

## Evaluation of Lumbar Foraminal and Extraforaminal Stenosis with 3D T2\*-Weighted Gradient-Echo MR Imaging at 3T

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**Purpose:** In patients with lumbar foraminal and extraforaminal stenosis, precise preoperative evaluation of nerve root is essential to avoid so-called failed back surgery syndrome (FBSS), defined as persistence of clinical symptoms even after surgery. However, conventional MR imaging (MRI) including heavily T2-weighted MR myelography can not demonstrate foraminal and extraforaminal stenosis clearly. The purpose of this presentation is to indicate the usefulness of spinal nerve root demonstration with 3D T2\*-weighted gradient-echo (T2\*W GRE) imaging at 3T in the diagnosis of lumbar foraminal and extraforaminal stenosis.

### Outline of Contents:

1. To describe diagnostic performance of demonstrating spinal nerve root with 3D T2\*W GRE imaging in comparison with conventional MRI and heavily T2-weighted MR myelography.
2. To demonstrate normal anatomy of spinal nerve root and neighboring structures on 3D T2\*W GRE sequence, along with various anatomical schemas.
3. To present key points of reading 3D T2\*W GRE images: ①abnormal course of nerve root (shifted upward and run transversely), ②obscuration of dorsal root ganglion, ③entrapment of nerve root, ④spinal nerve swelling, and ⑤anomaly of nerve root.

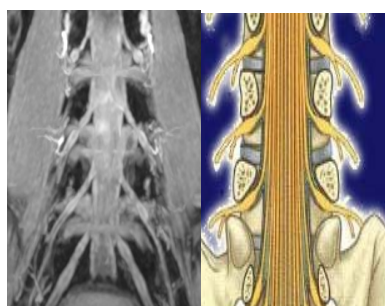
**Summary:** Demonstration of spinal nerve root with 3D T2\*W GRE imaging can provide more specific information than conventional MRI in the presurgical evaluation of lumbar foraminal and extraforaminal stenosis. The use of this technique has a potential of preventing FBSS, the persistence of clinical symptoms even after surgery.

**Figures:** **Fig.1** Demonstration of normal spinal nerve roots with 3D T2\*W GRE imaging (**A**) and corresponding anatomical schema (**B**).

**Fig.2** 3D T2\*W GRE imaging (**A**) also delineates vascular structures such as ascending lumbar veins (green arrowheads) and basivertebral vein (red arrow). Corresponding anatomical schema (**B**).

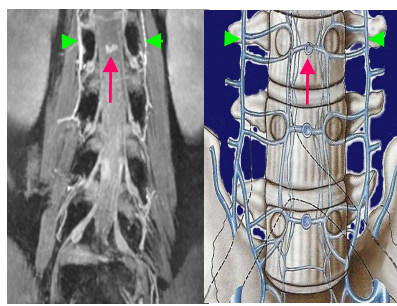
**Fig.3** 3D T2\*W GRE imaging clearly demonstrates compression of left L4 nerve root (yellow arrow) in a patient with herniated nucleus pulposus (HNP). (same patient in Fig.2)

**Fig.4** Obscuration of L4 dorsal root ganglion is noted on the right side (yellow circle) in another patient with HNP. Note the normal L4 dorsal root ganglion on the left side (white circle).



**Fig.1 A**

**B**

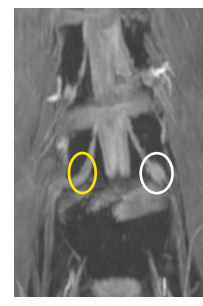


**Fig.2 A**

**B**



**Fig.3**



**Fig.4**

**References:** 1.Shen J, et al., AJNR 27:2098, 2006 2.Takahashi N, et al., Computerized Medical Imaging and Graphics 28:363, 2004