

Non-Pharmacological Management of Low Back Pain and Root Compression Revisited

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Abstract

The article discusses low back pain types, causes and mechanisms. It also discusses the management of low back pain, which is divided into two major types: the first is conservative management, the second is interventional management, which is subclassified into two sub-types: surgical intervention and non-surgical nonpharmacological intervention.

Keywords: Low Back Pain (LBP); Surgical Intervention; Non-Surgical Nonpharmacological Intervention; Kitchener's Technique; Single Vertebral Manipulative Therapy (SVMT)

What is low back pain

Low back pain (LBP) is known as pain or discomfort, localized to the lowest part of the backbone, either associated with lower limb radiation or not [1].

The back pain may range in intensity from a dull, constant ache to a sudden, sharp, or shooting pain; it is one of the most common reasons people see a doctor or miss days at work; even children can have back pain [2].

The incidence and prevalence of low back pain are roughly the same all over the world, a study in 2010 stated that its prevalence is 9.4% (95% CI, 9.0 - 9.8) [3]; next to the common cold, LBP is one of the commonest reasons why people seek medical attention, with a substantial medical social and economic impact for individuals, families, and society due to its high direct and indirect costs [4-6]. LBP ranks high, often first, as a cause of disability and inability to work, as its interference with the quality of life [7].

There are two types of back pain: Acute, short-term, lasts a few days to a few weeks; and chronic lasts more than 12 weeks.

Causes and mechanisms

Most causes of the acute low back pain are mechanical in nature, meaning that there is a disruption in the way the components of the back (the spine, muscle, intervertebral discs, and nerves) fit together and move. Examples of mechanical causes of low back pain include:

- Congenital: Skeletal irregularities such as scoliosis, lordosis, kyphosis, and other congenital anomalies of the spine such as spina bifida may cause pain through imbalance of weight axis.

- Traumatic: Injury of ligaments, muscles, tendons, bone, or disc rupture cause pain through nerve ending stimulation or injury.
- Degenerative problems: Intervertebral disc degeneration, which occurs when the nucleus pulposus loses its elasticity, as a normal aging process, causes diminution of disc spaces and shortness of vertebral column height leading to disturbance of body bearing axis.

Spondylosis, the degenerative aging of the spine, associated with osteophytes, sclerosis, and dehydration of pulposus nucleus, also, degenerative process of interarticular facet joints cause pain through nerve ending stimulation or injury.

- Inflammatory states: Include osteoarthritis, rheumatoid arthritis, as spondylitis and inflammation of the vertebrae which may cause pain through nerve ending stimulation or injury.
- Anatomical aberration: Spondylolisthesis, which happens when a vertebra of the lower spine slips out of place, with or without fracture of the pars interarticularis, pinching the roots at its exit causing referred pain, through its path distribution.
- Herniated or ruptured discs: Occur when the annulus fibrosus ruptures and the nucleus pulposus protrudes out of its sheath, which is painful by itself, more over it may compress a related root, or roots, or cause canal stenosis [2,4].
- Space occupying lesions: Tumors that compress or infiltrate the bony spine or spinal cord and roots, either primary or secondary, may cause pain through nerve ending stimulation or injury.
- Infectious: acute bacterial infections such as abscesses, and subdural empyema; or chronic like Pott's disease (TB).

Associations

In many instances low back pain (LBP) is associated by pain in one or both lower limbs, and less commonly lower limb pain may start before that of LBP; in spite of long-lasting recognition of lower limb pain as a common complaint for two millennia intervertebral disc impingement on a nerve root, which is the commonest cause of nerve root pain, was first described since less than a century [8]. Ever since disc herniations were first discovered, the goal of treatment or therapeutic intervention either surgical, or conservative, pharmacological, or non-pharmacological treatment has been to relieve the pressure on the nerve root.

In 1927, D. Petit-Dutaillis and Th. Alajouanine performed surgery in Paris on a patient with a herniated lumbar disc which they believed was responsible for the patient's lower limb pain [9] and Mixter and Barr, in 1933, reported to the New England Surgical Society in Boston on 19 patients including 11 with lumbar disc herniations [10].

Management

Management of low back pain is divided into two major types the first is conservative management, the second is the interventional management, which is subclassified into two types: surgical intervention and non-surgical nonpharmacological intervention.

Low back pain patients are commonly treated in the primary care facilities, a small proportion referred to secondary care and the smaller one undergoes surgery.

Conservative management

Conservative treatment of low back patients is primarily aimed at pain reduction either by analgesics and muscle relaxants, or by reducing pressure on the nerve root by physiotherapy and local analgesia and antiedematous measures, besides bed rest.

