

# The Essence of Clinical Practice Guidelines for Lumbar Disc Herniation, 2021: 4. Treatment

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## Treatment of Lumbar Disc Herniation

### Summary

- Therapeutic concepts for lumbar disc herniation
  - Diverse options are available for both conservative and surgical treatment of lumbar disc herniation; however, treatment with high-quality evidence are limited.
  - Conservative treatment is chosen in principle; however, case-by-case selection of appropriate treatment is important as surgical treatment is desirable for some pathological conditions.
- Various surgical procedures
  - Various surgical procedures are used for treatment of lumbar disc herniation, and good results have been obtained with all procedures in general. However, sufficient education (understanding of characteristics of different surgical procedures), preoperative planning, and operative training are required before implementation, as there are procedure-specific complications.
- Indications for (emergency) surgery
  - Surgical treatment for lumbar disc herniation is indicated when conservative treatment administered for a certain period of time brings about no improvements. However, early surgical intervention may be desirable when severe motor deficits or cauda equina syndrome occurs, because the severity of symptoms and time are important factors.
- Is pharmacotherapy useful?
  - No particular drugs have been demonstrated to have clear efficacy in drug therapy for the purpose of improving pain and physical function in patients with lumbar disc herniation.
  - Some drugs have been shown to have efficacy in patients with neuropathic pain, such as low back pain, sciatica, and radiculopathy, including patients with lumbar disc herniation; however, many articles have conflicts of interest, and the number of high-quality articles is small.
- Is epidural corticosteroid injection therapy useful?
  - No articles with high evidence levels comparing the usefulness of epidural corticosteroid injection therapy with that of other therapeutic methods are available.
  - Epidural corticosteroid injection therapy can improve pain and quality of life (QOL) for ~3-12 months after administration.
  - There is no consensus for whether herniotomy can be avoided after epidural corticosteroid injection therapy.
  - The reported incidence of complications after epidural corticosteroid injection therapy broadly range from 0% to 29.2%; however, there is a paucity of high-quality evidence regarding its safety.
- Are physical therapy and alternative therapy useful?
  - Among conservative treatment methods aiming to alleviate pain and improve physical function in patients with lumbar disc herniation, no physical therapy and alternative therapy procedures have been fully demonstrated to have efficacy, and the therapeutic benefits of these procedures are limited.

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## Commentary

### 1. Therapeutic concepts for lumbar disc herniation

Conservative treatment is the first-line treatment for lumbar disc herniation because symptoms may improve with time. A guide for this timing is around 3 months, in which the herniated mass responsible for symptoms may be re-sorbed spontaneously. However, limited high-level evidence is available to define efficacy of conservative treatment, and no studies have demonstrated the efficacy of folk remedies and quasimedical practice that are currently used. Meanwhile, evidence for surgical treatment, particularly for short-term efficacy, has been established, and surgical treatment is useful for cases meeting indications. However, available evidence shows mixed results for evaluation of its long-term efficacy, and it is important to make correct judgments if surgical indications are met. Actual evaluation of the efficacy and safety of the selected treatment method in individual cases is necessary for effective treatment.

With regards to pharmacotherapy, non-steroidal anti-inflammatory drugs (NSAIDs) or oral corticosteroids, which are commonly used in the acute phase, alleviate inflammation localized to the herniated site, thereby reducing pain. Meanwhile, Ca<sup>2+</sup>-channel  $\alpha 2\delta$  ligand inhibitors alleviate pain caused by neuropathy by blocking pain transmission at synapses. Therapeutic agents recommended in the neuropathic pain guidelines<sup>1)</sup> include serotonin/noradrenaline reuptake inhibitors, extracted from the inflamed skin of rabbits inoculated with the vaccinia virus, and opioids, which are often used to treat lumbar disc herniation, albeit these drugs have not been approved for this purpose.

Injecting local anesthetics into the epidural space, including nerve root block, is a treatment procedure commonly used for patients with radicular pain. Corticosteroids, local anesthetics, or mixtures thereof are commonly used for this treatment procedure.

Physical therapy is performed to alleviate symptoms and improve QOL and pain or functional impairment in patients with lumbar disc herniation.

