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Long-term outcome of lumbar disc surgery: an experience from Pakistan

Clinical article

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Object. The author conducted a study to determine the long-term outcome of lumbar disc surgery on relief of sciatic leg pain.

Methods. This was a retrospective observational study conducted at Fauji Foundation Hospital, Rawalpindi, Pakistan. The author reviewed medical records of 68 patients who underwent lumbar disc surgery for sciatic pain during the period 1995–2004. All patients were physically examined and interviewed.

Results. Lumbar disc surgery yielded complete pain relief in 79.41% of the cases. In 14.7% of the cases surgery failed to give any pain relief, and in 5.88% it yielded partial pain relief. At up to 10 years postoperatively, 27.77% of patients remained absolutely pain free. Pain recurred in 12.82% of cases after 1 year, in 35.89% during the first 5 years, and in 51.28% after 10 years. Pain recurred in the same leg in 63.88%, in the contralateral leg in 19.44%, and in both legs in 16.66%. Neurological deficits did not improve in any case except in 1 case of foot drop. New neurological deficits developed postoperatively in 8.82% of cases in the form of foot drop and calf muscle weakness .

Conclusions. Surgery provided immediate pain relief in 79.41% of cases, but the long-term outcome of lumbar disc surgery was not satisfactory. *(DOI: 10.3171/2009.10.SPINE09142)*

Key Words • **sciatica** • **lumbar disc** • **discectomy** • **pain** • **recurrence**

Disorders of the spine are leading causes of disability worldwide in the adult working population. Degenerative disc disease is the most common spinal disorder today. In the US, nearly 300,000 spinal surgeries are performed annually. The cost of disc surgeries exceeds $50 billion US.[16] Overall, 1.5 million disc surgeries are performed worldwide every year.[24] The annual incidence of discogenic sciatica is 5 in 1000.

Before 1930, sciatica was considered to be the result of disorders of the sacroiliac joint.[6] Mixter and Barr, in 1934, were the first to introduce discectomy as a treatment for sciatica. Forty years later Yaşargil and Casper introduced microsurgical discectomy. In 1975, Hijikata introduced endoscopic surgery. In 1985, Froning introduced the idea of an artificial disc for disc arthoplasty.[8]

The initial symptom of a herniated disc is usually low-back pain. Most patients have a history of episodes of focal backache without sciatica, which recovers spontaneously. Features suggestive of sciatica are unilateral leg pain radiating to the foot and toes, numbness in a dermatomal distribution, and positive straight leg–raising test. Sciatic pain becomes aggravated on sitting, standing, walking, straining, and coughing. It is only relieved by lying down, with the hip and knee flexed. A patient is usually able to trace the pain distribution.[17]

The most common cause of sciatica is herniated lumbar disc. The lumbar spine is prone to disc herniations because it supports the weight of the entire spinal column and the lower 2 lumbar vertebrae exhibit significant motion due to the horizontal orientation of the facet joints.[12] Aging and degenerative processes make lower-level discs prone to anular tears and subsequent disc herniation. The peak incidence of lumbar disc herniation is the 3rd–5th decades.

Ninety-eight percent of disc herniations occur at the L4–5 and L5–S1 levels; of these, 70% of disc prolapses occur only at the L5–S1 level. Only 2% of herniations occur at higher lumbar levels, and these lesions are usually seen in the older age group.[9]

Sciatica is usually a self-limiting disease.[21] More than 95% of patients with sciatica improve within 4 weeks after conservative treatment.[16,26] However, once disc herniation is diagnosed both clinically and radiologically, and if patients do not improve with conservative treatment within 6–8 weeks, surgery should be offered without further delay.

Valid indications for surgery and its optimal timing are still not clear.[24] The only absolute indication of surgery is acute cauda equina syndrome. All other conditions, such as intractable recurrent pain and neurological deficit, are relative.[10,25] Elective surgery may be offered for unilateral sciatica after the patient has undergone an adequate trial of conservative treatment.[17] Surgery is usually required in cases of severe sciatica, but moderate and mild cases need thorough scrutiny.[23]

The main aim of disc surgery is relief of sciatic leg pain. Surgical treatment has a short-term advantage over nonsurgical treatment, as it yields rapid relief of pain in more than 90% of cases.[21,23,24] Long-term results of surgical operations show that 10–40% of patients continue to have symptoms in the form of pain and motor deficit.[4,15]

The prognosis for surgery is good in young individuals, males, educated patients, those with shorter duration of preoperative symptoms, and those without any neurological deficit.[14] Chronic sciatica, female sex, and diabetes usually carry a poor prognosis. Patient selection, correlation of clinical findings with radiological findings, and psychological background are important prognostic factors in a patient's ultimate outcome after disc surgery.

