Chronic Lumbar Radiculopathy: Innovative Treatment for an Old Problem

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Chronic Lumbar Radiculopathy: Current Treatment Options

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Transforaminal Nerve Blocks for Radiculopathy

- Caused by compression or irritation of the nerve root
- Pain is referred along that nerve to its associated extremities
- Can be transient or chronic if nerve damage occurs

Pathology of Disc Herniation and Related Pain

Disc herniation can trigger pain at the site of the herniation and/or radiating pain. The distribution of radiating pain is dependent on the location of disc herniation.

Radicular Pain
- Caused by compression or irritation of the nerve root
- Pain is referred along that nerve to its associated extremities
- Can be transient or chronic if nerve damage occurs

Note: Sciatica is a term for the radicular pain stemming from the L4, L5 or S1 nerve roots, which eventually radiates over the sciatic nerve. Non-neuropathic causes, such as piriformis syndrome or sacroiliac joint deformities, can also cause sciatica as well. Source: Cramer and Darby, Basic and Clinical Anatomy of the Spine, Spinal Cord, and ANS, 2005.
Lumbar Radiculopathy

**FACTS**

- Disc disease with nerve root compression is the most common reason for low back pain of spinal origin.

- 50% patients will experience **disappearance** of symptoms. **Shrinkage** of the herniation by MRI or CT scans within 8-9 months.

- In the USA, **200,000** patients with **sciatica** are treated surgically every year with short term success of **95-98%**.

- Within **6 months** the success rate drops to 80% with **20%** characterized with severe symptoms and **15%** have **FBSS**.

_Eur J Rad, 2004_
Factors Impacting Treatment Course

- Patients seek treatment at varying time points in the course of their condition.
- More severe pain or inability to function will induce a more rapid progression through treatment options.
- Patients contraindicated for surgery, such as elderly patients, may move to long-term repeat ESIs.
- Patients with significant neurologic and/or motor deficit (such as Cauda equina syndrome) Require immediate surgical consultation/intervention.
- *The Nail and Hammer theory*
Lumbar Radiculopathy:

Variability of Care by Specialty

- Neurologist: EMG
- Rheumatologist: Lab. tests
- Neurosurgeon: MRI
- Pain Management: Nerve block

Acute vs. Chronic Radiculopathy

In later stages of disease, anti-inflammatories lose their disease modifying effects, partially accounting for the lack of ESI efficacy in these populations.

<table>
<thead>
<tr>
<th>Type of Pain</th>
<th>Acute (~0-2 months of symptoms)</th>
<th>Sub-Acute (~1-6 months of symptoms)</th>
<th>Chronic (~4+ months of symptoms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local back pain and/or Radicular pain</td>
<td>Local back pain and/or Radicular pain</td>
<td>Radicular Pain</td>
<td></td>
</tr>
<tr>
<td>Inflammation/Compression</td>
<td>Inflammation/Compression</td>
<td>Nerve damage/Central sensitization</td>
<td></td>
</tr>
<tr>
<td>Anti-inflammatory</td>
<td>Anti-inflammatory</td>
<td>Antineuropathic pain analgesic agents</td>
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</tr>
</tbody>
</table>

Source: Health Advances interviews and analysis.
In some cases, a second round of oral medications will be prescribed before ESIs are used. These aggressive orals include opioids.

In some cases patients may receive spinal stimulators and intrathecal pumps prior to or in place of surgery.
Factors Limiting ESI Efficacy

Misinterpretation of Radiographic Evidence

- Failure to corroborate radiographic pathology with history and physical examination can lead to treatment failure.

Failure to Use Fluoroscopic Guidance

- Blind ESI leads to inaccurate placement of needle in 30% of cases, regardless of physician experience.

Source: Health Advances interviews and analysis; Chen 2009 Epidural Steroid Injections Medscape; Sangwaiya 2009 Discrepancies in Reporting JACR.

Current Treatment Options: ESIs

Steroids as the Standard of Care!!!!

<table>
<thead>
<tr>
<th>Advantage of Steroids</th>
<th>Disadvantage of Steroids</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Steroids are thought to aid in the treatment of disc herniation pain via three mechanisms of action:</td>
<td></td>
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<tr>
<td>• Inhibition of PLA2 and inflammation</td>
<td></td>
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<tr>
<td>• Inhibition of neural transmission in nociceptive C fibers</td>
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<tr>
<td>• Reduction of capillary permeability</td>
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<tr>
<td>• Not FDA approved for use with radicular back</td>
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<tr>
<td>• Short acting pain relief</td>
<td></td>
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<tr>
<td>• Repeated injections typically required over several weeks/months</td>
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<tr>
<td>• Conflicting efficacy publications</td>
<td></td>
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<tr>
<td>• Safety issues reported.</td>
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</table>
**Transforaminal steroid injections**

- Prospective cohort (34) average 1.9 injections per patient
- Unilateral radicular pain
- 75% -successful long-term outcome (12 months), at least a >50% reduction VAS scores
- 64% improved walking distance
- 57% improved standing time

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**ESI Loses Efficacy Over Time**

Radicular Pain

Time

Pain Threshold

Pain
Surgical Treatment

- Laminotomy: more conservative decompression

Fusion is BAD
Motion is GOOD

“Fusion generates a conflict between immediate benefit and late consequences”

Ehni, Spine, 1981
Disc Replacement

Is this reasonable?????

Cost of Low Back Pain

- LBP study found 5-fold higher back surgery rate in US vs. Sweden, with no positive effects on work, pain, or back function (250,000 back operations/year)
- Estimated medical care & disability costs of $50 billion/year in 1990
- 5%-9% of patients account for 65%-85% of costs

References:
Significant Unmet Clinical Need – Lumbar Radiculopathy

Chronic Radiculopathy • ~2.5M

- Clinical need for an effective and approved therapy that directly addresses the pain
- Today, radicular back is one of the most prevalent of all lower back pain syndromes with various durations
- 50% of patients who currently seek conservative care do not reach resolution of symptoms.
- Untreated Pain has major psychosocial and physical implications.
- Surgical interventions do not provide the desired outcomes on consistent bases

Unmet Needs

- While most patients resolve with little medical intervention, those that need further attention have limited options with variable efficacy.

1 In some cases patients may opt for stimulators and intrathecal pumps prior to or in lieu of surgery.

Source: Health Advances interviews and analysis.
Value Proposition Solution

1. Common Pathology
   • Disc pathology in the lumbar leading to inflammation of the nerve and causing discomfort and radiating pain in the legs

2. Unmet Clinical Need
   • No standard treatment algorithm or approved indication for current standard of care
   • Over half of patients who seek treatment do not reach resolution of symptoms

3. Ideal Innovative Therapy
   • Single sustained Pain Relief Therapy
   • Non-surgical, minimally invasive procedure
   • First approved indication for radiculopathy
   • First in class therapy to replace multiple ESIs

*Source: Health Advances Market Research

Thank you!