ICNSJ Original Article

The Role of Steroid in Post Myelography Headache

Afsoun Seddighi[1], Amir Saied Seddighi[1], Hesam Rahimi Baghdashti[1], Alireza Sheikhi[1], Shoeib Naimian[2]

[1] Functional Neurosurgery Research Center, Shohada Tajrish Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran
[2] Qazvin University of Medical Sciences, Qazvin, Iran

ABSTRACT

Myelography is a diagnostic procedure to indicate spinal defects. After the inception of new means of spinal cord imaging, use of myelography has been limited. Since there are contraindications for other modalities in some patients, we have to use myelography. The most common complication of myelography is post myelography headache (PMH). Many methods have been proposed to alleviate the pain. In this clinical trial study we assess the role of steroid in PMH.

Keywords: Myelography; Headache; Lumbar puncture; Steroid

ICNSJ 2016; 3 (2) :108-112 www.journals.sbmu.ac.ir/neuroscience

Correspondence to: Afsoun Seddighi, MD, Associate Professor of Neurosurgery, Functional Neurosurgery Research Center, Shohada Tajrish Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran Mobile: +98(912)1852917; E-Mail: afsoun.seddighi@sbmu.ac.ir

Received: May 16, 2016 **Accepted:** May 30, 2016

INTRODUCTION

Myelography is a diagnostic method for detecting the pathologies of the spinal cord. This procedure is performed through injection of contrast medium into the subarachnoid space, followed by X-ray studies [1]. In the modern era with the advent of new technology in the medical field specially different modalities such as computerized tomography (CT) and magnetic resonance imaging (MRI) the role of myelography in diagnosis has been limited. Nevertheless there are still conditions such as claustrophobia which make myelography inevitable for diagnosis. Patients with medical or biostimulation implants (e.g, pacemakers, implantable cardioverter-defibrillators, insulin pumps, cochlear implants) are generally not considered for MR scanning [2,3].

Aside from patients in whom MR imaging is not possible for safety reasons, other reasons for myelography include severe image quality degradation due to metallic artifacts (e.g, shrapnel injuries), financial limitations or in cases that kyphoscoliosis makes image acquisition and interpretation extremely difficult. However, there are still indications for myelography as an independent diagnostic tool like cases suspected of far lateral lumbar disk herniation, thoracic and cervical canal stenosis or spinal cysts. In these situations CT-myelography has more diagnostic validity compared to MRI [4].

Myelography is generally safe. Reviewing of the literature shows a vast spectrum of complications. The most common complication of myelography is spinal headache, which is reported to occur in 4-60% of procedures [5,6]. It also has a low risk of seizure, allergic reactions, and other subtle complications [7]. These complications may be attributed to the contrast agent which may be oil-based or water soluble [8].

Generally, water soluble contrast agents such as Omnipaque or Metrizamide have less neurotoxic side-effects than the oil-soluble contrast media [9]. However, even new water-soluble agents may induce adverse reactions in nearly half of the patients. In these cases, headaches are reported in 43% [10].

Postmyelographic complications may be due to either CSF leakage or CNS irritation due to contrast material [11]. Management of these complications is extremely different (supine or sitting position, respectively). The proposed treatments for post-myelo headache consist of rehydration or use of acetaminophen or other NSAIDs, opioids, antiemetics [12], DDVAP [13,14], ACTH [15], Caffeine [16]. In resistant cases, epidural blood patch [17] or epidural saline [18-20] or dextran [21,22] injection are used as well as epidural, intratecal and parenteral opioids [23,24,25]. However, these

measures do not provide complete relief [26]. The last resort is surgery [27]. Very few studies have assessed the role of steroid in post myelography headache [28-32].

In this study we evaluated the therapeutic effects of steroid in alleviation of post myelography headaches. One of the most paramount features in our study is the classification of the degree of headache in to five stages. It is of great importance that the indication of myelography was lumbar radiculopathy in all of the cases.

MATERIAL AND METHODS

Sixty-five patients from February 2010 till February 2013 were considered for myelography in our clinic. All patients had low back pain with radicular pain in one leg or intermittent claudication. All the patients failed conservative treatment: at least two weeks bed rest with anti-inflammatory and palliative medications. Before the procedure, the patients were informed of the purpose of the study.