Surgical treatment is often selected when various conservative treatment procedures are poorly effective or when motor paralysis of the lower limbs worsens. There are many variations of surgical procedures; however, randomized controlled trials comparing surgical and conservative treatments have not yet provided a consensus about the superiority of the former in terms of long-term results, albeit its superiority at least in short-term results has been demonstrated. Regarding the results of surgical treatment, high preoperative severity and long disease duration ( $\geq 6$  months in general) are considered to be factors associated with poor outcomes. Preoperative severity has also been reported as a risk factor for prolonged postoperative leg paralysis, and paralysis is more difficult to improve as the interval between emergence and treatment increases. Postoperative outcomes are particularly poor and early surgical intervention is desirable when

patients have cauda equina syndrome (pain in both lower limbs, movement disorder, bladder and rectal disturbance, and sensory disturbance in the perineal region) or severe paralysis of the legs, and bladder and rectal disturbance.

### 2. Various surgical procedures

Discectomy is defined as a procedure involving more invasion than herniotomy, i.e., in addition to the hernia, a part of the intervertebral disc is removed. This surgical procedure is subdivided into three procedures depending on whether surgery is performed with naked eyes (open discectomy), with a microscope (microdiscectomy), or with an endoscope. The endoscopic procedure is further subdivided; two procedures called microendoscopic discectomy and full endoscopic discectomy, formerly known as percutaneous endoscopic discectomy, are currently mainstream, but there are others as well.

Herniotomy is a procedure to remove only the degenerated nucleus pulposus that is herniated. A meta-analysis of discectomy and herniotomy has shown superiority of herniotomy in terms of the operative duration, postoperative lumbar pain, postoperative analgesic use, and patient satisfaction; however, no differences were found in terms of the hernia recurrence rate, reoperation rate, bleeding volume, length of hospital stay, and intensity of postoperative sciatica<sup>2)</sup>. Nucleotomy, where a small volume of nucleus pulposus tissue is removed percutaneously, has historically been adopted but is presently obsolete. Spinal fusion is not commonly adopted to treat lumbar disc hernia, which usually does not demonstrate segmental instability.

### 3. Indications for (emergency) surgery

Immediate surgical removal of the herniated disc material is indicated when the patient demonstrates severe lower limb muscle weakness or when the patient has cauda equina syndrome (pain in both lower limbs, sensory disturbance, motor deficits, bladder and rectal disturbance, and sensory disturbance in the perineal region)<sup>3)</sup>, since prognosis of these patients is often poor.

### 4. Is pharmacotherapy useful?

Drugs that are prescribed in Japan to alleviate pain due to lumbar disc herniation include anti-inflammatory agents, analgesics including weak opioids, and drugs approved for neuropathic pain. NSAIDs, which are frequently used in clinical practice in Japan, have been shown to be effective for the treatment of acute low back pain, but their efficacy for lumbar disc herniation has not been established fully. Similarly, the efficacy of oral corticosteroids for lumbar disc herniation has not been established. Ca<sup>2+</sup>-channel  $\alpha 2\delta$  ligand inhibitors are used for treating neuropathic pain. Among them, the use of gabapentin for the treatment of lumbar disc herniation is not covered by health insurance in Japan. In contrast, pregabalin is indicated for neuropathic pain in Japan and is expected to have a therapeutic effect of alleviating pain in patients with lumbar disc herniation. Given the

