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A Review of Etiology Pathogenesis, Treatment of Sciatica

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Abstract: ***Sciatica is a disease occurred by the compression of the spinal nerves that are arise from the L4 to S3 the symptoms of the sciatica patientsare radicular pain in leg ,tingling sensation and numbness. It was caused by lumbar herniated disc, degenerative disc disease, isthmic spondylolisthesis, lumbar spinal stenosis, piriformis syndrome and treated with Analgesics or NSAIDS, Acupuncture, Epidural steroid injections, spinal manipulation. This article reviews about the different etiological pathways causing sciatica and its treatment.***

Keywords: sciatic nerve, herniateddisc, analgesics, epiduralinjections, pathway

1. Introduction

Sciatica is a disease of peripheral nervous system it is a shooting pain down the back of one or both of legs of the sciatica nerve derived from from spinal nerves L4 to S3.In about 90% of cases sciatica is caused by herniated disc with nerve root compression.In general an estimated 5-10% of patients with low back pain have sciatica[1].The main risk factors are age(45-64yrs),increasing risk with height,smoking,mental stress and strenuous physical activity –like ifiting, especially while bending and twisting.The sciatica patients with common symptoms like radicular pain in leg ,tingling sensation and numbness.It was caused by lumbar herniated disc, degenerative disc disease, isthmic spondylolisthesis, lumbar spinal stenosis, piriformis syndrome, sacroiliac joint dysfunction and there are some other causes like pregnancy, scar tissue, musclestrain, spinal tumor, infection, fracture, ankylosing spondylitis and it was diagnosed by the following indicators like unilateral leg pain greater than low back pain,pain radiating to foot and toes,numbness and paraesthesia ,straight leg raising test induces more leg pain and it was treated with Analgesics or NSAIDS, Acupuncture, Epidural steroid injections, spinal manipulation, fraction therapy, physical therapy and behavioural treatment[2].

Etio-Pathogenesis of Sciatica

The sciatica is developed in many ways among them most common are the following:

- Herniated discs are the most common cause of sciatica in the lumbar spine.
- Degenerative disc disease a natural biological process assosciated with aging, is known to cause disc weakness that can be a precursor to a disc herniation.
- Lumbar spinal stenosis is a narrowing of sciatic nerve.
- Isthmic spondylolisthesis results from the vertebra to slip forward on the sacral segment (S1). The slippage may cause the L5 nerve root to become pinched as it leaves the spine.
- Piriformis syndrome is named for piriformis muscle and the pain causes when muscle irritates the sciatic nerve.
- Spinal tumors and infections are other disorders that may compress the sciatic nerve, but this is rare[2].

The origin of sciatic pain is probably multifactorial, involving mechanical stimulation of the nerve ends of the external portion of the fibrous ring, direct compression of the nerve roots (with or without ischemia) and a series of inflammatory phenomena induced by the extruded nucleus[3].

Lumbar Herniate Disc: Herniated disc, an abnormal bulge or breaking open of a spinal disc. The factor that triggers sciatic pain is the mechanical compression of the nerve root caused by the disc herniation.

A Herinated disc occurs when the outer part(annulus fibrosus) of the disc ruptures allowing the gel(nucleus pulposus) inside to bulge and protrude outwards between the vertebrae.The ruptured disc can dessicate and the desscicated disc cannot perform load bearing function of the spine it leads to spinal instability. Whether a disc bulges or herniates, disc material can press against an adjacent nerve root and compress delicate nerve tissue and cause sciatica.

Pathway: As the age increases vascular changes start to fail and vascular diffusion of nutrients decrease thus number of viable chondrocytes in the nucleus pulposes diminishes it leads to decrease synthesis rate and concentration of proteoglycans and proportion of collagen increase in nucleus pulposes then water binding capacity decrease it leads to nucleus become more fibrous and stiffer then nucleus is less able to bear and disburse load, transferrin load to the posterior annulus fibrous. Fissures develop across annuluar lamella may extend upto disc periphery it leads to disruption of disc by entering the nucleus pulposus by these fissures finally leads to herniated disc.

Not only does the herniated disc cause direct compression of the nerve root against the interior of the bony spinal canal, but the disc material itself also contains an acidic, chemical irritant (hyaluronic acid) that causes nerve inflammation. In both cases, nerve compression and irritation cause inflammation and pain, often leading to extremity numbness, tingling, and muscle weakness[4].

Treatment:

Conservative treatment includes support physiotherapy with analgesia and relaxation, particularly through exercises and

stretching. The aim of the treatment is to relieve pain and stimulate neurological recovery. NSAIDs are the medications that should be used most, since these exactly meet the physiopathological needs (which are basically problems of inflammation), while pure analgesics remain an additional therapeutic resource.One alternative to help the conservative treatment is blockage of the affected root using anesthetics and corticoids. These act directly on the hernia, through reducing its volume, and on the root, through reducing its inflammatory response.