This procedure was performed with patient in the lateral decubitus position. At first we took 5–10 ml CSF for laboratory studies. Then, we injected Omnipaque (Iohexol) with a standard dosage of 10 milliliters and a concentration of 240 milligrams of iodine per milliliter. The rate of injection was slow. It lasted for 1-2 minutes. After myelography the patients were placed in a semi-recumbent position for six hours and confined to bed for 24 hours. The patients were divided into two groups. In this study start of the headache was not an indication for us to inject dexamethasone. The first group consisted of 37 patients in whom intravenous steroid (dexamethasone), 8 mg twice a day was prescribed. For the other 28 patients (second group) distilled water as placebo was used. We prescribed dexamethasone and distilled water before the headaches started. These patients were randomized into these groups using colored cards. Each patient picked up a card from a sack. The randomization process was double-blinded. We performed myelography with 26 gauge needle. The exclusion criteria in this study were as follows: congestive heart failure, coagulopathy, psychogenic problems like panic disorder, severe anxiety, and patient's unwillingness to collaborate.

Patients were asked to describe their headaches. We graded the headaches from 0 to 4 as described in table 1. The frequency and severity of adverse reactions in the two groups were then compared. For analgesia we used diclofenac tablets. The number of required diclofenac tablets was also recorded and compared.

Demographic and pain score data were analyzed using Microsoft Excel software performed by a statistics' expert. Assessment of the intervening factors was done using student's t-test and χ^2 test. Based on the patients headache score they were divided into two groups (greater or equal grade 3 and lesser than grade 2) and was compared using χ^2 test.

RESULTS

Our series consist of 65 patients that were referred to us due to spinal complaints from February 2010 till February 2013. We performed myelography because of different reasons such as economic problems, claustrophobia, metallic foreign bodies, etc.

We randomized all our patients in to two groups. The first group received 8mg dexamethasone IV just before the performance of myelography. This group included 37 patients of whom 23 were male and 14 were female, M/F ratio was 1.64. The average age of this group was 41.45 years, ranging from 28 to 78 years with standard deviation of 11.91 years. Median age was 38 years and the mode was 32 years. The second group did not receive dexamethasone. They were 28 patients of whom 16 were male and 12 were female, M/F 1.33. The average age of this group was 39.5 years, ranging from 24 to 79 years with standard deviation of 17.14 years. In most of the cases the age was 30 and the median was 30.5. The symptoms of the patients according to the degree of headache, was summarized in table 1.

In the first group the major cause of myelography was economic problems, 18 patients (48.6%). The second most common cause was claustrophobia, 9 patients (24.3%). Six patients (16.2%) underwent myelography due to metallic foreign bodies. Two patients (5.4%) had morbid obesity and in 2 patients (5.4%) myelography was performed because lumbosacral MRI was inconclusive. Economic problems were also the major cause of myelography in the second group consisting of 15 patients (54%). The other cause was claustrophobia in 8 patients (29%). Four patients (14%) had metallic foreign bodies, and one patient (3%) had morbid obesity. Table 2 shows the statistical analysis of matching between our two groups.

The most common clinical complaint in the first

Table 1. Symptoms of the patients according to headache grading.

Grade of headache	Symptoms
0	No headaches
1	Mild headache, no interference with daily activities
2	Moderate headache, some interference with daily activities
3	Severe headache, bedridden
4	Severe headache, requires hospitalization

Table 2. Age, sex and economical cause of myelography in each group.

	Steroid +	Steroid -	P-value
Age (median)	41.45	39.5	0.675
Sex (M/F ratio)	1.64	1.33	0.4197
Economical cause of mylography	48.6%	54%	0.453

group was persistent radicular pain (30 patients, 81.1%) followed by intermittent claudication (5 patients, 13.5%), and refractory axial back pain in 2 patients (5.4%). The most common clinical complaint in the second group was also persistent radicular pain, 19 patients (68%), followed by intermittent claudication in 9 patients (28%). In the first group 28 patients (75.7%) had sensory impairment and 25 patients (67.6%) had motor impairment. In the second group 19 patients (68%) had sensory impairment and 13 patients (46%) had motor impairment.