Cognitive behavioral therapy [13] and physical fitness are the most offered treatment options, despite non-conclusive study results. Drug therapy [14] offers temporary relief, especially for acute pain, but it is rarely beneficial in patients with chronic pain. Paracetamol and nonsteroidal anti-inflammatory drugs (NSAIDs) lower the pain intensity to a tolerable level. Narcotics alone or in combination are no longer used, as the risks of habituation and addiction grow over time. WHO's analgesic ladder [15], originally developed for the treatment of cancer pain, may be used in LBP. Bed rest, supportive belts, which used to be routinely prescribed, are no longer prescribed for back pain, as they are thought to prevent the muscles from providing the necessary structural support. Back schools, in which posture, exercises, and other training techniques for the back muscles are used, have limited or no value, especially for chronic pain syndrome [12]. Corticosteroids should be avoided, even by local injection, as placebo injections seem to work just as well as active injections, and neither give more than temporary relief [12]. Small doses of tricyclic antidepressants (especially amitriptyline) given up to an hour before bedtime can help regulate the sleep cycle, and control pain through its gate neurotransmission, which seems to help in some cases. Muscle relaxants also have limited role [13]. Spa, wet heat application, and even cold cabinets, which were introduced in Japan, which are used in some rehabilitation centers in Western countries, may be useful, but most treatments have not been validated. Radiofrequency neurotomy: in this procedure, a fine needle is inserted through the skin so the tip is near the area causing pain; radio waves are passed through the needle to damage the nearby nerves, which interferes with the delivery of pain signals to the brain.

Interventional management

Surgery

There is a consensus that surgery is indicated in carefully selected low back pain patients, with or without sciatica, in presence of a lumbar disc prolapse [18], or severe sciatic pain with motor or progressive neurologic deficits and the imaging demonstrates lumbar disc herniation compressing the nerve root, correlating with the patient's examination localizing findings.

The main surgical techniques available for treating LBP are fusion, prostheses, and stabilization procedures and devices [19-32]. Fusion techniques include Posterolateral fusion (PLF) with or without instrumentation, posterior lumbar inter-body fusion (PLIF), Transforaminal inter-body fusion (TLIF), Anterior lumbar inter-body fusion (ALIF), and Circumferential lumbar fusion via a dual anterior and posterior approaches. Prostheses can replace part of the functional spinal unit, e.g., either a disc or a joint. Finally, dynamic stabilization devices can be implanted using either pedicle screws or interspinous systems.

International consensus in management of low back pain concluded that non-operative treatment must be provided for a minimum of one year before considering surgery in patients with degenerative LBP; patients must be informed about conservative treatment options and also the risks related to surgery; standing radiographs must be obtained to assess sagittal spinal alignment and a magnetic resonance imaging scan to determine the mechanism producing pain; and, if fusion is performed, the lumbar lordotic curvature must be restored [21-32].

Non-surgical intervention

The spread of chiropractic and other manipulative techniques worldwide has won many adherents [12], who perceive that it works better than others. This hypothesis was recently put to the test [16] and although the respondents still favored such approaches (chiropractic adjustment, osteopathic manipulation, and physical therapy) perhaps because of the time spent and the laying on of hands meta-analysis cannot confirm the superiority of these manipulative techniques [17] over other forms of therapy [11]. Manipulative treatment techniques are more expensive than other techniques, as the patient needs frequent sessions, apart from surgery [17].

Spinal manipulation was found to be effective for both pain control and functional recovery and was recommended for uncomplicated and complicated acute LBP within the first month of symptoms. Many studies support spinal manipulation for acute LBP, resulting in both short and long-term benefits of 1 to 3 years [14,16,17,33].

Single vertebral manipulative interventional technique

Single Vertebral Manipulative Therapy (Kitchener's Technique) (SVMT) is effective in alleviating pain levels and regaining physical functioning in low back pain with spinal root compression syndromes in comparison to standard conservative medical care strategies.

Single Vertebral Manipulative Therapy (Kitchener's Technique) (SVMT) (Kitchener 2016): is a newly developed chiropractic therapeutic technique; it depends on moving one vertebra at a time, giving more appropriate control to the intervention process [34].

Kitchener's Technique (SVMT) description

In one or two sessions at most, clinician moves one single vertebra, at a time, by hand to:

- 1) Make negative pressure in the annulus fibrosus in-between vertebrae.
- 2) Release compressed root.
- 3) Re-align vertebrae.
- 4) Re-position facet articulations.
- 5) Opposition of any fractured pars intervertebralis, in cases of spondylo-lithesis with fractured pars.

In the new technique, only the bare hands are used for manipulation, as clinician moves a single vertebra at a time, gently and with precision.

In difficult and very obese patients, technique is done under direct visual monitoring using C-arm. Also, for training of new staff, C-arm is used to enrich fine sensory discrimination skills of the trainees.

Results of a recent study suggested that SVMT offers a significant advantage for decreasing pain and improving physical functioning in acute and subacute cases of LBP associated with root compression syndromes, which is the severest form of LBP [35].

Conclusion

International consensus in management of low back pain concluded that conservative and non-operative treatment must be provided for a minimum of one year before considering surgery in patients with degenerative LBP; patients must be informed about conservative treatment options and the risks related to surgery.

Single Vertebral Manipulative Therapy (Kitchener's Technique) (SVMT) is effective in alleviating pain levels and regaining physical functioning in low back pain with spinal root compression syndromes, it is more effective and less costly as regards functional recovery.

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