fact that Ca<sup>2+</sup>-channel  $\alpha_2\delta$  ligand inhibitors are widely used in Japan, studies on their efficacy for pain associated with lumbar disc herniation are awaited. Acetaminophen may be considered for administration to patients with lumbar disc herniation, given its established safety; however, studies to establish its efficacy for pain associated with lumbar disc herniation are awaited, because acetaminophen has practically no anti-inflammatory effect and has not been shown to alleviate neuropathic pain<sup>4)</sup>. Tricyclic antidepressant amitriptyline is approved for use to alleviate peripheral neuropathic pain; however, there is no study proving its direct effect in patients with lumbar disc herniation<sup>5)</sup>. Serotonin-norepinephrine reuptake inhibitors are also used in patients with chronic neuropathic pain<sup>6)</sup>. Among them, milnacipran has no approved indications for neuropathic or chronic pain in Japan. In contrast, duloxetine is indicated for chronic lumbago, including neuropathic pain, in Japan; however, studies to verify the efficacy for treatment of radicular pain in patients with lumbar disc herniation are awaited. Neurotrophin<sup>TM</sup>, an extract from the inflamed skin of rabbits inoculated with the vaccinia virus, is indicated for lumbar pain and neuropathic pain in Japan<sup>7)</sup>. Based on actual clinical practice in Japan, tramadol, an opioid analgesic (weak), is expected to be used for the treatment of neuropathic pain associated with lumbar disc herniation, but direct evidence is unavailable. No biopharmaceuticals have been indicated for treating lumbar disc herniation in Japan. Chondroitin sulfate ABC endolyase is a newly approved drug that improves symptoms associated with lumbar disc herniation via intradiscal administration and is currently being used for patients who are not responsive to conservative treatment<sup>8,9)</sup>.

##### 5. Is epidural corticosteroid injection therapy useful?

Epidural corticosteroid injection therapy is used as a conservative treatment option in Japan. Its efficacy has been mentioned in the previous edition as follows: some studies have shown no short-term and medium-to-long-term efficacy, while some other studies have shown only short-term efficacy; therefore, pain may be alleviated at an early stage of treatment. Among articles reviewed during the present revision, no articles directly compared the epidural corticosteroid injection therapy and other treatment methods; they compared use versus non-use of steroids, different types and concentrations of steroids, and usefulness of different approach routes for drug injection.

Multiple variations in routes for drug injection exist in studies reviewed. The major routes for drug injection into the epidural space are as follows: 1. injection from the intervertebral foramen at a level almost the same as or slightly central to the nerve root block as performed in Japan<sup>10,11)</sup>, 2. injection between posterior vertebral arches<sup>10,12)</sup>, and 3. injection from the sacral hiatus<sup>10,13)</sup>. It is not uncommon that different analgesic effects are experienced with different approaches for epidural steroid injections in clinical practice. The review demonstrated lack of high-level evidence com-

paring the usefulness of epidural corticosteroid injection therapy with other therapeutic methods.

##### 6. Are physical therapy and alternative therapy useful?

Among conservative treatment methods aiming to alleviate pain and improve physical function in patients with lumbar disc herniation, many patients choose physical therapy and alternative therapy solely or in combination with other therapeutics mentioned above. Despite this situation, a very small number of randomized controlled studies directly evaluating the efficacy of specific procedures of physical therapy or alternative therapy in patients with lumbar disc herniation are available. No high-quality research articles demonstrating that exercise therapy was effective to alleviate pain and improve physical function in patients with lumbar disc herniation were found. Traction therapy aiming to alleviate pain and improve activities of daily living in patients with lumbar disc herniation is performed with the expectation that traction of the lumbar spine mitigates continuous compression of the nerve tissue by the herniated mass and stretches the contracted muscle tissue around the spinal column, resulting in pain alleviation and functional improvement; however, its effectiveness has not been demonstrated clearly. For the purpose of alleviating pain in patients with lumbar disc herniation, ultrasound therapy is performed in Japan with the expectation that the warming and micromassage actions of the mechanical vibrations of ultrasonic waves applied to the body through the skin exert various beneficial effects, including pain alleviation, blood flow increase, and tissue repair promotion; however, no high-quality evidence exists presently. Based on the clinical practice in Japan, corsets may be prescribed for local stabilization purposes in lumbar disc herniation patients with a complaint of pain; however, no studies testing the efficacy of corsets have been found in the extent of our search. Overall, the efficacy and therapeutic benefits of these procedures are limited, and more direct and high-quality studies verifying the efficacy are awaited.

**Conflicts of Interest:** The author declares that there are no relevant conflicts of interest.

The original version of this clinical practice guidelines appeared in Japanese as Yotsui Tsuikanban Hernia Shinryo Guidelines 2021, and its translated version in English was published in the Journal of Orthopaedic Science: Japanese Orthopaedic Association (JOA) clinical practice guidelines on the management of lumbar disc herniation, third edition. 2022;27(1): 31-78.

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