After performance of myelography we assessed the total amount of analgesic consumption. In the first group the average number of diclofenac tablet prescription was 3.45 ranging from 1 to 8 with standard deviation of 2.71. The median number was 2 tablets and in the most of the cases only 1 tablet was used. In the second group the average number of diclofenac tablet consumption was 5.85 ranging from 1 to 8 with standard deviation of 2.51. The mode was 7 tablets and the median was 7 tablets too.

In the first group the average degree of headache was 2, which ranged from 0 to 4. The standard deviation was 1.19. In most of the cases the degree of post myelography was 1 and the median was 1. In the second group the average degree of headache was 3, ranging from 0 to 4 and the standard deviation was 1.32. The median and mode were 3. Generally in our patients significant (grade >=3) PMH occurred in 50.1% of the patients.

We also assessed the duration of headache after myelography. In the first group, the average duration was 1.37 days, ranging from 0-4 with standard deviation of 1.5 days. The median duration was 1 and the mode was 0. In the second group the average duration was 4.9 days, ranging from 0-7 with standard deviation of 2.29 days. In most of the cases, duration of headache was 4 days and the median was 3 days.

DISCUSSION

Post dural puncture headache (PDPH) occurs after dural puncture for myelography, lumbar puncture, or spinal (subarachnoid) anesthesia [30-33]. The headache is positional; it is relieved by lying supine and exacerbated by sitting or standing [30-32]. It may be associated with nausea, vomiting, impairment of vision, tinnitus, or loss of hearing [30,31].

CNS irritation is the major cause of symptoms that were reported after myelography with Metrizamide as a contrast agent and there is no difference in side effects between ambulatory patients and bed-rest patients [11,34,35]. The complications that have been reported with Iohexol (Omnipaque) are less than Metrizamide [36-39]. The almost fast disappearance of intrathecally injected Iohexol [40] considering the duration of the symptoms and the effect of position on the severity of the headache, it seems that CSF leakage is more effective than the irritative effect of contrast agents on post-myelography symptoms [41].

Water-soluble agents have less side-effects compared to conventional contrast agents. However, they are not without any morbidity. The risk involved in the process is considered acceptable in patients who suffer from radicular symptoms and objective signs who had not received conservative treatment.

We asked all the patients to remain on 30° head elevated supine position after myelography. According to Ilkka and Hans's study [41] it does not appear that the patient's position after myelography significantly affects the rate of adverse post-myelography symptoms. PDPH treatment is determined based on the severity of symptoms. If the headache is mild, the treatment will be supportive. The patients were administrated to remain supine; acetaminophen, nonsteroidal analgesics and opioids are used to alleviate the pain.

The administration of Methylxanthine agents for patients who suffered from severe PDPH has been suggested [30-32]. It produces vasoconstriction especially in cerebral vessels [30]. Methylxanthine alleviates PDPH in 75%-85% of the patients [31]. Patients with mild to moderate PDPH might get prescribed Methylxanthine orally. However patients with severe PDPH may be given intravenous Methylxanthine [30-32]. This supportive treatment is continued until the dural defect heals itself.

If PDPH continues after at least 24 hours of supportive therapy, then treatment with an epidural blood patch is suggested [30-32]. The injection of autologous blood into the epidural space will immediately relieve the headache by means of closing the dural defect. Applying the first epidural blood patch is successful in 85%-90% of patients. Also less than 2% of patients have residual PDPH after a second epidural blood patch [31].

In our review of the literature we didn't find any article which was based on a grading scale for assessment of headache, except the study performed by Hess JH [32]. Based on their grading scale the authors reported that after myelography severe headache occurred in 15% of their patients. However, in our study severe headache occurred in 50.1% of patients. This difference may be due to the pain threshold of patients and/or needle gauge.

One of the paramount advantages in our study was the similarity between our two groups which matched according to proofs summarized in (Table 2). Statistical analysis did not show any significant difference of the age and sex between the two groups (Table 2). Generally in our patients, significant (grade >=3) PMH occurred in 50.1% of patients. In the patients who received steroid severe PMH occurred in 37.8% where as in the other group it occurred in 75%. Statistical analysis showed that this difference was significant (p=0.026). In this study 49% of patients had 0-1 degree of headache, 35% were grade 2 and just 15% of patients had severe (more than grade 3) headache. In our study, the average of headache duration was 1.37 days in treated patients in contrast to 4.9 days in the other group and the difference between the two groups was statistically significant (p=0.0092).

