg/day was not shown to be statistically significant compared to placebo (-8.9 to 0.1; $I^2 = 0.1\%$; $p < 0.06$). The combination of meloxicam 15 mg/day, lornoxicam 8 mg/day, and piroxicam 20 mg/day also does not show statistical significance compared to placebo (-8.0 to 0.2, $I^2 = 0.6\%$, $p < 0.07$). Similarly, the combination of meloxicam 15 mg/day, diclofenac 50-150 mg/day and piroxicam 20 mg/day does not demonstrate statistically significant results compared to placebo (-9.4 to 0.6, $I^2 = 6.8\%$; $p < 0.09$)[14-16] **(B)**.

Piroxicam 20 mg taken orally twice daily for 2 days, followed by once per day during the following twelve days showed no significant reduction of leg pain and low back pain compared to placebo ($CI_{95\%}$ = -6.9 to 6.9)[16] **(B)**.

The use of meloxicam 7.5 mg/day compared to using diclofenac 50 mg three times per day for 14 days did not show statistically significant results regarding overall pain relief in an average period of one week ($IC_{95\%}$ = -15.2 to -15.2), while the use of meloxicam 15 mg/day compared to the use of diclofenac 50 mg, in three daily doses, shows statistically significant results for overall pain relief for the same period. ($CI_{95\%}$ = -4.5 to -6.5)[14] **(B)**.

Diclofenac 75 mg 2 times a day for 14 days showed worse results regarding overall pain relief within 1 week ($IC_{95\%}$ = 15.5 to 24.4) and even for an average 8 of weeks ($CI_{95\%}$ = 1.1 to 14.9), and the reduction of disability in approximately 1 week ($IC_{95\%}$ = 6.0 to 11.8) when compared to single injection (40 mg Methylprednisolone, 8 mg dexamethasone, 7 ml of 2% prilocaine HCL and 10ml of 0.9% NaCl)[17] (**B**).

Recommendation

Both the isolated use of anti-inflammatory drugs, and the combined use with other anti-inflammatory drugs or even with other classes of adjuvant drugs for pain relief in patients with disc herniation do not show strong enough results to be statistically significant, except for the parenteral use of corticosteroids, which showed greater analgesic efficacy in addition to reducing disability, when compared to diclofenac.

3. What is the efficacy of opioids in treating lumbar disc herniation?

The use of morphine with an initial dose of 15 mg/day incremented to 30 mg/day by the fourth day, as tolerated, with 15 mg added weekly to

the initial dose up to the maximum dose of 90 mg/day, over a period of four weeks, shows a not significant reduction of 7% in relieving leg pain compared to placebo in patients with lumbar disc herniation ($CI_{95\%}$ = -8 a 22%, $p > 0.05$). A combination therapy of morphine and nortriptyline also results in a 7% improvement ($CI_{95\%}$ = -4% to 18% $p > 0.05$). Thirteen patients who received morphine had improvement in overall pain (ARR: 0.033 $CI_{95\%}$: -0.123 to 0.189; NNT = 30 $CI_{95\%}$: 5 to ∞) while eighteen patients who received combination therapy of morphine and nortriptyline reported improvement in pain (ARR: 0.115 $CI_{95\%}$: -0.031 to 0.261; NNT = 9 $CI_{95\%}$: 4 to ∞)[18] **(B)**.

The rate of adverse effects in patients who used morphine therapy alone *versus* placebo was 93% (ARR: -0.196 $CI_{95\%}$: -0.359 to -0.033; NNH = -5 $CI_{95\%}$: -30 to 3), and with the combination therapy of morphine and nortriptyline it was 89% (ARR: -0.180 $CI_{95\%}$: -0.342 to -0.018; NNH = -6 $CI_{95\%}$: -57 to -3) showing low safety in the use of these medications[18] **(B)**.

Recommendation

There is no evidence to confirm the efficacy of opioids, which demonstrate a high rate of adverse effects with their use, for the treatment of pain in patients with lumbar disc herniation.