Methods

This is an observational retrospective study of 68 patients who underwent lumbar disc surgery for sciatic leg pain at the Fauji Foundation Hospital, Rawalpindi, Pakistan, during the period 1995–2004.

Inclusion criteria included were the patient's availability for examination and laboratory investigations, the presence of complete medical records, surgery only for sciatic leg pain and not for low-back pain, absence of a subsequent reoperation for sciatica after a first lumbar disc surgery, and no other medical or surgical problem mimicking sciatic pain at the time of final check-up.

No patient was included who had been surgically treated more than 10 years previously.

Patients suffering only from low backache, those suffering from traumatic spinal injury at any time after lumbar disc surgery, or those who had undergone pelvic, gynecological, or abdominal surgery after lumbar disc surgery were not included in the study.

The aim of the study was to determine the time interval to recurrence of sciatic symptoms or the length of the pain-free postoperative period; the goal was not to ascertain factors associated with good or bad outcome.

Clinical judgment, meticulous physical and neurological examinations, and an up-to-date medical record were the only outcome measuring tools in this study.

All patients were contacted by mail or telephone and given a clear-cut explanation of the study. Only 68 patients responded and participated in the study. Of these, most of the symptomatic patients were already undergoing follow-up for their persistent sciatic pain. Asymptomatic patients responded and appeared for the interview and examination on request.

Medical records of all patients were reviewed to note preoperative signs and symptoms and relevant preoperative investigations. Review of these records demonstrated that all patients had low-back pain and sciatic leg pain preoperatively of more than 6 months' duration. All of these patients had also received conservative treatment in the form of physiotherapy and bed rest for more than 6 weeks. Most of the patients underwent fluoroscopy-guided water-soluble lumbar myelography, and only a few underwent CT or MR imaging because these modalities were not available in the city. All necessary laboratory studies were performed before surgery to exclude conditions other than lumbar disc disease. In all cases a herniated disc was found to be the cause of sciatic pain. However, preoperative radiological studies such as myelograms and CT or MR images were not available for review. No case of spinal tuberculosis, spinal stenosis, or spondylolisthesis was included in this series. In all cases surgery was performed after induction of general anesthesia. A wide bilateral laminectomy at L-4, L-5, or S-1, as well as discectomy and curettage of the disc space, was performed in all cases but without spinal fusion and fixation.

All patients were physically examined and interviewed by the author. The main emphasis was neurological examination of the lower limbs. Straight leg–raising test, lower-limb reflexes, and the sensory and motor status of both legs were carefully examined. All routine laboratory investigations—such as complete blood count, erythrocyte sedimentation rate, C-reactive protein, and liver and renal function tests—along with chest radiography studies were done to exclude any comorbidity, neurogenic claudication, spondylolisthesis, and polyarthritis. Only plain radiographs of the lumbosacral spine were acquired to confirm a laminectomy defect as a clue of past surgery. In no case, did we perform postoperative myelography or CT/MR imaging.

In cases of recurrent sciatic pain, efforts were made to look for the signs and symptoms related to sciatic radiculopathy. This was the only way to presume clinically that recurrent symptoms were most probably due to recurrent disc herniation.

All symptomatic patients refused to undergo any further investigation out of fear of further surgery and the pain of myelography.

Results

There were 44 women and 24 men in this study. Most of the patients were in the 4th (30.88%) or 5th (33.35%) decade of life. The majority of patients (75%) suffered from unilateral sciatic leg pain. Only 24.52% of the patients had bilateral sciatica. Preoperative neurological examination showed that 75% of patients had no neurological deficit except pain at the time of presentation, but 25% presented with some form of a sensory or motor deficit of more than 6 months' duration. Sensory deficits of pain and sensitivity to touch in the leg dermatomes were present in 41% of these patients. Motor deficits in the form of foot drop or weakness or calf muscle wasting were recorded in 35%. Two patients were suffering from neurogenic claudication and 2 others had urinary incontinence before surgery. Lumbar myelography was conducted as a preoperative diagnostic procedure in 91.17% of the cases. Computed tomography and MR images were acquired

only in a few cases. Surgery provided complete pain relief in 79.41% of the cases.

