LUMBAR MYELOGRAPHY ENHANCED WITH ION FREE CONTRAST MEDIUM – PRO AND AGAINST. PRESENTATION A NEW TECHNIQUE IMPROVING QUALITY OF THE IMAGE IN THE AREA OF LATERAL RECESUS OF VERTEBRAL CANAL

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Summary. The causes of low back and leg pain should be sought thoroughly. They might be degenerative changes of the spine: disc prolapse, stenosis and their combinations. When the degenerative changes are in a phase of destabilization, the changes are in an early stage and can be discovered only during dynamic change of the position of the spine. In this study, our objectives are: to compare the data in the literature and to discuss the diagnostic value of the conventional myelography on the one hand, and of CT scan and MRI, on the other; to make lumbar myelography more tolerabl for the patients; to improve diagnostic abilities of the lumbar myelography to discover dynamic – position dependent, lumbar stenosis of the patients, especially in the cases where there is no image of compression in the CT scan or MRI. We studied two groups of 60 patients. In the first group, one neurorentgenologist did conventional myelography of the patients in sitting position. In the second group another neurorentgenologist performed myelography in the new way proposed by us. In that case, lumbar puncture was done of the patient in prone position on the x-ray table. After injection of the contrast medium, the position of the x-ray table was changed to vertical, and A-P, lateral, left and right oblique projections of x-ray images were taken. After that, x-ray table was moved back to horizontal position and x-ray images in A-P and both oblique projections were done. After the myelography, the patients in both groups were recommended to drink sufficient amount of fluid and to keep bed rest for 4 hours. We compared both groups of patients. It was found that when lumbar puncture was done in prone position less patients – 15 (25%) suffered from postdural puncture headache than those to whom dural puncture was performed in sitting position – 46 (77%). Conclusions: 1. Lumbar myelo-

graphy is important method to obtain information about the condition of the lateral recessus, and helps to create preoperative plan in patients with position dependent lumbar stenosis. 2. The proposed by us method for performing myelography in prone position is better tolerated by patients and gives more information and better images of the lateral recessus. 3. It helps to plan the surgery in a way to prevent compromising outcome due to postoperative stenotic nerve root compression.

Key words: *lumbar disk diseases, lumbar myelography*

INTRODUCTION

Flexion and extension in the lumbar area change volume relations between nerve root, yellow ligament and small joints. This creates conditions for dynamic position dependent lateral stenosis and compression of the nerve root in the lateral recessus or in the intervertebral foramen. When degenerative changes are in a phase of destabilization, the changes are initial and can be filmed only during dynamic changes of the position of the spine. This consideration is important for the preoperative investigation of possible compression of the nerve root in the area of lateral recesus and is of exceptional importance for the surgical outcome.

OBJECTIVES

In this study, our objectives are:

– To compare the data in the literature and to discuss the diagnostic value of the conventional myelography on the one hand, and that of CT scan and MRI, on the other.

– To make lumbar myelography more tolerable for the patients.

– To improve diagnostic possibilities of the lumbar myelography to discover dynamic – position dependent lumbar stenosis of the patients, especially in the cases where there is no image of compression in the CT scan or MRI.

MATERIAL AND METHODS

We studied the literature for most frequent reasons against lumbar myelography. Under consideration were comparative investigations of diagnostic abilities of investigative methods: conventional myelography, CT scan, CT scan with residual intratecal contrast medium after myelography and MRI in the different areas of the vertebral channel in degenerative diseases.

Most frequent reasons against lumbar myelography were that it is an invasive method causing some pain during lumbar puncture and postdural puncture headache.

We studied two groups of 60 patients to whom conventional myelography was done for diagnosis of degenerative diseases of lumbar spine – disc prolapse, lumbar spinal stenosis or combination of both. The investigation of the patients was done by two physicians – one for each group. In both groups of patients, spinal

needle 22 G was used and 12 ml contrast medium containing 300 mg/ml Iodine was injected.

The difference in the investigation of both groups of patients was in the position of the patient during lumbar puncture and the position on the x-ray table during rentgenography.

In the first group of patients, the lumbar puncture was done in sitting position and maximal flexion of lumbar spine. After injection of the contrast medium, the patient was positioned upright and x-ray was taken in A-P, lateral, left and right oblique projections.