4. What is the efficacy of antidepressants in the treatment of lumbar disc herniation?

Nortriptyline in incremental dosage, starting with nightly doses of 25 mg for 7 days with 25 mg weekly increases during the following three weeks, as tolerated by the patient, up to a maximum dosage of 100 mg/day showed a not significant reduction of 14% of leg pain compared to placebo ($CI_{95\%}$ = -2% to 30%, $p > 0.05$)[18] **(B)**.

Combined treatment with nortriptyline and morphine initiated with daily doses of 25 mg and 15 mg for 7 days and 4 days, respectively, with morphine dosage increased to 30mg/day from the 5th day of treatment, and weekly increments of 25 mg of nortriptyline and 15 mg of morphine in the subsequent three weeks, as tolerated by the patient, respecting a maximum dose of 100 mg/day of nortriptyline and 90 mg/day of morphine, showed a not significant reduction of 7% of leg pain compared to placebo ($CI_{95\%}$ = -4% to 18%; $p > 0.05$)[18] **(B)**.

Twelve patients who received nortriptyline showed overall improvement in pain (ARR: 0.017 $CI_{95\%}$: -0.141 to 0.175; NNT = 59 $CI_{95\%}$: 6 to ∞) and eighteen patients who received combination therapy of morphine and nortriptyline reported improvement in pain (ARR: 0.115 $CI_{95\%}$: -0.031). Therapy with nortriptyline proved as safe as placebo in the occurrence of adverse effects (ARR = -0.081 $CI_{95\%}$ = -0.238 to 0.076; NNH = 12 $CI_{95\%}$ = 4 to ∞) whereas the combination therapy was less safe (ARR = -0.180 $IC_{95\%}$ = -0.342 to -0.018; NNH = -6 $CI_{95\%}$ = -57 to -3)[18] **(B)**.

The use of sarpogrelate hydrochloride 300 mg/day orally for 2 weeks demonstrated a 33% improvement in VAS scale average for low back pain, 32% for leg pain and 35% for numbness in the leg compared to the use of diclofenac sodium in oral dosage of 75 mg/day for 2 weeks. However the rates of improvement were not statistically significant ($p > 0.05$) between the two groups[19] **(B)**.

Recommendation

There is no scientific evidence to corroborate the analgesic efficacy of antidepressants in patients with disc herniation.

5. What is the efficacy of gabapentin for the treatment of lumbar disc herniation?

Gabapentin taken orally with an incremental dosage of 400 mg on the first day, 400 mg twice on day two, 400 mg every 8 hours on the third day and increased by 400 mg/day for 10 days to a maximum dose of 2400 mg/day reduces pain (visual analogue scale: 6.5 to 1.7, $p < 0.001$) increases the walking distance (0-100 m up to 1000 m, $p < 0.001$) three months after initiation of treatment. There are reports of improvements in symptoms and occupational capacity in 84.7% of treated patients. Adverse effects such as drowsiness and dizziness are observed in 9% of cases[20] **(C)**. Lower dosages from 300 mg/day up to 1800 mg/day for eight weeks, also relieve pain and improve quality of life in patients with chronic lumbar radiculopathy[21] **(C)**.

Additionally, topiramate taken orally at a dosage of 50-400 mg/day does not improve lower back pain, sciatica or disablility[22] **(B)**.

Recommendation

The maximum dosage of 2400 mg/day of gabapentin reduces pain and disability 3 months after initiating treatment. Topiramate shows no improvement of the same parameters at a dosage of 50-400 mg/day.

6. Is acupuncture indicated in the treatment of lumbar disc hernia?

Electroacupuncture, at a frequency of 4 Hz for 30 minutes three times a week for three weeks, reduces pain 42% by VAS, 1 day after the last treatment session ($p < 0.01$). Moreover, TENS (Transcutaneous electrical nerve stimulation) reduces pain 23% ($p < 0.05$), and the application of placebo 8%, at the same frequency. Furthermore, the daily consumption of anti-inflammatory analgesic decreases by 50% ($p < 0.01$), 29% ($p < 0.05$), and 8%, respectively, 3 weeks after the application of each therapy[23] **(B)**.