Of the 68 patients treated surgically, 54 (79.41%) became pain free after surgery, 4 (5.8%) had partial relief of pain, and 10 (14.7%) received no benefit.

Postoperatively, sensory loss did not improve in any case. Only in 1 patient with a foot drop deficit did improvement occur; in the remaining cases, motor deficits did not improve. Both cases of neurogenic claudication and urinary incontinence, however, improved.

A new neurological deficit also appeared over the follow-up period in 8.82% of the cases in the form of foot drop and calf muscle weakness. Of patients who became pain free after surgery, 27.77% remained completely pain free up to 10 years postoperatively.

In 39 (77.22%) of the 54 patients who received an initial benefit from surgery, pain recurred sooner or later, either in the same or the opposite leg. In this group of 39 patients for whom 10-year follow-up data were available, pain recurred in 5 (12.82%) patients during the 1st postoperative year, in 14 (35.89%) patients after 5 years, and in 20 (51.28%) patients after 10 years. Recurrence of pain was highest in the same leg in 63.88% of cases; pain recurred in the opposite leg in 19.44% of cases and in both legs in 16.66% of cases. No patient underwent any further radiological study for evaluation of pain or any repeat surgery.

Discussion

Sciatica is not always caused by a herniated lumbar disc. A diagnosis cannot be confirmed preoperatively or radiographically in 30% of cases, despite strong clinical evidence of lumbar disc herniation.[6,17] In many asymptomatic patients who had never had backache or sciatica, various imaging modalities such as CT or MR imaging show lumbar disc herniation in 30–50% of cases.[4,5,8,13,20]

Not every patient suffering from sciatica needs to undergo imaging investigation. Not all prolapsed discs cause sciatica or need surgery. Unnecessary and premature imaging may lead to incidental findings, which may require further study and cost. Imaging studies should not be a substitute for careful physical examination.[4,20,21]

The exact pathophysiology of sciatic pain is still not known.[3] Many poorly understood factors are involved in the pathophysiology of this disease.[29] Mechanical compression of a prolapsed disc over the nerve root is supposed to be a source of pain. Anular tears, however, can also cause radiating pain in the absence of any direct nerve root involvement due to leakage of the contents of the nucleus pulposus into the epidural space.[13] Some inflammatory mediators like interleukin-6, interleukin-8, and tumor necrosis factor–α are released by a prolapsed nucleus pulposus, which causes irritation of nerve roots and low-back pain.[7,28]

It is prudent to exclude all other causes of sciatica like infections, spinal stenosis, synovial cysts, facet joint arthropathy, tumors, and extraspinal causes such as piriformis syndrome and pathology of the sacroiliac joint before turning to surgery and risking poor surgical results.[28]

The sequence of disc pathological change is nuclear degeneration, nuclear displacement, fibrosis, and calcification. Most herniated discs are absorbed either due to dehydration or apoptosis over a period of time.[19,21] Larger discs tend to absorb more than smaller ones.[21] Various CT and MR imaging studies have provided evidence of progressive absorption of prolapsed discs. Many patients improve clinically before morphological resorption of prolapsed discs.[3]

A variety of nonoperative treatments for sciatica have been adopted—complete bed rest, physiotherapy, traction, nonsteroidal antiinflammatory drugs, and epidural steroid injection.[25] The principle of nonoperative treatment is to protect the abnormal disc from strain and to put it at rest to encourage the healing process. Even sequestered fragments may respond to this treatment.

To relieve pressure on the nerve root, many techniques, such as standard discectomy, limited discectomy and microdiscectomy have been adopted, but the end results have always been the same.[10]

Nowadays microdiscectomy is an outpatient procedure. It causes less scarring, less postoperative low backache, and is associated with a shorter hospital stay, but the rate of recurrence is high.[10] Microdiscectomy, however, is exclusively needed in cases of foraminal disc herniation, disc rupture in the settings of stenosis, axillary disc herniation, and reoperation of recurrent disc.