In the second group of patients, the lumbar puncture was done in prone position and after injecting of the contrast medium the patient was positioned in upright position and x-ray images in A-P, lateral, left and right oblique projection were taken. After that, the position of the patient ware turned back to horizontal, and x-ray in A-P and both oblique projections were done. In this way, the contrast medium overflows better the nerve roots, intervertebral foramina and lateral recessus which gives better and more reliable information.

After the investigation, the patients received sufficient amount of fluid per os and were advised to keep strict bed rest for minimum 4 hours with their head in slightly elevated position.

RESULTS

The results showed that the patients in whom lumbar puncture was done in prone position suffered less from postdural puncture headache (10 patients – 25%) than those to whom lumbar puncture was done in sitting position (46 patients – 77%).

During comparison of oblique x-ray images done in upright and prone position, it became obvious that prone position gives more valuable information, more details and better quality, than sitting position of the patient.

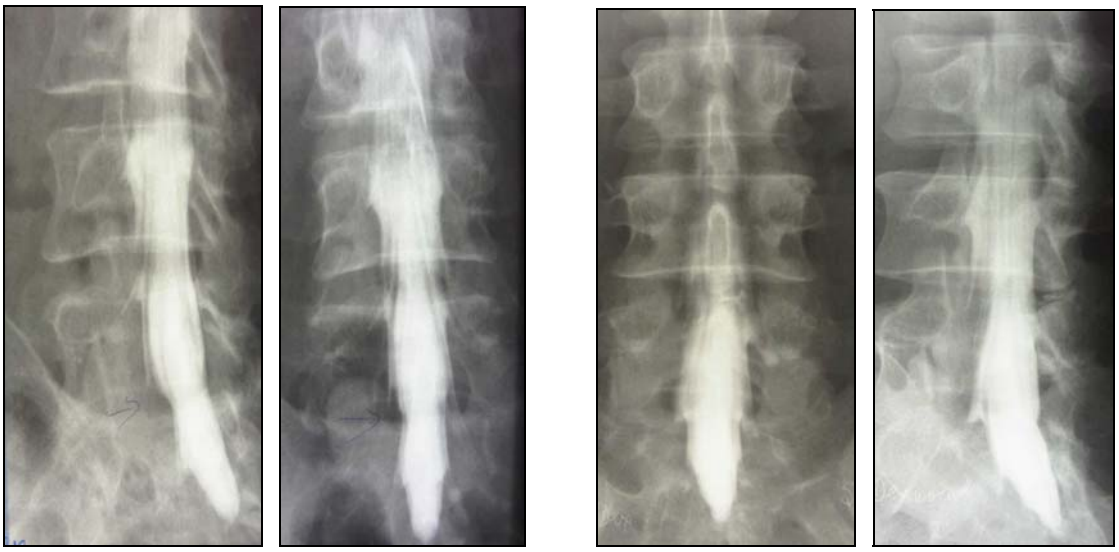
On the fig. 1, there are shown myelographic images done in A-P and oblique projection of the same patient diagnosed with lateral disc prolapse.

A. A-P and left oblique projection in upright position

B. A-P and left oblique projection in prone position

Fig. 1. Myelographic images of patient with lumbar disc prolapse at level L5 – S1 in A-P and left oblique projections

On fig. 2, there are shown myelographic images in A-P and oblique projections of the same patient diagnosed with lateral spinal stenosis.

