



Role of Conventional Myelography in Diagnosis and Treatment of Degenerative Spine Disease in Low-Income Communities: Prospective Study

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INTRODUCTION: Chronic back pain is a common problem, and imaging is crucial for effective diagnosis and treatment. In low-resource settings conventional myelography is a cheap alternative to magnetic resonance imaging and computed tomography. This study was conducted to reexamine the diagnostic reliability, effectiveness for surgical decision making, and safety of conventional myelography.

METHODS: The study was conducted at Tenwek Mission Hospital during June 2009 and March 2010. New patients who presented with features of radiculopathy and/or myelopathy were eligible. Standard anteroposterior views were taken; oblique views were obtained from patients with radiculopathy. Cervical and lumbosacral myelography was performed using iohexol contrast. Patients were observed for complications. Those with surgically remediable lesions underwent operation. Patients were monitored for symptom improvement and complication postoperatively.

RESULTS: Fifty-one patients underwent diagnostic myelography and 39 of them (77.8%) were positive. Lesions at levels L4/5 were the most common, occurring in 23 patients (59%). Of those with cervical lesions, 11 of them (73.3%) had a positive myelography compared with 28 patients (77.8%) with lumbosacral lesions. Patients presenting with claudication were more likely to have a positive myelography, compared with those with other symptoms. There were 16 patients (41%) with partial spinal canal block, 6 patients (15.4%) with total block, and 17 patients (43.6%) with recess compression. Thirty-eight (38) patients had

surgery, and recess decompression was the most common procedure ($n = 24$, 63.2%). Following surgery, symptoms due to degenerative spine disease improved in the majority of patients.

CONCLUSIONS: Conventional myelography is a reliable and safe diagnostic test. Appropriate and sound surgical decisions can be made following conventional myelography tests.

INTRODUCTION

Chronic degenerative conditions of the spine and their complications are common in both orthopedic practice and neurosurgery.¹⁻³ Imaging studies are crucial in the diagnosis and localization of the lesion in order to guide the management.⁴ Magnetic resonance imaging (MRI) and computed tomography (CT) scanning are considered to be the diagnostic tests of choice. Conventional myelography has been largely abandoned and in some centers even discouraged.^{3,5-7} However, in low-income countries (LICs), the cost of MRI and CT scanning are beyond the reach of the majority of the patients.⁸⁻¹⁰ Furthermore, in many LICs, centers that can conduct these tests are sited in the capital or large cities and therefore inaccessible to most patients living in rural areas owing to large distances.^{8,10} Due to this, the majority of affected patients in LICs cannot be investigated and will not have surgery. It is common for this group of patients to spend long periods of times with disabling symptoms, resulting in significant impairment of their ability to work. This leads to a large economic loss that subsequently increases financial strain on families and communities.

Key words

- Canal and recess stenosis
- Claudication
- Iohexal
- Myelography
- Myelopathy
- Radiculopathy

Abbreviations and Acronyms

- CT:** Computed tomography
- LIC:** Low-income country
- MRI:** Magnetic resonance imaging

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In the past, conventional myelography proved to be a reliable diagnostic procedure. In some aspects, its accuracy has been found to be superior to that of MRI or CT scanning.^{4-6,11-14} In addition, incidences of complications following iopamidol conventional myelography have been found to be acceptably low.¹⁵ The test has even been carried out safely on an outpatient basis.^{4,16-21}

Because plain x-ray facilities are widespread and readily available, we sought to reevaluate the use of conventional myelography in a low-income setting. It is hoped that reintroduction of conventional myelography tests as an acceptable diagnostic tool would benefit poor communities by widening the availability of spinal surgery and hugely alleviate preventable suffering of patients with surgically remediable spinal conditions in rural areas. The current study was conducted to reexamine the diagnostic reliability, clinical decision making utility, and safety of conventional myelography in a rural setting.

METHODS

Patient Selection

This prospective cohort study recruited 51 patients during the months of June 2009 and March 2010 at Tenwek Mission Hospital. The hospital is located about 225 km northwest of Nairobi, Kenya. At the time of the study there were no MRI or CT services in the hospital, but there was a well-functioning plain x-ray machine available.