Applications of acupuncture on the ventral points RN9, RN6 and RN4 for thirty minutes once a day significantly improved pain after twenty applications, as assessed by the VAS, with averages of 4.98 ± 0.36 before, 3.06 ± 0.13 after 10 applications, and 0.83 ± 0.49 after twenty applications ($p < 0.05$). Compared to treatment with therapeutic manipulation there is a significantly greater improvement in pain (VAS before 4.77 ± 0.24 after 10 sessions 3.96 ± 0.31, and after twenty sessions 2.85 ± 0.49) ($p < 0.01$)[24] **(B)**.

Recommendation

Classical acupuncture and electroacupuncture significantly improve the pain caused by lumbar disc herniation.

7. Is exercise indicated for lumbar disc herniation?

In sciatica caused by acute lumbar disc hernia of less than 6 weeks duration, exercise combined with clinical treatment for 6 weeks with a total of 9 treatments shows 79% improvement, compared to 56% with clinical treatment alone after 52 weeks, as measured by the Global Perceived Effect (GPE) scale (ARR = 0.232; CI95% = 0.079 to 0.385; NNT = 4 CI95% = 3 to 13). The exercise program consists of therapeutic exercises, excluding passive modalities such as passive manipulation techniques or the application of mechanical techniques, combined with information and guidance on lumbar disc herniation. Clinical treatment also provides guidance about the condition, beyond prescribing pain

medications if necessary, based on the consensus of the Dutch College of General Practitioners (1996)[25] **(A)**.

Patients with severe disability, as measured by the Roland Morris Disability Questionaire (RDQ) scale, with RDQ ≥ 17, showed improvement of 84% compared to 53% with clinical treatment alone, after 52 weeks (ARR = 0.305; CI95% = 0.091 to 0.519; NNT = 3 CI95% = 2 to 11)[25] **(A)**.

Intensive physical exercise started 4 weeks after lumbar surgery improves disability in 63.5% measured by RDQ (p = 0.02) after 6 months, compared to 46.6% improvement with light exercises at home, guided by a therapist and with office visits every two weeks. There is also an improvement of 61.7% in the VAS (p = 0.04) with intensive exercise compared to 35.7% with light exercise performed at home. The intensive training consists of exercises for strengthening the lower back, abdominal and lower limb muscles, without manual intervention by a physical therapist, 3 times a week for 8 weeks. Twelve months after surgery there is no statistically significant difference between the treatments[26] **(A)**.

Using the questionnaire "Multidimensional Pain Inventory" (MPI), which considers the psycho-social behavior of the individual in relation to chronic pain, there is significant improvement in the 3-month (p = 0.02) and 12-month (p = 0.02) periods post-surgery, with intensive training started 1 day after surgery, intensified at 6 weeks and completed at 12 weeks in comparison with light exercise, suggesting that intensive training which starts early has a positive effect on how patients deal with pain. The intensive training includes exercises to increase the range of motion of the trunk and legs and strengthen the spine extensors, with 17 to 21 minutes more per session than the light exercise program. The latter followed mild-intensity training exercises focused on strengthening the abdominal muscles. There is no difference in VAS within 12 months after the treatments[27] **(A)**.

Two programs were compared: a supervised exercise program for lumbar and hip mobility, trunk stability, strengthening back, abdomen and leg muscles, started 3 weeks after surgery and performed once per week for 8 weeks, *versus* a home exercise program, guided by a physiotherapist who gradually increased the number of repetitions and was available to personally answer questions if necessary. The supervised program shows no difference in comparison with home exercise, as measured by the pain and disability Oswestry Disability Index (ODI) questionnaire taken within 12 months after surgery (p = 0.09). Home exercise shows significant improvement in pain and quality of life in relation to supervised exercise (p = 0.04). However this last program keeps patients more active for 12 months after surgery, and more satisfied with treatment 3 months after[28] **(A)**.

It should be highlighted that intensive exercise started 30 days post-discectomy, 1.5 hours per session 3 times a week for 8 weeks, is more beneficial than home exercises in reducing pain, as measured by VAS (p < 0.001) and improvement in disability (p < 0.01), as measured by the Modified Oswestry Disability Index immediately after the end of treatment[29] **(B)**.