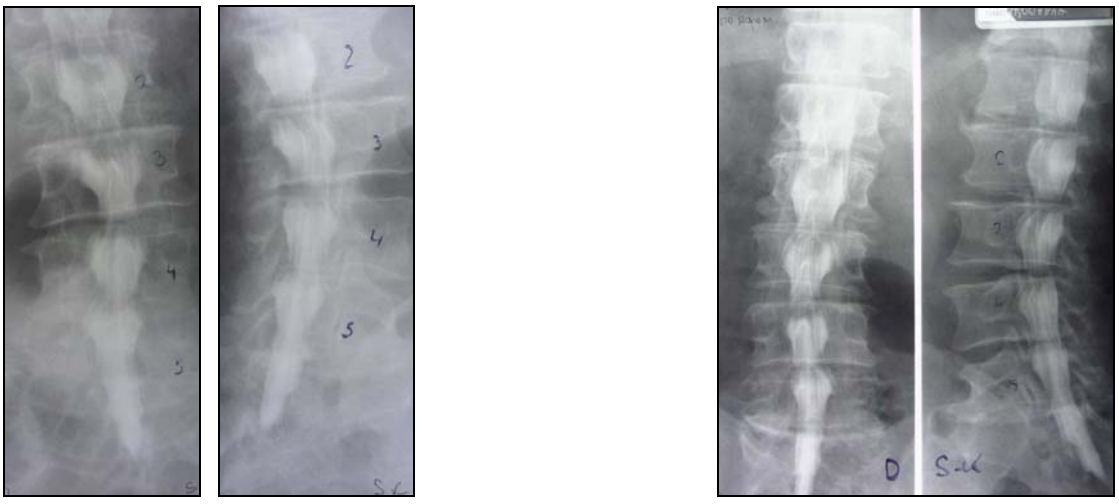


A. A-P and left oblique projections in upright position.

B. A-P and left oblique projections in prone position.

Fig. 2. Comparison of myelographic images of patient with lateral spinal stenosis at level L4-L5 and L5-S1 taken in A-P and left oblique projections

On fig. 3, there is shown comparison between myelographic images of the same patient with lumbar spine stenosis on several levels in oblique projection.



A. Left A-P and oblique in upright position

B. Left A-P and oblique in prone position

Fig. 3. Comparison of myelographic images taken from patient with spinal stenosis at level L3-L4, L4-L5, L5-S1 in left A-P and oblique projections

DISCUSSION

The lumbar myelography is not routinely used because it is an invasive method with possible complications [1, 2]. Some doctors don't recommend it only because it is an invasive method [3].

The local pain from spinal injection is considerably diminished by infiltration of the puncture site with local anaesthetic. Postdural puncture headache after lumbar myelography is due to leakage of spinal fluid in the epidural space at the site of puncture causing brain hypotension [1, 4, 5, 6]. The incidents of postdural puncture headache with different techniques of neck and lumbar myelography do not differ from those used for usual diagnostic lumbar puncture [7, 8]. There is no considerable difference in complaining of the patients when the investigation is carried out in out–patients or during hospitalization. There are conclusions that myelography is a more reliable and cheaper diagnostic method preferred by some patients [9].

The postdural puncture headache can be decreased considerably by using smallest possible spinal needle and horizontal position of the patient. In this position, dura matter is not distended and not cracking during puncture. The puncture hole is smaller, leakage is lesser and it closes faster. The abovementioned results support this conclusion – about three times lesser patients complained of postdural headache after investigation.

The reason for better x-ray images of dynamic – position dependent, stenosis is due to anatomical changes which are taking place during changes of the position of the lumbar spine during shooting x-ray images. The lumbar spine changes its configuration during flexion and extension as the size of spinal channel between vertebrae can increase by up to 12% during flexion and decrease by up to 15% during extension from its size in neutral position; A-P size can vary by up to 30% [10, 11, 12, 13]. In that way the dynamic-position dependent spinal stenosis appears clinically and on the myelography.

In patients with dynamic-position dependent spinal stenosis CT scan investigation can underestimate stenosis in comparison with myelography done when the patient is in upright position with flexion and extension [8, 14, 16, 17, 18]. During oblique lumbar myelography, there can be taken images with flexion and extension of the spine that will show dynamic component of the stenosis, which CT scan and MRI cannot show.

MRI myelography gives good images but gives false positive and false negative results in comparison with conventional myelography [6, 13]. It can not reach the quality of conventional myelography and can not substitute it because well developed stenosis is overexposed and not well developed stenosis can be underestimated [7, 15, 19]. Bartynsky et al. [20] mentioned that MRI myelography does not show well lateral spinal stenosis and lateral recessus in 28-29% of the patients, while conventional myelography misses diagnosis in 5 to 7%. In our opinion, the

myelography is a more exact method in diagnostics of segments of the spine and lateral disc prolapse [20, 21].

We accept as a result of these facts that the diagnostics at clinical level of lumbar disc prolapse and stenosis done with CT scan or MRI is not enough exact for the goals of conservative surgical method of operative treatment, and myelography is always recommended before surgery, which is supported by some other publications [21, 22, 23]. Myelography should be done if there is clear clinical indication requiring surgical treatment in the limit of one week before surgery. We are convinced from our personal experience that positive result from myelography predicts good and effective surgical outcome.

CONCLUSIONS

1. The lumbar myelography is important method to obtain information about the condition of the lateral recessus, and helps to create preoperative plan for patients with dynamic position dependent lumbar stenosis.

2. The proposed by us method for performing myelography in prone position is tolerated better by patients and gives more information and better images of the lateral recessus.

3. It helps to plan the surgery in a way to prevent compromising outcome due to postoperative stenotic nerve root compression.

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