

A Comparative Evaluation of Myelography Taken Up as an Inpatient Vs An Outpatient Procedure in a Contemporary Indian Population

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ABSTRACT

Background: Myelography is usually an inpatient procedure. No adverse effects of outpatient myelography have been reported till date. Thus, the aim of this study was to compare the incidence and severity of adverse reactions associated with myelography performed in outpatients vs. inpatients. **Methodology:** A total of 105 patients were taken up for myelography procedure. Thirty-five of the 105 patients underwent outpatient myelography using a specified protocol. The incidence and severity of adverse reactions were compared with the other 70 patients, who underwent conventional inpatient myelography. **Results:** The overall rate of adverse effects noted was 10.6% in outpatients, as compared to 8.3% in inpatients. Only 2.8% of outpatients and 1.4% of inpatients experienced “severe” adverse effects that could require hospitalization. No significant differences were observed ($p < 0.05$) between the 2 groups. **Conclusions:** This study concluded that no significant differences were observed between inpatients and outpatients if the latter were selected based on proper criteria. The outpatient procedure is more economical and convenient for the patient.

KEYWORDS: Myelography; Complications; Outpatient; Inpatient

INTRODUCTION

Myelography is the examination for recording changes in the spine when diagnosing degenerative lumbar scoliosis in elderly people. Air myelography became popular in the early 1900s. The diagnostic capability and safety of myelography have improved significantly since then due to the development of new contrast agents.

Iophendylate was used in 1940s as a contrast agent, but being oil-based, it caused a lot of meningeal reactions resulting in headaches, fever, seizures, dizziness and adhesive arachnoiditis.¹ Hence, ionic, water-soluble agents including iocarmate meglumine (CONRAY) and methylglucamine iothalamate came in. However, they were found to be too neurotoxic due to their relative hyperosmolarity.² Metrizamide was introduced as a first generation nonionic, water-soluble contrast agent in 1972 [3]. However, it was associated with nausea or vomiting (10%–20%), seizures (0.2%–0.6%), and headaches (30%–50%). Newer contrast agents (eg. iohexol and iopamidol) have reported fewer neuropsychiatric complications than metrizamide, although they have a similar incidence of headache and nausea.¹

Hospitalization was usually deemed necessary for myelography due to the relatively high rate of after effects, such as headache, fever, and altered mental status.² However, the severity of adverse effects has

reduced significantly since the introduction of newer contrast media.⁴

Thus, the aim of the present study was to compare the incidence and severity of the adverse symptoms associated with myelography among outpatients vs. inpatients and to evaluate the safety and usefulness of outpatient myelography.

MATERIALS AND METHODS

A prospective trial was designed to compare the adverse effects of the inpatient procedure with those of the outpatient procedure that started in 2009. The study protocol was approved by the hospitals' Committee on Ethics, and informed consent was obtained from each patient.

Between 2013 and 2014, 105 hospital patients underwent the myelography procedure for a spinal disorder. For outpatient myelography, few inclusion criteria were set to eliminate already known factors that could cause a problem with the myelography procedure. These included: no severe past medical history; an age of <75 years; the presence of an adult family member on that day; and the availability of informed consent recognizing the potential risks associated with the outpatient procedure.

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Of the 105 patients, 35 patients who met above mentioned inclusion criteria underwent the outpatient procedure, while the remaining 70 were made to undertake the conventional inpatient procedure. The outpatient group consisted of 25 men and 10 women, with a mean age of 56.6 ± 12.5 years. The inpatient group consisted of 47 men and 23 women with a mean age of 68.22 ± 13.8 years. The patients' primary diseases were shown in Table 1. No significant differences were noted in the male/female ratio, age or prevalence of primary disease between the two groups. All myelographies were carried out by an orthopedic spine surgeon using the following procedure: The skin was sterilized, and local anesthesia was administered with 1% lidocaine. The dural sac was punctured with a 21-gauge Quincke spinal needle, from the L2/3 to L4/5 level. Myelography was done after injecting 8–10 mL of iohexol (OMNIPAQUE 240, Daiichi-Sankyo Co, Tokyo, Japan).

In outpatient myelography, after the myelography procedure, patients were moved to a vacant bed in the orthopedic ward and asked to rest their upper body at a 30° angle. The patients received 500 mL of Ringer lactate solution intravenously. The patients' vitals were recorded immediately after myelography, at 30 minutes, 1 hour, 2 hours and 4 hours after the procedure. The patients were discharged if no adverse effects were observed within four hours of the procedure. They were asked to take complete bed rest, and avoid using toilet till next morning.

The clinical course of the outpatient procedure was documented, with the adverse effects clearly marked (headache, nausea, vomiting, paralytic attack, lower back pain, or pyrexia) with space to record vitals and any kind of medications administered. This ensured a thorough evaluation.

On the other hand, after the inpatient procedure, patients were admitted and made to rest the upper body at a 30° angle while receiving 500 mL of Ringer lactate solution intravenously. The vitals were recorded till 4 hours after the myelography and patients were instructed to continue to rest and avoid using the toilet until the next morning. Patients were then monitored every 6 hours until next day, and discharged home if no adverse effects were observed.

