

## STUDY OF THE MRI IDENTIFICATION OF LUMBAR-SACRAL NERVE ROOT IN SPINA BIFIDA PATIENTS BEFORE OPERATION

### Hypothesis / aims of study

To explore the clinical value of the MRI performance in identifying the lumbar-sacral nerve roots in spina bifida patients before artificial somatic-Central Nervous System-autonomic reflex pathway (abbreviation: artificial reflex arc) operation. [1, 2, 3]

### Study design, materials and methods

The lumbar-sacral nerve roots of 10 healthy adult volunteers and 30 spina bifida patients were scanned with SIEMENS Vision 1.5T MR, imaging scan sequence included T1 weighted and T2 weighted Turbo Spin Echo (TSE), 3D FT-CISS three-dimensional Fourier transform-constructive interference in steady state and related MPR (Multi-Planar Reconstruction), during Oct. 2003 to Oct. 2004. The SB MRI was compared with its operation findings to verify its accuracy.

### Results

We successfully performed the MR scan and related MPR to all the 10 volunteers and 30 SB patients to identify the lumbar-sacral nerve roots. In all the 30 SB cases, 13 cases (43.3%) were found having lumbar-sacral nerve roots anomaly (LSNRA) when protruding the vertebral foramen by the pre-operative MRI and MPR, while 8 cases were found by the operation. There were twelve cases (40%) were found having LSNRA by the operation, two cases having two at a time.

### Interpretation of results

The artificial somatic-Central Nervous System-autonomic reflex pathway procedure has been established as an effective and safe treatment to restore bladder and bowel continence and reverse the bladder dysfunction for the patients with spina bifida or spinal cord injury [1, 2, 3]. This research is dedicated to explore the MRI clinical value in identifying the lumbar-sacral nerve roots in spina bifida patients with neurogenic bladder patients before artificial reflex operation.

The major MRI technological parameter listed as followed, TSE T1 weighted TR 600ms TE 12.0 ms TA 2min56sec SL 3.0mm FOV 218mm×290mm 288×512 data matrix TSE T2 weighted TR 3200ms TE 112.0 ms TA 7min44sec SL 3.0mm FOV 218mm×290mm 288×512 data matrix T2WI 3D-CISS TR 12.25 ms TE 5.90ms TA 16 min 7 sec FOV 140 mm×280 mm 154×512 data matrix EFF. Thick 0.94 mm NO. Partition 128.

Although pre-operative MRI and MPR results showed 13 cases have LSNRA in all 30 SB cases, eight cases were found by the operation. There may be several factors to explain this difference, such as, due to the operating field limitation, or too heavily scar adhesion, fatty tissue assemble, you can not expose the spinal nerve root completely, missing to find the LSNRA is inevitable. There were twelve cases (40%) were found having LSNRA by the operation as listed followed.( two cases having two at a time)

Lumbar sacral nerve root	Occurrence time	Anomaly%
S2-S4	4	28.6
S3-S4	3	21.4
L5-S1	2	14.3
S1-S3	2	14.3
S1-S2	2	14.3
S2-S5	1	7.1
In all	14	100

Concluding message

MRI associated measurement can exhibit the lumbar-sacral nerve roots clearly, providing reliable information on neural anatomy and anomalies for pre-operative evaluation.

**Reference**

- 1 An artificial somatic-autonomic reflex pathway for controllable micturition after SCI: Preliminary results of 15 patients. J. Urol.170:1237-1241, 2003
- 2 An Artificial Somatic-Autonomic Reflex Pathway Procedure for Spina Bifida Children to Gain Bladder Control. J.Urol.171:4 211A, 2004.
- 3 An Artificial Somatic-Autonomic Reflex Pathway Procedure for Bladder Control in Children with Spina Bifida. J.Urol.June, 2005. Accepted, In Press.

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