Surgical treatment is to decompress nerve structures by laminectomy or microdiscectomy.

Degenerative Disc Disease (DDD)
The discs of the spine serve as "cushions" between each vertebral segment. Degeneration (deterioration) of the disc makes the disc more susceptible to herniation (rupture), which can lead to localized or radiating pain. Sciatica can result from disc herniation ("ruptured disc") when nerves in the low back are irritated.

Pathway:A degenerative disc is an aging disc that is dried and cracking. As we age, the water and protein content of the cartilage of the body changes. Disc gradually dries out, loses height and volume as the nucleus pulpeouschenges from a turgid gelatinous to brownish dessicated structure then annulus fibrous develop fissures parallel to the vertebral end plates it leads to compressive loads transfer away from nucleus to margins. This change results in weaker, more fragile, and thin cartilage. Because both the discs and the joints that stack the vertebrae (facet joints) are partly composed of cartilage, these areas are subject to wear and tear over time (degenerative changes). The gradual deterioration of the disc between the vertebrae is referred to as degenerative disc disease. Wear of the facet cartilage and the bony changes of the adjacent joint is referred to as degenerative facet joint disease or osteoarthritis of the spine.

Treatment:

Pain medication: Typical pain medications used to treat the low back pain include acetaminophen, NSAIDs, oral steroids, narcotic drugs, and muscle relaxants.
Chiropractic manipulation: Manual manipulation by a chiropractor or other qualified health professional is thought to provide lower back pain relief by taking pressure of sensitive neurological tissue, increasing range of motion, restoring blood flow, reducing muscle tension, and creating a series of chemical reactions in the body (such as endorphin release) that act as natural painkillers.
Epidural injections: An epidural injection into the spine delivers steroids that can provide low back pain relief by decreasing inflammation in the painful area.
Transcutaneous Electrical Nerve Stimulators (TENS): These devices deliver mild electrical stimulation that overrides the painful signals sent to the lower back.

Lumbar Spinal Stenosis

Lumbar spinal stenosis (LSS) is commonly used to describe patients with symptoms related to anatomical reduction of the lumbar spinal size.

Pathway: The narrowing of spinal canal leads to stenosis. In the spine, the passageways are the spinal canal and the neuroforamen. The spinal canal is a hollow vertical hole that contains the spinal cord. The neuroforamen are the passageways that are naturally created between the vertebrae through which spinal nerve roots exit the spinal canal. As, the canal space narrows, the spinal cord and nearby nerve roots are squeezed it leads to the nerve compression[5].

Treatment

Medications: Analgesics, NSAIDs, muscle relaxants and opioid
Epidural injections: An epidural injection into the spine delivers steroids that can provide low back pain relief by decreasing inflammation in the painful area.
Physical therapy, exercises and bracing :A comprehensive rehabilitation program of manual therapy, stretching, and strengthening exercises forthe lumbar spine and hip region.
Surgery: Decompressive laminectomy

Isthmic Spondylolisthesis
Greek words (spondylo = vertebra, and olisthesis = translation). The spine condition called isthmic spondylolisthesis occurs when one vertebral body slips forward on the one below it because of a small fracture in a piece of bone that connects the two joints on the back side of the spinal segment.

Pathway: The isthmus, or pars interarticularis, is a small, thin segment of bone that connects the facet joints at the back of the spine. A fracture of the isthmus, known as a spondylolysis, is usually a result of stress to the spine and may lead to slippage of the vertebrae, known as spondylolisthesis. It results from a stress fracture often at the 5th lumbar vertebra (L5). The fracture combined with disc space collapse may allow the vertebra to slip forward on the sacral segment (S1). The slippage may cause the L5 nerve root to become pinched as it leaves the spine[6].

Treatment

General
- Initially resting and avoiding movements like lifting, bending and sports.
- Analgesics and NSAIDs reduce musculoskeletal pain and have an anti-inflammatory effect on nerve root and joint irritation.
- Epidural steroid injections can be used to relieve low back pain, lower extremity pain related to radiculopathy and neurogenic claudication.
- A brace may be useful to decrease segmental spinal instability and pain.

Surgery
Patients with chronic and disabling symptoms, who fail to respond to conservative management may be referred for surgery. When the condition of spinal instability is very severe, a surgical intervention may be necessary to attach the vertebras together. It can help the patient to reduce pain, improve spinal function and increase the quality of life. The goal of surgery is to stabilize the segment with listhesis, decompress the neural elements,reconstruction of the disc

space height and restoration of normal sagittal alignment.options for surgical treatment; one of them is fusion (e.g. posterolateral fusion). The aim of fusion is to reduce pain by reducing the motion of the segment.

