Spine (Phila Pa 1976). 2012 Jul 15;37(16):E985-92. doi: 10.1097/BRS.0b013e31821038f2.

Axial loading during magnetic resonance imaging in patients with lumbar spinal canal stenosis: does it reproduce the positional change of the dural sac detected by upright myelography?

Kanno H, Endo T, Ozawa H, Koizumi Y, Morozumi N, Itoi E, Ishii Y.

Source

Department of Orthopaedic Surgery, Nishitaga National Hospital, Sendai, Japan.

Abstract

STUDY DESIGN:

We compared the sizes of the dural sac among conventional magnetic resonance imaging (MRI), axial loaded MRI, and upright myelography in patients with lumbar spinal canal stenosis (LSCS).

OBJECTIVE:

To determine whether axial loaded MRI can demonstrate similar positional changes of the dural sac size as were detected by upright myelography in LSCS.

SUMMARY OF BACKGROUND DATA:

In patients with LSCS, constriction of the dural sac is worsened and symptoms are aggravated during standing or walking. To disclose such positional changes, upright myelography has been widely used. Recently, axial loaded MRI, which can simulate a standing position, has been developed. However, there has been no study to compare the dural sac size between axial loaded MRI and upright myelography.

METHODS:

Forty-four patients underwent conventional MRI, axial loaded MRI, and myelography. Transverse and anteroposterior diameters and the cross-sectional areas of the dural sac from L2-L3 to L5-S1 were compared. Pearson correlations of the diameters between the MRIs and the myelograms were analyzed. On the basis of the myelograms, all disc levels were divided into severe and nonsevere constriction groups. In each group, the diameters and the cross-sectional areas were compared. Sensitivity and specificity to detect severe constriction were calculated for the conventional and axial loaded MRI.

RESULTS:

Transverse and anteroposterior diameters at L4-L5 in the axial loaded MRI and myelogram were significantly smaller than those observed in the conventional MRI ($P < 0.001$). Cross-sectional areas in the axial loaded MRI were significantly smaller than those in the conventional MRI at L2-L3, L3-L4, and L4-L5 ($P < 0.001$). Between the axial loaded MRI and the myelography, Pearson correlation coefficients of the transverse and anteroposterior diameters were 0.85 and 0.87, respectively ($P < 0.001$), which were higher than those for conventional MRI. Reductions of the dural sac sizes in the axial loaded MRI were more evident in the severe constriction group. The axial loaded MRI detected severe constriction with a higher sensitivity (96.4%) and specificity (98.2%) than the conventional MRI.

CONCLUSION:

The axial loaded MRI demonstrated a significant reduction in the dural sac size and significant correlations of the dural sac diameters with the upright myelogram. Furthermore, the axial loaded MRI had higher sensitivity and specificity than the conventional MRI for detecting the severe constriction observed in the myelogram. Therefore, the axial loaded MRI can be used to represent positional changes of the dural sac size detected by the upright myelography in patients with LSCS.