

Role of conventional lumbar myelography in the management of sciatica: An experience from Pakistan

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ABSTRACT

Objectives: A prospective study of 80 patients suffering from sciatica was conducted at Fauji Foundation Hospital, Rawalpindi, Pakistan.

The aim of this study was to select patients for lumbar myelography on clinical grounds in the absence of magnetic resonance imaging (MRI)/computerized tomography (CT) facilities and to know the causes of sciatica.

Materials and Methods: All patients underwent conventional lumbar myelography due to lack of MRI facility at a local hospital as well as financial constraints. Myelography was done with radio-opaque dye, Iopamidol, on outpatient basis.

Results: Lumbar myelograms were positive in 77.5% and negative in 22.5% cases. Minor complications in the form of headache developed in 32.5% patients but no major complication like meningitis and arachnoiditis developed. Lumbar disc prolapse and stenosis were found to be common causes of sciatica. Non-filling of nerve roots was seen in 33.87%, blocks (complete/partial) in 54.83%, and stenosis in 11.29% patients.

Conclusions: Conventional myelography was found to be safe and an informative diagnostic technique in areas where facility of high-tech investigations like CT/MRI was not available. Conventional lumbar myelography could be recommended and performed with confidence on outdoor basis, in cases of sciatica with positive straight leg raising test, reflex loss, sensory, or motor deficit.

Key words: Complications, iopamidol, lumbar disc, myelography, sciatica

Introduction

Sciatica is a common health problem all over the globe. Its exact incidence and prevalence are not known.^[1] It has many causes like lumbar disc herniation, spinal stenosis, spondylosis, spondylolisthesis, sacro-iliac joint dysfunction, and piriformis syndrome.^[2,3] Although lumbar disc prolapse is a common cause of sciatica, it is not always responsible in every case of radiculopathy. Clinical signs are also not always reliable for true assessment and

localization of spinal lesions; therefore, safe and accurate radiological investigations are required for the diagnosis and management of sciatica.^[1,3]

In the past, contrast myelography remained a gold standard for diagnosing spinal diseases. Apart from its traumatic process, the only disadvantage was use of oil-based non-absorbable contrast materials, which were potentially epileptogenic and were causing disabling arachnoiditis. Nowadays, water-soluble, nonanoinic and non-toxic intrathecal contrast materials are available and aforementioned complications are much less prevalent.^[4,5]

In the west, latest and noninvasive imaging technologies like computerized tomography (CT) and magnetic resonance imaging (MRI) have replaced the conventional myelography.^[2,6] In developing countries, such technologies are either not available or too expensive to be affordable.^[7]

In such circumstances, lumbar myelography is the best alternative option.^[8,9] It is easily available, cheaper, and can be performed on an outdoor basis with reduced incidence of side effects.

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This study will show how conventional lumbar myelography remains useful in diagnosing lumbar disc disease and spinal stenosis in areas where facilities for MRI or CT scans were not available. This diagnostic approach helped to identify many patients suffering from intractable sciatica for early referral for surgery.

Materials and Methods

Informed consents were obtained from all the participants and no ethical approval was required for this study. Eighty patients were selected from the neurosurgical outpatient department. These patients were suffering from either unilateral or bilateral leg pain with or without neurogenic claudication. All patients had classical signs and symptoms of sciatica of variable duration.

Patients suffering from chronic backache, polyarthralgia, spinal tuberculosis, past history of lumbar disc surgery, and spinal/peripheral nerve injuries were not included. Cases with history of drug/food allergies, bleeding disorders, local skin infections, and patients on anticoagulant, antihyperglycemics, or antiepileptic drugs were also excluded.

All patients underwent complete physical and neurological examinations including straight leg raising test, femoral stretch test, ankle/knee reflexes, motor and sensory examinations of both lower limbs. The spine was examined for tenderness and deformity. Fundoscopy was done in every patient to exclude any condition associated with raised intracranial pressure.

Complete blood count, erythrocyte sedimentation rate, C-reactive protein, urine examination, and chest x-rays were done to exclude any systemic disease. Nerve conduction and electromyographic studies were not advised in any case. Plain x-ray films of lower dorsolumbar spine and pelvis were done to exclude any pathology of the spine, hip, or sacroiliac joints.

Since MRI and CT scan facilities were not available at the local hospital; myelography was the only choice. This procedure was done on the outdoor basis. None of the patients were kept nil per mouth, nor were they given any intravenous fluids, antibiotics or steroids, before or after the procedure.

After giving skin deep local anaesthesia, lumbar puncture was done under aseptic conditions either at L2-3 or L3-4 level with 22 gauge spinal needle either in sitting or in lateral decubitus position. Lumbar needle was passed through a midline approach under fluoroscopic guidance. No cerebrospinal fluid was allowed to be lost during the lumbar puncture. Precautionary measures were available in the event of any untoward reaction to the intrathecal contrast medium.