2. Piriformis Syndrome

Piriformis syndrome is a controversial condition which is believed to result from compression of the sciatic nerve around the piriformis muscle.

Pathway: When the piriformis muscle shortens or spasms due to trauma or overuse, it can compress or strangle the sciatic nerve beneath the muscle. Generally, conditions of this type are referred to as nerve entrapment or as entrapment neuropathies; the particular condition known as piriformis syndrome refers to sciatica symptoms not originating from spinal roots and/or spinal disc compression, but involving the overlying piriformismuscle[7].

Treatment:

- Therapeutic injections such as local anesthetics (e.g.,lidocaine), Anti-inflammatory drugs and/or corticosteroids, botulinum toxin (BTX, BOTOX), or a combination of the three, all of which have a well-documented effectiveness at relieving muscle-related pain.
- Stretching of the hip muscles should not be done until the acute pain is gone. At that point in time, begin with gentle stretching, such as the cross-legged stretch while pulling up on the knee. The muscle should have increased flexibility before an active return to running.
- For rare cases with unrelenting chronic pain, surgery may be recommended. Surgical release of the piriformis muscle is often effective[8].

Spinal Tumors and Infections are other disorders that may compress the sciatic nerve, but this is rare. Spinal tumors are abnormal growths that are either benign or cancerous (malignant). If a spinal cord tumor is small and not causing symptoms, it might not need to be treated right away. Other spinal cord tumors are treated like those in the brain. Astrocytomas of the spinal cord usually cannot be removed completely. They may be treated with surgery to obtain a diagnosis and remove as much tumor as possible, and then by radiation therapy, or with radiation therapy alone. Meningiomas of the spinal canal are often cured by surgery, as are some ependymomas. If surgery doesn't remove an ependymoma completely, radiation therapy is often given.

3. Conclusion

Sciatica is one of the most frequently reported complaints affecting quality of life and reducing social and economic efficiency and most cases of sciatica are self-limiting and pain tends to resolve within a matter of months. Disc herniation is a pathological condition with an extremely benign course.Conservative and surgical intervention are two predominant choices for therapy. Epidural steroid injection remains a popular treatment for the acute phase of sciatica.Patients with symptomatic stenosis may present with one or more of a combination of axial pain,radiculopathy and neurogenic claudication. Decompressive surgery is the gold standard for treatment of central or lateral recess lumbar stenosis. In cases in which pain is difficult to control, foraminal block is the best option.Surgical indications should be proposed if conservative treatment fails, or if the neurological symptoms progress. In such cases, microdiscectomy (under a magnifying glass or through a microscope) with preservation of the ligamentumflavum has been shown to be effective for preventing complications, avoiding peridural fibrosis and reducing symptomatic relapses.

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References

[1] M. A. Stanford, P. Peng, D. A. Hill M. A. Stanford, P. Peng , D. A. Hill "Sciatica: a review of history, epidemiology, pathogenesis, and the role of epidural steroid injection in management". British Journal of Anaesthesia, Volume 99, Issue 4, 1 October 2007, Pages 461–473

[2] B W Koes, M W van Tulder and W C Peul "Diagnosis and treatment of sciatica" British Medical Journal, 2007 Jun 23; 334(7607): 1313–1317.

[3] 3.Mei Ji, Xiaoxia Wang, Meijuan Chen, Yan Shen, Xu Zhang, and Jin Yang "The Efficacy of Acupuncture for the Treatment of Sciatica: A Systematic Review and Meta-Analysis". Evidence-Based Complementary and Alternative Medicine hindawi,Volume 2015 (2015), 12 pages

[4] Luis Roberto Vialle, EmilianoNevesVialle, Juan Esteban SuárezHenao, and Gustavo Giraldo "LUMBAR DISC HERNIATION" RevistaBrasileira De Ortopedia journal. 2010 Jan; 45(1): 17–22.

[5] SeungYeop Lee, Tae-Hwan Kim, Jae Keun Oh, Seung Jin Lee, and Moon Soo Park. "Lumbar Stenosis: A Recent Update by Review of Literature". Asian Spine J. 2015 Oct; 9(5): 818–828.

[6] Foreman P. et al, L5 spondylolysis/spondylolisthesis: a comprehensive review with an anatomic focus, Childs Nerv Syst. 2013;29(2):209-16

[7] KevorkHopayian, Fujian Song, Ricardo Riera, and SidhaSambandan "The clinical features of the piriformis syndrome: a systematic review".European spine journal springer, 19(12): 2095–2109.

[8] Miller TA, White KP, Ross DC (September 2012). "The diagnosis and management of Piriformis Syndrome: myths and facts". The Canadian Journal of Neurological Sciences.Le Journal Canadien Des Sciences Neurologiques. 39 (5): 577–83.