Isolated exercises for strengthening the lumbar extensors, for 12 weeks beginning six weeks after lumbar surgery, are more effective for pain relief (VAS) (p < 0.05) when compared with home exercises for conditioning the lumbar spine. The "back to work" percentage also improves 4 months post-surgery (87% *versus* 24% respectively) and shows a significant increase in muscle mass in the multifidus and rotators as measured by computerized tomography[30] **(B)**.

Recommendation

Programmed exercise combined with clinical treatment for 6 weeks is better than clinical therapy alone in improving sciatica and disability in acute lumbar disc herniation with less than 6 weeks duration. Intensive exercise beginning soon after surgery is more effective than home exercises in improving disability and VAS, but home exercises can be effective if well guided by trained therapists available to answer questions throughout treatment.

8. What mechanical techniques are indicated for the treatment of lumbar disc hernia?

Traction, low power laser and ultrasound reduce the size of the herniated disc on magnetic resonance image by 20%, 17% and 24% respectively (p < 0.05) in a total of 15 sessions in 3 weeks with assessment 3 months after the end of treatment. Furthermore, there is significant improvement in 23%, 27% and 27% (p < 0.0167) after 3 months, respectively, as regards the parameters addressed in the Modified Oswestry Questionnaire, including pain and function. There is not, however, a statistically significant difference between the groups evaluated[31] **(B)**.

Low power laser is superior to ultrasound by 38% in achieving negative Lasègue's Sign the third month after treatment (p = 0.02), but there are no other significant differences shown with this clinical indicator among the cited modalities[31] **(B)**.

PENS (Percutaneous electrical nerve stimulation), or electro-acupuncture, reduces pain by 42% by VAS 24 hours after the last therapy session (p < 0.01), when administered with a frequency of 4 Hz for 30 minutes 3 times per week for 3 weeks. TENS (Transcutaneous electrical nerve stimulation) reduces pain by 23% (p < 0.05), while the application of placebo (sham-PENS) by 8%, applied on the same frequency. Furthermore, the daily consumption of anti-inflammatory analgesic medication decreases by 50% (p < 0.01), 29% (p < 0.05), and 8% respectively, during the 3-week application period of each therapy. PENS therapy is preferred by 73% of patients compared with 21% and 6% for TENS (p < 0.05) and sham-PENS (p < 0.01)[23] **(B)**.

The use of electro-acupuncture eliminates sciatic pain in up to 80% (p < 0.05) of cases when applied on the pain points parallel to the lumbar spine (BL24, BL25, BL26), while the cure rate with TENS on the same pain points is 44.9% (p < 0.05)[32] **(B)**.

Ultrasound is effective in reducing pain and range of motion of the lumbar spine when compared to rest alone (p < 0.01)[33] **(B)**.

The use of traction in conjunction with shortwave and iontophoresis significantly improves back pain as measured by the Japanese Orthopaedic Association system (JOA score), when compared to treatment with traction and shortwave (p < 0.05) and traction alone (p < 0.05)[34] **(B)**.

Recommendation

Traction, low power laser and ultrasound are effective in reducing pain and reducing the size of the herniated disc, but without statistical differences between them. Electro-acupuncture and TENS are effective in reducing pain, however electro-acupuncture is superior when used at a frequency of 4 Hz, 30 minutes a day, 3 times a week for 3 weeks. The combined use of mechanical techniques is more effective in reducing pain than when used alone.

9. Are physical rehabilitation therapies (exercise, OT/physiotherapy) indicated for postoperative lumbar disc hernia? Which?

