
The advances of MR Neurography (MRN) techniques have improved several diagnostic challenges of the past. The contribution of 3T MR scanners, new phased array surface coils, and parallel imaging aids in the acquisition of high-contrast and high-resolution images. The ability of discrimination based on the high resolution provided by the techniques of MR Neurography (MRN) offers a solid morphologic aid in clinical or pre-surgical evaluation and patient management.

Current role of MRN in evaluation of polyneuropathies relies on the recognition of abnormal patterns supplementing the history, clinical and electrophysiological examination. Magnetic Resonance Neurography aids diagnosis and management of peripheral nerve disease by enabling precise localization and detailed characterization of peripheral nerve lesions, often in areas inaccessible to standard electrophysiology.

There are several approaches to MR Neurography, such as DTI and DWI, the focus of this paper is the potential of IDEAL technique. The sequence IDEAL (Iterative decomposition of water and fat with echo asymmetry and least-squares estimation) is a water-fat separation method that uses 3 Point Dixon technique and enhanced correction algorithms provides most uniform fat suppression. Because 3 point Dixon uses 3 NEX, there is an inherent increase in SNR as well.

At first IDEAL was used for brachial plexus neurography because of the classic fat suppression failures in this region, but can also be used in other anatomies as well. Rationale behind this technique essentially using thin slices to minimize partial volume, adjust TR/TE to have best nerve contrast against background. Using minimum number of slices is critical to reduce scantime and post process using MPVR (MIP over a partial slab volume).

At FLENI the protocol of MRN for plexuses includes IDEAL T2-weighted (T2w) and 3D IDEAL T1-weighted sequences before and post contrast.

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Clinical case

A female patient presented progressive weakness and sensory loss on left biceps muscle. Diagnosis of superior trunk injury (mononeuropathy) relies on clinical and electrophysiological examination.

MR Neurography of brachial plexus showed a bilateral but asymmetrical diffuse high signal on T2w and hypertrophy of roots, trunks and cords. The left side was more affected (Figure 1).

These findings suggested a polyneuropathy was dramatic clinical impact. A week later, an MRN of lumbosacral plexus was performed. The examination showed high intensity on T2w and hypertrophy of de roots of lumbosacral plexus (Figure 2). The patient was treated with immunoglobulin and improved her symptoms. The diagnosis of Chronic Inflammatory Demyelinating Polyradiculoneuropathy (CIDP) es based mainly on the clinical and electrophisiological examination. However, in clinical practice, CIDP is often difficult to diagnose. This is a typical case of dissociation between electrophysiological examination and MR N. Magnetic Resonance Neurography of brachial and lumbar plexus will be very helpful in diagnosing CIDP. In this patient MRN changed the diagnosis and provided data on patient prognosis.

Table 1: Scan protocol

<table>
<thead>
<tr>
<th>Sequence</th>
<th>FOV</th>
<th>Thickness</th>
<th>TR/TE</th>
<th>Matrix</th>
<th>NEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>3D FIESTA axial</td>
<td>27</td>
<td>1.4/0.0</td>
<td>5/1.9</td>
<td>320X320</td>
<td>0.8</td>
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<tr>
<td>DWI axial</td>
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<td>2.4/0.0</td>
<td>6500/102.2</td>
<td>128x128</td>
<td>8</td>
</tr>
<tr>
<td>2D IDEAL coronal T2</td>
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<td>1.0/0.1</td>
<td>7080/92.7</td>
<td>320x256</td>
<td>3</td>
</tr>
<tr>
<td>3D IDEAL coronal T1</td>
<td>40</td>
<td>1.0/0.1</td>
<td>1320/10.2</td>
<td>320X224</td>
<td>3</td>
</tr>
</tbody>
</table>

Figure 1: IDEAL T2w sequence of brachial plexus. High signal and hypertrophy of brachial plexus, included roots, trunks and cords.

A) coronal, show the asymmetrical findings.

B) right oblique.

C) left oblique.

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