One week after myelography, both groups were asked to come for a follow-up at the outpatient clinic. The myelographer asked specific questions regarding headache, nausea, vomiting, or other adverse effects. The severity of symptoms was rated as follows: (1) "not severe," when the patient had some difficulty in performing daily activities, but recovered within several days without hospitalization and (2) "severe," when the patient had marked difficulty in performing daily activities and required hospitalization.

The SPSS version 18.0 was used for statistical analysis. Values were expressed as mean \pm standard deviation. A one way ANOVA with Student's *t*-test, chi-square test,

and Fisher's exact test were used for intergroup comparisons.

RESULTS

In the outpatient group, no adverse reactions were seen in 31 patients (89.4%), while the remaining 4 patients (10.6%) experienced headache ($n=2$), nausea ($n=1$), and neck pain ($n=1$) (Fig. 1, Table 1). Symptoms were rated "not severe" by 3 patients who recovered fully within 5 days after fluid intake and rest. A steroid drip, if required, was used at the outpatient clinic.⁵ One patient however, experienced "severe" symptoms that included a prolonged headache and extreme nausea and vomiting that required hospitalization; this patient was given intravenous antiemetic drugs, steroid and Ringer lactate solution and managed.

In the inpatient group, no adverse reactions were recorded in 64 patients, while the remaining 6 patients (8.3%) experienced headache ($n=1$), nausea ($n=3$), neck pain ($n=1$), and dizziness ($n=1$) (Fig. 1, Table 1). The symptoms were "not severe" in 5 patients, who recovered completely within few days with fluid intake and complete rest at home or a steroid drip, if required. One patient rated symptoms as "severe", as the patient experienced a prolonged headache and severe nausea, which required extended hospitalization; the patient recovered after rest and intravenous antiemetic drugs, steroid and lactate Ringer's solution.

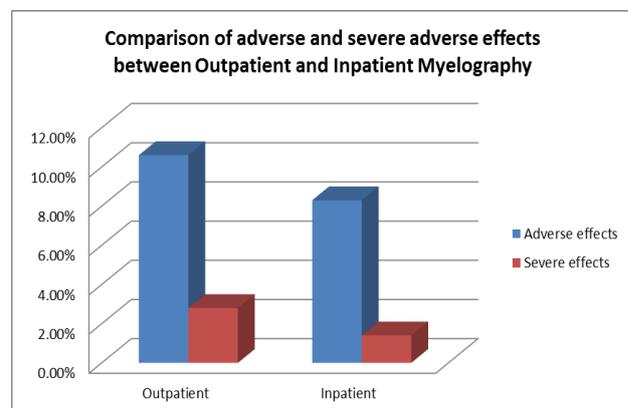


Fig 1: Comparison of adverse and severe adverse effects between Outpatient and Inpatient Myelography

The overall rate of adverse effects was 10.6% in the outpatient group, as compared with 8.3% in the inpatient group ($p=0.87$; chi-square test). The rate of "severe" adverse side effects was 2.8% in the outpatient group, as compared with 1.4% in the inpatient group ($p=1.61$; Fisher's exact test).

DISCUSSION

The use of the contrast agent and the lumbar puncture are the factors responsible for any kind of adverse effects during the myelography procedure. However, the incidence and the severity of adverse effects have reduced considerably since the introduction of water-

Disease	Outpatient group (n = 35)	Inpatient group (n = 70)
Cervical spine		
Cervical spondylotic myelopathy	3	13
Cervical disc herniation	2	2
Thoracic spine		
Thoracic ossification of ligament	1	3
Thoracic vertebral collapse from osteoporotic fracture	0	3
Lumbar spine		
Lumbar spinal stenosis	20	25
Lumbar disc herniation	5	15
Lumbar far-out syndrome	1	5
Degenerative lumbar scoliosis	0	3

Table 1: showing primary diseases of patients selected for myelography

soluble contrast media (such as iohexol). Research has indicated that all adverse effects from contrast agents occur at a rate of only 2.2 - 2.4%, which is relatively low considering the frequency in past decades.^{1,2} Therefore, the contrast agent is relatively safe.

The adverse effects ensuing from the lumbar puncture are because of leakage of cerebrospinal fluid. Preventive measures reported include: use a thin needle⁶; needle insertion with bevel parallel fiber of the dura;⁷ replacement of the stylet while withdrawing the needle⁸; and the use of non-cutting (pencil-point type) needle.⁸ Scientific literature does not support the increase of fluid intake to reduce adverse effects after the procedure.⁹

In this study, procedures for both groups of patients were performed by the same myelographer using the same technique. The only difference was in the duration of post-procedure rest. No significant differences were found in the complication rates post operatively. The findings of this study are in consistence with those of previous studies that found no evidence supporting the efficacy of an increased rest period following myelography.^{10,11} Thus, the outpatient procedure is considered safe.

Also, the outpatient procedure costs less than the inpatient procedure. Therefore, the outpatient procedure

is very economical for patients and may be effective in reducing the cost of medical care. The outpatient procedure has the added benefit of being more time-efficient for the patient. Also the inpatient procedure takes a full day (including a 1-night stay at the hospital) whereas the outpatient procedure would require just 4 hours for the diagnostic test.

CONCLUSION

The results of this study suggest that if patients are selected according to proper inclusion criteria, no significant differences in the incidence and severity of adverse effects were found between inpatients and outpatients following the myelography. Additionally, this procedure is more convenient and also time efficient for the patient.

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