The use of different types of therapeutic exercises for patients with lumbar disc herniation is indicated, among them, those performed on machines, with exercise balls and also in water. Men with a history of discectomy in the lumbar region (L3-S1) may benefit from physical rehabilitation through exercise performed in water or exercises performed on apparatus for strengthening the lumbar extensor muscles, initiated 6 weeks after surgery. Resistance exercise with equipment should be performed twice per week to strengthen the extensor muscles of the trunk. Stretching should be done initially for 10 minutes, after a warm-up followed by aerobic exercise and subsequently resistance exercise on the weight machine, going from 0° to 72° of trunk flexion (2 series of 15-20 repetitions each, at 50%-60% of 1RM (1-rep max)). Aquatic exercises should be performed in a pool with a depth of 1.3 meters with the temperature between 28-29° C, with 70-75% humidity and room temperature between 27 and 28° C. Stretching exercises should be performed first, followed by leg lifts (lifting the legs to the front, rear and sides, walking forward, backward and sideways and performing trunk flexion and extension). Both types of exercises should be performed for approximately 60 minutes. The exercise groups show improvement in isometric trunk strength after the first 6 weeks of training, but without statistical significance compared to the control group. After 12 weeks of exercise there is a significant difference ($p < 0.05$) in isometric strength between the exercise group *versus* the control group, however after a period without training, strength returns to similar levels among the three groups, returning to improved levels in the training groups compared to the control group after a new intervention period ($p < 0.05$)[35] **(A)**.

Early and intense rehabilitation after lumbar disc herniation surgery has a positive effect on pain, disability, and lumbar mobility. Patients with a herniated disc between L4-L5 and L5-S1 who, 2 weeks post-surgery, initiate neuromuscular control treatment with spinal muscle activation exercises using weights, resistance bands and exercise balls, with 2 weekly sessions (40-60 minutes per session) for 4 weeks, significantly decrease back and leg pain. The same occurs in individuals receiving traditional physiotherapy treatment starting 6 weeks after surgery and consisting of trunk stabilization exercises on fitness equipment designed to focus on mobility and coordination. After 12 months the result for pain as measured by the visual analog scale (VAS) is better ($p = 0.063$) compared to conventional therapy. Disability as measured by the Roland-Morris Disability Questionnaire is significantly reduced in individuals who initiate exercise early, and the difference is significant ($p = 0.034$) in comparison to the control group after 12 months[36] **(B)**.

Recommendation

Therapeutic exercise is recommended 2 times per week, 1 hour per session, performed both in water and on equipment, in order to strengthen the trunk extensor musculature of herniated disk patients 6 weeks after surgery[35] **(A)**.

The use of neuromuscular training initiated 2 weeks after surgery performed for 4 weeks with 2 weekly sessions of 40-60 minutes is superior to conventional treatment initiated after 6 weeks and has no adverse effects[36] **(B)**.

10. Are physical rehabilitation therapies (exercise, OT/physiotherapy) indicated for pre-operative lumbar disc hernia? Which?

Patients with low back pain due to disc herniation may benefit from various therapies, among them, the use of corticosteroid injections in anesthetic agents. The use of selective nerve block alone followed with physiotherapy improves disability and decreases pain. The nerve block should be performed by fluoroscopically-guided injection with a 22- or 20-gauge, approximately 9 cm (3.5-in) spinal needle. A 0.5 mL Methylparaben Free Lidocaine solution can be used with 2.2 mL of methylprednisolone acetate (Depo-Medrol*, 40 mg/mL) or 0.5 to 2.0 ml 1% or 2% lidocaine or 0.5% bupivacaine as a local anesthetic, and 0.5 to 2.0 mL of dexamethasone (40 mg/ml) and triamcinolone acetonide (40 mg/ml) as the glucocorticoid. No more than 3 injections are done in 2 weeks. Individuals who receive physiotherapy should perform strength and flexibility exercises for the spine extensors, with stabilization and cardiovascular exercises for 4 weeks, 2 sessions per week. Eight weeks after the start of the intervention there is observable improvement in disability in subjects who received the nerve block alone or individuals who received nerve block associated with therapy ($p < 0.05$), with no differences between the groups ($p = 0.83$). The group receiving injection followed by physiotherapy had a score of 39.6 ± 21.6 before and 22.4 ± 18.3 after 8 weeks; the group that received injection alone scored 35.7 ± 16.7 before and 16.9 ± 18.2 for the same period. Regarding the intensity of pain, this is from 5.4 ± 2.5 cm before and 3 ± 2.3 cm after treatment for the group with combined injection therapy and physiotherapy and from 4.9 ± 2 cm before and 2.4 ± 2.4 cm after the intervention for the injection group, both showing significant improvement ($p < 0.05$), but with no difference between the two techniques ($p = 0.63$)[37] **(B)**.