Radio opaque dye, Iopamidol in recommended doses was injected very slowly through the lumbar puncture.

All myelograms were done in the prone position. The free flow of a contrast medium was seen up to the lower dorsolumbar region under the fluoroscope. Anteroposterior, lateral, right and left oblique views at 45° and 60° were taken at the required levels. No x-ray film was taken in the sitting position.

Patients were observed for a few hours after procedure, before discharging them home. Those who developed any complication later were admitted in the hospital. Symptomatic treatment in the form of bed rest, and oral non-narcotic pain medications were given to all patients routinely. Blood patch was never required in any case. A general radiologist who was provided a detailed history of the patients reported all myelograms.

Results

There were 67 females and 13 males. Most of the patients were in the fourth (32.5%) and fifth decades (42.5%).

Unilateral leg pain was the most predominant symptom (86.25%). Right sciatica was recorded in 40 (50%) and left sciatica in 29 (36.25%) cases, both legs were involved in 11 patients (13.75%). The straight leg-raising test was positive in 100% cases. All patients had negative femoral stretch test and crossed straight leg-raising test.

Sensory loss in various dermatomes of lower limbs was noted in 72.5%, motor loss in 43.75% and reflex loss in 42.5% cases. Significant wasting of calf muscles (54.28%) and foot muscles (34.28%) were another significant signs. Four patients (11.42%) had also unilateral foot drop. None of the patients had any autonomic disturbances like bladder and bowel control. Spinal deformity or tenderness was not observed in any case.

Lumbar myelograms were positive in 77.5% and negative in 22.5% cases.

All myelograms were suggestive of either lumbar disc herniation or spinal stenosis. No intradural or extradural spinal tumour was found. The findings on the myelograms were either complete/partial blocks, unilateral or bilateral nerve roots cut or multiple filling defects. Non-filling of nerve roots was seen in 33.87%, blocks (complete/partial) in 54.83% and stenosis in 11.29% patients. The most common site of lesion was L4-5 level (58.15%) followed by L5-S1 level (35%).

The post-procedure complications developed within 24 h in 32.5% of cases. Neck pain, headache, and vomiting were the common symptoms. All these patients were then hospitalized. No patient developed any serious complication like meningitis or arachnoiditis.

Discussion

For evaluation of spinal disorders, conventional myelography remained a benchmark investigation for many decades.^[1] It is

still statistically more accurate in lumbar disc herniation and spinal stenosis.^[10] Myelography can detect the presence or absence of lumbar nerve root compression including tumours of cauda equine.^[3,11] Its sensitivity ranges from 70% to 96% and specificity 67%.^[2] Its accuracy rate is 93% at L4-5 level and 70% at L5-S1 level.^[1]

Nowadays, myelography has been relegated, but surgeons are still requesting myelography for cases in which root compression is clinically suspected but MRI is negative.^[12] In one study for diagnosis of lumbar stenosis, the measurement of the anterior-posterior diameter of the spinal canal by CT was found less reliable than the measurement of the dural sac on myelograms. CT provided correct diagnosis in 20% but myelography provided in 83% of patients.^[13] In another study, conventional myelography correctly predicted impingement in 93% to 95% of the lateral recesses, whereas MRI underestimated root compression in 28% to 29% and CT underestimated root compression in 38% of the lateral recesses.^[12,14]

On myelograms, disc herniations, osteophytes, hypertrophied apophysial joints, dural adhesions, and neoplasms produce filling defects, dents, deformities, and blocks of contrast filled dural sac.^[15,16]

The criteria for diagnosing disc prolapse are angular indentation of the anterior or anterolateral aspect of the thecal sac opposite the disc space, nerve root sheath amputation, and deviation suggestive of root compression.^[11] Narrow dural sac and hourglass deformity at multiple levels are reliable signs of lumbar stenosis. These strictures like defects are produced due to the narrowing of the spinal canal by hypertrophied articular processes, thick ligamentum flavum, and capsular ligaments.^[17]

Blocks are produced either by extradural prolapsed disc, intradural tumours or ruptured intradural disc.^[15] Striation of contrast has been attributed due to oedematous nerves roots in the dural sac.^[16] Lateral indentation is a common myelographic defect but all dents are not symptomatic. It is difficult to differentiate the extradural deformity produced by a bulging disc and a herniated disc.^[17]

In this study, conventional myelography established clinical diagnosis nearly in two thirds of cases. Lumbar disc herniation and spinal stenosis were found to be common causes of sciatica. The most common involved levels were L4-5 and L5-S1. These findings are consistent with other studies reported in the literature.^[2] Lateral indentation, non-filling of the nerve root sleeves, and hourglass or stricture type defects have been reported in 62.9%, 14.9% and 16.4% cases respectively.^[15] In this study, non-filling of nerve roots was seen in 33.87%, blocks (complete/partial) in 54.83%, and stenosis in 11.29% patients.