Vandam and Dripps reported that 72% of PDPH resolved within 7 days, and 87% had resolved in 6 months [42]. Hess JH in his series reported that PDPH in 90% of the cases began within 3 days of the procedure and the duration of PDPH was usually 3-5 days [32]. Reynolds F. in his study confirmed these results [43]. In Leibold RA study, 66% of PDPH started within the first 48 h [31]. In few cases the headache began in 5 to 14 days after dural puncture, however, rarely it may present itself immediately after dural puncture [44]. Our study showed that the total amount of analgesic consumption was statistically lower in cases with steroid injection (p=0.0094).

CONCLUSION

According to our study, it seems that using steroid after myelography is effective on the improvement of headache severity, duration, and need for analgesics.

ACKNOWLEDGEMENT

The authors appreciate deeply Mr. Esmail Seddighi and Mrs. Banooashraf Saberi for their great role in editing the text and data analysis.

REFERENCES

1. Bontranger KL, Lampignano JP. Radiographic Positioning and Related Anatomy, St. Louis. Elsevier Mosby. 2005.
2. Graham-Rowe D, Marks P. Nano-coated implants cut MRI scan dangers. New Scientist. 1 June 2003;Retrieved 2011-11-28.
3. Jost C, Kumar V. "Are Current Cardiovascular Stents MRI Safe?". The Journal of invasive cardiology. 1998;10(8):477–479. PMID 10762825
4. Christoph O, Jan G, Alexander R, Ralph B, and Gerhard S. Myelography in the Age of MRI: Why We Do It, and How We Do It. Radiology Research and Practice. 2011;Article ID 329017, doi:10.1155/2011/329017
5. Sand T. "Which factors affect reported headache incidences after lumbar myelogtaphy?". Neuroradiology. 1989;31:55-59
6. Jones MJ, Selby IR, Gwinnutt CL, Hughes DG. Technical note: the influence of using an atraumatic needle on the incidence of post-myelography headache. Br J Radiol 1994;67:396-398.
7. Bruce A. Sandow, John F. Donnal. Myelography Complications and Current Practice Patterns. AJR. 2005;185:768–771
8. Grainger RG, in Recent Advances in Radiology, 6.Edinburgh, Churchill Livingstone, 1978.
9. Grainger RG, Kendal BE, Wylie IG. Lumbar myelography with metrizamide: a new non-ionic contrast medium. Br J Radiol. 1976;49:996-1003.
10. Irstam L. Adverse effects of water-soluble contrast media in lumbar myelography. MD thesis. Department of Diagnostic Radiology. Sahlgren Hospital, Gothenborg, Sweden. 1974.
11. Sykes RHD, Wasenaar W, Clark P. Incidence of adverse effects following metrizamide myelography in nonambulatory and ambulatory patients. Radiology. 1981;138:625-627.
12. Ostheimer GW, Palahniuk RJ, Shnider SM. Epidural blood patch for post-lumbar-puncture headache. Anesthesiology 1974;41:307-8.
13. Hansen PE, Hansen JH. DDAVP, a synthetic analogue of vasopressin, in prevention of headache after lumbar puncture and lumbar pneumoencephalography. Acta Neurol Scand 1979;60:183-8.
14. Tourtellotte WW, Haerer AF, Heller GL, Somers JE. Lumbar puncture headaches. Spring®eld, Illinois: Charles C. Thomas, 1964.
15. Collier BB. Treatment for post-dural puncture headache. Br J Anaesth. 1994;72:366-7.
16. Holder HG. Reactions after spinal anaesthesia. JAMA. 1944;124:56-7.
17. Gormley JB. Treatment of post-spinal headache. Anesthesiology. 1960;21:565-6.
18. Crawford JS. The prevention of headache consequent upon dural puncture. Br J Anaesth. 1972;44:598-600.
19. Moir DD. Recent advances in pain relief in childbirth. II: regional anaesthesia. Br J Anaesth. 1971;43:849-57.
20. Stevens RA, Jorgennsen N. Successful treatment of dural puncture headache with epidural saline infusion after failure of epidural blood patch. Acta Anaesthesiol Scand. 1988;32:429-31.