Lumbar disc herniation is a cause of low back pain, and treatment modalities such as educational programs, exercise, posture training, spinal manipulation, massage, acupuncture, physical therapy and lumbar support vest are recommended. Low-level laser therapy (LLLT) is a noninvasive, non-ionizing, monochromatic and electromagnetic polarized beam of highly concentrated light that has analgesic, mio-relaxant, tissue healing effects. The use of gallium-aluminum arsenide laser (GaAlAs, infrared laser diode) with a wavelength of 850 nm, output power of 100 mV continuous wave, applied for 4 minutes at each point (paraspinal tissues side of the lumbar disc spaces) with an energy of 40 J/cm^2 and a pulse frequency of 16 Hz for acute low back pain and 154 Hz applied to chronic LBP, active or not (placebo), combined with hot compress for 20 minutes is beneficial. Therapy for 3 weeks, 5 days per week totaling 15 sessions shows improvement ($p < 0.05$) in all assessments conducted: pain (VAS), mobility (Modified Schober Test), and disability (Roland Disability Questionnaire (RDQ) and the Modified Oswestry Disability Questionnaire (MODQ)), in all individuals, whether they have acute or chronic pain, whether with placebo or active laser combined with hot compress. There is no difference between the groups after the intervention ($p > 0.05$) in relation to VAS ($p = 0.40$), the Modified Schober Test ($p = 0.18$), and disability: RDQ ($p = 0.070$) and MODQ ($p = 0.07$). There is no difference between the use of laser and placebo laser on the severity of pain and functional capacity in patients with acute or chronic pain caused by lumbar disc herniation[38] **(A)**.

Recommendation

The use of hot compress for 20 minutes (15 sessions over 3 weeks) for individuals with acute or chronic pain due to lumbar disc herniation is recommended, because combined treatment with low power laser (gallium-aluminum arsenide) does not produce improvement[38] **(A)**.

The use of selective nerve block with a solution of 0.5 mL of methylparaben free lidocaine and 2.2 mL of methylprednisolone acetate, or 0.5 to 2.0 ml of 1% or 2% lidocaine or 0.5% bupivacaine as a local anesthetic, and 0.5 to 2.0 mL of dexamethasone (40 mg/ml) or triamcinolone acetonide (40 mg/mL) applied with a 22- or 20-gauge, approximately 9 cm (3.5-in) spinal needle, is recommended for patients with low back pain due to disc herniation, to decrease pain intensity and improve functional capacity. The use of nerve block may be combined or not with conventional physiotherapy exercises (strength and flexibility exercises for the spine extensors, with stabilization and cardiovascular exercises) performed 2 times per week[37] **(B)**.

11. Which scales are used most for assessment of depression and anxiety?

The main scales used to assess depression and anxiety in cases of lumbar disc herniation are: Hospital Anxiety and Depression Scale (HAD), Beck Depression Inventory (BDI), General Depression Scale (ADS-L), Center of Epidemiological Studies-Depression (CES-D) and Beck Anxiety Inventory (BAI).

The Hospital Anxiety and Depression Scale (HADS) has 14 items, seven of which are geared to assess anxiety (HADS-A) and seven for depression (HADS-D). Each of the items can be scored from zero to three, allowing a maximum score of 21 points for each scale.

The scale of the Beck Depression Inventory (BDI) consists of a self-report questionnaire with 21 multiple-choice items, each item having a value of 0-3. It is one of the most widely used tools for measuring the severity of depressive episodes.

The Beck Anxiety Scale (BAI) consists of 21 questions about how the individual has felt during the previous week, expressed as common anxiety symptoms. Each question has four possible answers, and that which most resembles the mental state of the individual should be marked.