Patients who were included in the study had been symptomatic for ≥ 2 months and who had ≥ 1 of the following symptoms: pain (neck, back, or referred to an extremity); numbness/loss of sensation; claudication; and limb weakness. Patients presenting with new or recurrent symptoms, who were previously enrolled in the study, were excluded. All patients provided consent for study participation, and their management during hospital admission was not impacted by study participation.

Procedures

Myelography was performed by the 2 principal investigators, a radiographer and a nurse. The level and type of lesion (stenosis, block, and recess compression) were recorded. For the cervical region, patients were positioned prone on the x-ray table with the chin supported to keep the neck extended and the head slightly elevated to prevent contrast from flowing through the foramen magnum into the intracranial space. The space between C1 and C2 was identified at 2 cm below and posterior to the mastoid process. Next, 2% lidocaine was infiltrated in the skin and superficial space. A 22-gauge spinal needle was carefully introduced horizontally into the C1/C2 intervertebral space until cerebrospinal fluid was recovered. Iohexol 200 (4 mL) was injected through the needle into the thecal space, and the needle was then removed.

For the lumbosacral region, patients were positioned prone with a small pillow under the abdomen to allow caudal and limit rostral contrast flow. The most accessible intervertebral space between L2 and S1 was identified and prepared as for the cervical test. A 20- or 18-gauge spinal needle was carefully introduced until cerebrospinal fluid was recovered. Iohexol 300 (5 mL) was injected into the thecal space, and the stylet was replaced. The needle was left in situ until the study was completed to allow for introduction

of additional contrast whenever it was necessary or for administration of extrathecal steroid if the study proved to be negative.

Anteroposterior cervical or lumbar radiographs were obtained to demonstrate the findings. Additional oblique views were taken when no spinal stenosis or block was found and where there were clinical features creating a strong suspicion of radiculopathy.

Surgery

When indicated on the basis of myelographic findings, surgical operations were executed. Spinal anesthesia was used in all cases of lumbosacral operations, and general anesthesia was used for the cervical region. The myelographic findings were correlated with the operative findings. Analgesics and prophylactic antibiotics were used. While on the ward, patients were examined daily for evidence of improvement in their symptoms and signs, as well as presence of postoperative wound infection. Duration of stay on ward was also recorded.

Patient Follow-Up

Post myelography, patients were observed for the following complications: headache, confusion, increasing pain, seizures, hypotension, or hypertension and allergic reactions. All patients who were not booked for surgery on the same or following day were discharged on the same day. Patients who had surgery were followed up for complications until the time of discharge.

Data Analysis

Data were stored in a password-protected database. Stata 12.1 was used for analyses (StataCorp, LLC, College Station, Texas, USA). Statistical significance was defined as $P < 0.05$. Comparisons between groups were performed using the Fisher exact test for categorical variables.

RESULTS

Background Demographics

Fifty-one patients (25 male and 26 female) underwent myelography on the basis of presenting signs/symptoms. The median age was 50 years. The majority of patients were between ages 26 and 55 ($n = 23$, 41%). Meanwhile, 16 patients were >55 years old (31%). Of all patients who underwent myelography, 39 of them (75.9%) had symptoms for >1 year, 20 of whom (67.2%) had symptoms for >2 years.

Symptoms and Association with Myelography Findings

Myelography yielded positive findings for 39 of all recruited patients (77.8%). Sixteen patients (41%) had partial spinal canal block, 6 of them (15.4%) had total block, and 17 of them (43.6%) had recess compression. Neck or back pain was the most common presenting symptom followed by extremity pain, with 50 patients (36.76%) and 38 patients (27.94%) reporting them at presentation, respectively (Table 1). Patients with almost all presenting symptoms, except for neck or back pain, were likely to have a positive myelogram in $>80\%$ of cases. There was no association between various presenting symptoms and positive myelography ($P = 0.179$) (see Table 1). Lumbosacral lesions were more common than cervical lesions, with 36 patients (70.59%) reporting the former and 15 of them (29.41%) reporting the

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