Currently, latest diagnostic technologies have demonstrated that disc lesions and nerve root pressure are not the only causes of sciatic pain.^[18,19] Patients may develop

radiculopathy without any pressure on the nerve roots due to proinflammatory substances released from the damaged nucleus pulposus.^[14,20] Some patients may remain asymptomatic in spite of root compression due to disc protrusion. Facet arthropathy also causes radiculopathy in the absence of disc protrusion or root compression.^[21] Lateral recess and piriformis syndrome are other notable causes of non discogenic sciatica.^[18,22]

In this study, myelography failed to pick up pathology in 22% cases. Myelography provides views of the subarachnoid spaces and its contents only therefore it has 5% false positive and 15% false negative rates.^[3,23] It is recognized that far lateral disc is usually missed by myelography. A large prolapsed disc at L5-S1 level is also not visible on the myelograms due to wider canal but narrow dural sac.^[1] Dural sheaths do not extend fully into intervertebral foramina; therefore, these areas are not well demonstrated on the myelograms.^[23]

Further investigations in the form of CT myelography and MRI are required in patients with negative myelograms. In fact, no imaging technique shows a clear advantage over the other. Errors in diagnosis may occur with any technique. Evidence shows that both CT and MRI are equally accurate in diagnosing lumbar disc prolapse.^[4]

Despite the presence of advanced X-ray CT scanners and MRI systems, the need remains for myelography in non-diagnostic CT/MRI examinations.

Sensitivity of CT and MRI has been reported from 88% to 94% and specificity of 57% to 64%, respectively.^[6] Even sensitivity of magnetic resonance myelography for disc herniation and spinal stenosis was found 82% to 89%.^[24] When MRI, CT, and myelography were compared, the accuracy remained, 96%, 88%, and 79%, respectively.^[2]

Each modality has its own advantages and disadvantages. The choice between MRI and CT depends on cost and an access to equipment. CT can detect far lateral disc herniation, discitis, and spondylolysis. It can accurately depict the foraminal and extraforaminal nerve roots because surrounding fat provides excellent natural contrast. However, CT is less effective for evaluating the intrathecal nerve roots, in spinal stenosis and in operated cases where there is a paucity of fat.^[21,25] Also, CT cannot detect arachnoiditis, intradural abnormalities, and the severity of spinal stenosis. A mobile disc protrusion may be missed on CT scanning. Similarly, routine imaging of conus and entire lumbar spine is not done in CT lumbar spine.^[23]

On the other hand, MRI can detect far lateral disc, cysts in the synovial membranes of facet joints, and isthmus spondylolisthesis.^[2] Contrast-enhanced MRI is useful for suspected spinal infection, neoplasm, and postoperative cases.^[6] It can also distinguish sequestered disc from subligamentous disc herniation.^[2]

MRI is contraindicated for patients with biomedical implants. Ten percent of patients are claustrophobic in traditional MRI and 1% in newer open-model machines.

In order to get best results from lumbar disc surgery and spinal stenosis, timely investigation of patients is of utmost importance. Myelography provides great opportunity to manage such patients without any delay. In this study, myelography was a safe and cost-effective procedure.^[5,7] Although, one third of patients developed post dural puncture headache, no serious complications like meningitis and archnoiditis occurred.

Although meticulous clinical examinations and strict selection criteria kept our complication rate very low, this study had a few limitations as well. Myelography was the only available diagnostic modality; therefore, patients with negative myelograms could not be further investigated. Blocks detected on myelograms could not be further evaluated; therefore, if there were any lesions below the blocks these could not be identified.^[10] Myelographic diagnosis could not be confirmed peroperatively; because surgery was not performed at this institution. In one study, myelographic findings have been confirmed in 72.3% to 90% cases, preoperatively.^[16] The only disadvantage of myelography encountered in this study was that those patients (32.5%) who developed minor complications after the procedure, subsequently had to be admitted in to the hospital.

Since myelography is an invasive procedure, it should not be recommended injudiciously. In-depth clinical history and meticulous neurological examinations are prerequisites before advising someone for conventional myelography.

Conclusion

Myelography is an informative technique in areas where CT and MRI are not available. However, it should be reserved only for those patients who have a strong clinical diagnosis of lumbar disc lesion or spinal stenosis.

CT and MRI should be reserved for patients with strong clinical suspicion of underlying infection, cancer, persistent neurological deficit, or equivocal myelograms.

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