The CES-D (Center for Epidemiological Studies - Depression; Radloff, 1977) is a screening test for depressive symptoms, a self-report scale consisting of 20 items involving assessment of the frequency of depressive symptoms experienced in the week prior to the interview. Originally, the cutoff point on the CES-D scale to identify the presence of depressive symptoms is ≥ 16 points.

The General Depression Scale (ADS-L) has not been validated for the Brazilian population.

The HAD-A Scale had a predictive power of poor (ppp) and satisfactory (pps) outcome of 28 and 81%, respectively[39] **(B)**.

Recommendation

Although they have not been used for lumbar disc hernia, use of the Beck Depression Scale, Beck Anxiety Scale and the Hospital Anxiety and Depression Scale is recommended.

12. What is the role of cognitive behavioral therapy in the treatment of lumbar disc hernia?

The use of psychomotor therapy with post-surgical patients, based on the cognitive-behavioral protocol of Linton, with education on healing processes, relaxation techniques, the use of coping strategies for pain management, motivational support, positive reinforcement of progress, and action plans for the management of obstacles, relapses and setbacks, reduces low back pain by 47% (64.3 ± 21.8 to 34.0 ± 19.9), which is statistically significant when compared to the 30% reduction (from 67.3 ± 21.9 to 46.9 ± 19.7) in the group that performed only the strength and endurance exercise protocol (breathing exercises, transfer training, gait training and other activities of daily living), three months after starting the program. Two to three years after surgery the results are equivalent, maintaining pain reduction with averages of 33.6 ± 29.9 for the exercise group and 30.4 ± 28.5 in the Psychomotor Therapy group. Both therapies last for three months, with daily exercise and cognitive behavioral therapy applied by physiotherapists every three weeks in the group undergoing Psychomotor Therapy[40] **(B)**.

The combination of Behavioral Graded Activity with motor training is not superior to specific motor training alone, in the overall perception of the patient (RRA = -0.179 CI 95% -0.364 to 0.006, NNH = 6 IC 95% of 3 to ∞). O Tratamento Comportamental Graduado consiste em técnicas de condicionamento operante que trabalham estratégias de reforço positivo como forma de aumentar comportamentos saudáveis, extinção de comportamentos desadaptativos relacionados à dor e educação a respeito de prognóstico e sintomas - e o Tratamento Específico Motorfocando exclusivamente em estratégias motoras, como explicações de ergonomia, eletroterapia e manipulação. Behavioral graded activity consists of operant conditioning techniques that apply strategies of positive reinforcement as a way to increase healthy behaviors, extinguish maladaptive behaviors related to pain, and educate regarding prognosis, symptoms, - and specific motor treatment, focusing exclusively on movement strategies such as explanations of ergonomics, electrotherapy and manipulation. The patients undergo 18-30 minute sessions with physical therapists for a period of three months. The authors conclude that physical therapists may have been unsuccessful in decreasing patient fear and insecurity during treatment because the Behavior Therapy protocol was not conducted properly, causing patients to seek help from other professionals; which reinforces the importance of the participation of a professional specializing in the application of this technique[41] **(B)**.

The combination of cognitive intervention and exercise has a beneficial effect similar to posterolateral fusion with transpedicular fixation at L4-L5 and/or L5-S1[42] **(B)**. Surgical treatment in patients who have undergone prior lumbar surgery with conservative treatment that includes cognitive intervention and exercises for 25 hours a week for three weeks - in which patients were given training regarding pain receptors, facet joints and muscle structure, being assured that there would be no increase in pain if they were to engage in other activities beyond those of everyday life, using their backs and not being extremely cautious, combined with resistance exercises, coordination and contraction of abdominal muscles, indicates no significant difference between the two groups after one year (p = 0.79), which shows that reoperation is not recommended in patients who have previously undergone lumbar surgery. However, statistically significant improvement in pain and disability is observed in both groups after one year (lumbar arthrodesis of 47.0 ± 9.4 to 38.1 ± 20.1, p = 0.023; cognitive therapy and exercise from 45.1 ± 9.1 to 32.3 ± 19.1, p = 0.001). Infection in the surgical wound was observed in 8.7% of surgery cases[42] **(B)**.