Surgeons have attempted many percutaneous procedures such as chemonucleolysis with papain, automated percutaneous lumbar discectomy, percutaneous endoscopic laser-assisted microdiscectomy, and oxygen-ozone therapy, but long-term results have never been satisfactory.[1]

The main aim of surgery is relief of leg pain rather than relief of the neurological deficit. The major advantage of early disc surgery is rapid relief of leg pain and early return to routine activities. Early surgery does not decrease the risk of long-term unsatisfactory outcome. Several studies have shown that after 10 years, results are the same, both in patients who have undergone surgery and in those who have undergone conservative treatment.[24] A Cochrane review report concluded that long-term effects of surgery and its positive or negative role in the natural history of disc disease are still unclear.[17]

Disc surgery should be offered in highly selected patients because it is not free of complications. There is a 2–9% complication rate, such as dural tears, arachnoiditis, epidural hematoma, fracture of facet joints, nerve root injury, wound infections, discitis, and wrong-level exploration.[29]

The success rate of disc surgery is 84–96%. In a long-term follow-up study, less than half of the patients were asymptomatic.[26] More than one-third of the patients had unsatisfactory results, and more than one-quarter complained of significant residual pain.[18,23] In one study with a follow-up of 11 years the authors reported that 56% of patients were pain free, 36% had no change, and 8% were worse than before.[27]

In our study 79.41% of the 68 patients experienced complete relief of pain soon after surgery, and this is consistent with values in the international literature.[16,25,31] Ten

years after surgery only 27.77% of the 39 patients with follow-up results remained absolutely free of pain. The remaining patients, that is more than two-thirds of the population, were in poor condition. Apart from intractable pain, a new neurological deficit developed in 8.82% of cases in the form of foot drop and calf muscle weakness over the follow-up period. None of the patients with recurrent or persistent pain were willing to undergo any further investigation or treatment.

Preoperative neurological disturbances in sciatica have been reported in 50–80% of cases.[14,26] In our study 25% of the patients suffered from a neurological deficit. According to various studies surgery does not guarantee any improvement in neurological dysfunction like foot drop and sensory loss.[14,31] In our study, except in 1 case of foot drop, no other sensory or motor deficit improved even long after surgery. A severe, stable, and long-lasting motor deficit usually does not improve.[26] Recovery of muscle paresis is similar both in medically and surgically treated patients.[2,25]

Recurrent disc herniation has been reported in 3–20% of cases.[15,29] More than 50% of the recurrent disc herniations occur at the same level, usually after the 1st postoperative year. In 63.88% of our cases recurrent leg pain developed in the same leg, suggestive of possible recurrence at the same level. Recurrent disc herniation is supposed to be procedure related. The extent to which disc should be removed is controversial. Only extruded or free-fragment disc material should be removed.[16] Curettage of the disc space may traumatize the endplates, resulting in more severe postoperative low-back pain.[2] Repeat surgery for a recurrent herniated disc is risky and creates even more disability.[15,29]

Intractable low-back pain develops in 10–20% of cases after lumbar disc surgery.[10,11,22,30] Causes of postoperative low-back pain may be stenosis, arachnoiditis, and epidural fibrosis. It is still not known whether this backache is procedure related or due to natural aging and degenerative processes. Discectomy reduces the height of disc space, which in turn increases the segmental instability of the spine. This anatomical and structural instability may lead to secondary spinal stenosis and poor long-term results. Discectomy with and without fusion has the same long-term results.[10]

Disc surgery is not the final answer for sciatica. Future innovations such as artificial disc technology, regeneration of disc, use of tumor necrosis factor–α antagonists, and enzymes other than papain, for example chondroitinase ABC, may help such patients.[8,17,26]

Conclusions

Our study shows that the long-term outcome of lumbar disc surgery is not very good. A considerable number of patients suffer from the pain for which they sought to undergo surgery. Late presentation of patients or their casual selection can lead to the worst prognosis.

Our study was not ideal because it was retrospective in nature and no preoperative and postoperative images of the lumbar spine were available.

Disclosure

The author reports no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

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