21. Souron V, Hamza J. Treatment of postdural puncture headaches with colloid solutions: an alternative to epidural blood patch. Anesth Analg. 1999;89:1333-4.

22. Lander CJ, Korbon GA. Histopathologic consequences of epidural blood patch and epidurally administered Dextran 40. Anesthesiology. 1988;69:A410.

23. Cohen S, Amar D, Pantuck EJ, Singer N, Divon M. Decreased incidence of headache after accidental dural puncture in caesarean delivery patients receiving continuous postoperative intrathecal analgesia. Acta Anaesthesiol Scand. 1994;38:716-18.

24. Eldor J. Opiate treatment of post-dural puncture headache. Acta Anaesthesiol Scand. 1995;39:1140.

25. Eldor J, Guedj P, Cotev S. Epidural morphine injections for the treatment of postspinal headache. Can J Anaesth. 1990;37:710-11.

26. Flaatten H, Rodt S, Rosland J, Vamnes J. Postoperative headache in young patients after spinal anaesthesia. Anaesthesia. 1987;42:202-5.

27. Harrington H, Tyler HR, Welch K. Surgical treatment of postlumbar puncture dural CSF leak causing chronic headache. Case report. J Neurosurg. 1982;57:703-7.

28. Kenneth P. Botwin, Robert D. Gruber. Lumbar epidural steroid injections in the patient with lumbar spinal stenosis. Phys Med Rehabil Clin N Am. 2003;14:121–141.

29. D. K. Turnbull, D. B. Shepherd. Post-dural puncture headache: pathogenesis, prevention and treatment. British Journal of Anaesthesia. 2003;91(5):718-29.

30. Morewood GH. A rational approach to the cause, prevention, and treatment of postdural puncture headache. Can Med Assoc J. 1993;149:1087-1903.

31. Leibold RA, Yealy DM, coppola M, Cantees KK. Post-dural-puncture headache:characteristics, management, and prevention. Ann Emerg Med. 1993;22:1863-1870.

32. Hess JH. Postdural puncture headache: A Literature review. J Am Assoc Nurs Anesth. 1991;59:549-555

33. Kido DK, Wippold FJ, Wood RC. The role of nonionic myelography in the diagnosis of lumbar disc herniation. Invest Radiol 1993;28(suppl 5): 62-66.

34. Robertson WD, Lapointe JS, Negent RA, Robinson RG, Daly LF. Positioning of patients after metrizamide lumbar myelography. AJNR. 1980;1:197-198.

35. MacPherson P, Teasdale E, MacPherson PY. Radiculography: is routine bed rest really necessary? Clin Radiol. 1983;34:325-326.

36. Gabrielson TO, Gebarski SS, Knake JE, Latack JT, Yang PJ, Hoff JT. Iohexol versus metrizamide for lumbar myelography: double-blind trial. AJNR .1984;5:181-183.

37. Kieffer SA, Binet EF, Davis DO, Gabrielsen TO, Kido DK, Latchaw RE, et al. Lumbar Myelography with iohexol and metrizamide: a comparative multicentrer prospective study. Radiology. 1984;151:665-670.

38. Sortland O, Nestvold K, Kloster R, Aandahl MH. Comparison of iohexol with metrizamide in myelography. Radiology. 1984;151:121-122.

39. Laasonen EM. Iohexol and metrizamide in lumbar myelography. Comparison of side effects. Acta Radiol Diagn. 1985;26(6):761-76.

40. Holz E, Michelet AA, Jacobsen T. Absorption after subarachnoid and subdural administration of iohexol, Cr_{51}-EDTA, and I_{125}-albumin to rabbits. AJNR. 1983;4:338-341.

41. Ilkka K. Kuuliala, Hans J. Goransson. Adverse reactions after iohexol lumbar myelography: influence of postprocedural positioning. AJR. 1987;149:389-390.

42. Vandam LD, Dripps RD. Long-term follow up of patients who received 10 098 spinal anesthetics. JAMA. 1956;161: 586-91.

43. Reynolds F. Dural puncture and headache. Br Med J. 1993;306:874-6.

44. Weir EC. The sharp end of the dural puncture. Br Med J. 2000;320: 127-8.