Cognitive behavioral therapy, combined with conservative medical treatment, is more effective than conservative medical treatment alone after six months in patients with acute sciatica due to lumbar disc prolapse or protrusion ($p < 0.001$). In the group undergoing cognitive-behavioral therapy, the average number of individual sessions was 27, for 1 hour once per week - which focused on guidelines about chronicity of the herniated disc, maladaptive coping strategies for pain, self-observation of associated risk factors, behaviors in daily life, identifying cognitive barriers, anxiety, and monitoring the consequences of the new behaviors and self-reinforcing. In the group receiving conservative treatment, the intervention was based only on electromyographic biofeedback means (12 sessions, once a week). These results indicate the importance of the association between physical and psycho-social approaches[43] **(B)**.

Recommendation

There are few published studies that address cognitive-behavioral interventions by professionals, making it difficult to compare research findings. However, early intervention, based on a multidisciplinary model can minimize complications due to chronic pain.

The role of cognitive-behavior therapy for herniated disc is still controversial. The combination of cognitive-behavioral therapy and resistance exercise, motor coordination and contraction of the abdominal muscles should be performed for a three week period under the supervision of professionals.

13. Which educational program is indicated for the treatment of lumbar disc herniation?

An audio-visual web-based educational program, on a laptop, offered the day before surgery increases satisfaction by means of the information provided[44] **(C)**. The program contains educational information about the disease, preoperative preparation, surgical procedures, risks and benefits, alternative therapies, and more. Among patients with herniated disc who undergo surgery 54% feel calmer, 82% found the information useful in preoperative preparation and 90% believe that this type of educational program can be significant for patients who will undergo other types of surgeries[44] **(C)**.

It is also known that educational level influences the improvement of patients undertaking non-surgical interventions, for example physiotherapy, and guidelines for exercises and the use of anti-inflammatory drugs. In a graded sequence, those with college graduate or above educations presented better bodily pain scores on the SF-36 questionnaire than those with some college education, who in turn had better scores than those with high school or less education, after four years of therapy [SF-36 values as medians and $CI_{95\%}$, respectively: 25.5 (2.8) 22 (15.4-28.7); 31 (2.6) 18.4 (12.4-24.5); 36.3 (1.8) 11.9 (7.6-16.2); $p < 0.05$]. However, for those undergoing surgical intervention, education level does not influence the improvement of the patients ($p > 0.05$)[45] **(B)**.

Recommendation

There is no effective educational program specific to lumbar disc herniation, although there is evidence that presurgical orientation calms the patient and the better educated the patient is, the better their recovery. More studies are needed before educational programs can be recommended.

14. Is periradicular infiltration indicated for sciatica caused by lumbar disc herniation?

Periradicular infiltration has been used frequently, and shows efficacy in relieving lumbar sciatica[46-50] **(A)**. The technique described performs periradicular infiltration guided by fluoroscopy in the surgical environment, at the lumbar site where the herniated disc is located[46] **(A)**. Different anesthetics are used, among them procaine, bupivacaine and lidocaine. Generally the anesthetic is combined with a corticosteroid, predominantly methylprednisolone[46-50] **(A)**. Periradicular corticoid infiltration is contraindicated in cases of extruded herniation[47-48] **(A)**. Sciatic pain relief is expected in up to 79% of subjects (CER 0.167; EER 0.143; RRR 14%, RRA .024; NNT 42), requiring repetition of the procedure 3 to 4 times per year and providing around 40 weeks of relief in a 52 week period[49] **(A)**.

Recommendation

Lumbar periradicular infiltration is recommended at the corresponding herniation site for the relief of lumbar sciatica pain, with the aid of fluoroscopy, in a surgical environment,[1] using 1% procaine (7 ml)[46] **(A)** or 0.25% bupivacaine (2 mL)[47-49] **(A)** or 1% lidocaine (10 mL)[49] **(A)**. The combination of anesthetic with steroids, especially methylprednisolone in doses ranging from 40 to 80 mg[46-51] **(A)** is recommended, with the exception of extruded lumbar disc herniation, where corticosteroids are contraindicated.

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