Neural-Scan Helps Identify Piriformis Syndrome

The Neural-Scan detected abnormal L5 and S1 dysfunction on the ipsilateral (same) side. The outcome measures of pain intensity were Visual Analog Scales (VAS) (11), and modified McGill (12) scores, and the outcome measures of disability were Oswestry (13), and Roland-Morris Disability Scale (14) scores. The data below were obtained prior to treatment, and at 6-8 weeks follow-up after the procedure. VAS pain intensity was mean ± SEM 8.8 ± ±0.151, compared to post treatment 4.53 ± 0.242 (p<0.05). Table III shows the change in McGill, Roland-Morris and Oswestry scores from before to after treatment. All patients reported a reduction in pain scores. VAS pain scores in the study population were 8.87 ± ±0.15 prior to treatment and 4.53 ± ±0.2 after treatment (p<0.01). McGill scores were 40.6 ± ±3.04 before and 21.5 ± ±2.51 after the injection (p<0.01). Oswestry scores changed from 25.9 ± ±1.26 to 11.7 ± ±1.02 (p<0.01) and Roland-Morris scores decreased from 16.0 ± ±9.35 to 20.6 ± ±1.02 (p<0.01). Lumbar SPF-NCS showed hypoaesthesia in nerve roots L5 in 7/48, S1 in 9/48 and both L5 and S1 in 32/48 patients.

DISCUSSION
Botulinum toxin-A™ is a 150 Kda protein produced by Clostridium Botulinum. It is a neurotoxin, which acts presynaptically by inhibiting the release of acetylcholine, thus leading to functional denervation of muscle (15). This effect lasts up to 6 months. In 1989, FDA approved its use for the treatment of strabismus, blepharospasm, and hemifacial spasm (ref). Botulinum toxin-A™ has been on the market for a while now, but its use in pain patients has gained popularity only recently (16, 17, 18, 19). The piriformis muscle is a pyramidal muscle that arises as three digitations from the ventrolateral aspect of the sacrum from S1-S4, gluteal surface of ilium near the posterior inferior iliac spine and the anterior capsule of the sacroiliac joint. It passes through the greater sciatic foramen on its lateral trajectory to its tendonous insertion on anterior/medial aspect of the greater trochanter of the femur. Piriformis syndrome is a secondary cause of sciatica due to compression and/or irritation of sciatic nerve compressed by the contracted piriformis muscle. Its signs and symptoms can be explained by the proximity of the muscle to sciatic nerve at the sciatic notch. There are six possible relationships between the piriformis muscle and the sciatic nerve (23). Most commonly, the nerve is anterior and below piriformis muscle. The patient complains of pain, numbness and/or weakness in L4, L5 or S1 distributions. These may be associated with localized tenderness in piriformis muscle itself. Alternatively, pain due to piriformis spasm can also be felt as a deep, aching type of pelvic pain on the same side without signs and symptoms of sciatica.

As the piriformis muscle is a lateral rotator of hip flexion and assists in abduction, active muscle contraction can lead to pain reproduction (Beatty’s maneuver (9). These physical signs if present are useful in differentiating piriformis syndrome, from sciatica due to other causes alone.

SPF-NCS provides a reproducible (<0.2mA) functional assessment of the peripheral sensory nervous system by measuring the voltage intensity which initiates membrane potential changes, to propagate a nerve impulse.
One problem with the diagnosis of the piriformis syndrome has been the lack of consistent objective diagnostic findings. We have found lumbar SPF-NCS reliable in detecting sciatica and, when correlated with signs and symptoms can confirm the diagnosis of piriformis syndrome.

Our study shows an association of piriformis syndrome with low back injury and/or surgery, degenerative disc disease, total hip surgery, spinal metastases and pelvic surgery. Two of our patients had piriformis syndrome after hard falls to the floor. We speculate that piriformis muscles may go into spasm either secondary to irritation of its nerve supply, sciatic nerve irritation, as in disc disease, lumbosacral radiculitis, or surgery in its vicinity, such as in total hip replacement, pelvic surgery, etc.

A variety of therapeutic approaches have been suggested for the management of piriformis syndrome (20, 21, and 22). These include conservative measures such as analgesics, application of heat, osteopathic manipulation, stretching exercises and even surgical resection of the piriformis muscle (23). Except for the latter, none of these modalities offer significant pain relief, and surgery is associated with morbidity. Perisciatic injection of steroids (24) and caudal epidural steroid injection for piriformis syndrome (25) have been described, as well as injection of local anesthetics and steroids in the muscle belly, but at present there are no outcome data which show their efficacy. Our study shows that intrapiriformis Botulinum toxin-A™ injection significantly reduces pain and disability for at least 6 and up to 8 weeks. All of the patients who underwent Botulinum toxin-A™ injection to piriformis muscle reported at least a 45% reduction in pain as well as improvement in their disability scores. Intrapiriformis Botulinum toxin-A™ injection can be performed easily and quickly (< 10 minutes) under fluoroscopic guidance, does not require EMG needle placement or the use of a nerve stimulator, and is less invasive than surgery. The technique for intrapiriformis injection described in this paper can be learned easily. After performing a few injections, one easily appreciates the characteristic feel of the needle entering the piriformis sheath. Intrapiriformis Botulinum toxin-A™ injection is an effective treatment for Piriformis Syndrome.

### TABLE I: DEMOGRAPHIC CHARACTERISTICS OF 50 PATIENTS

<table>
<thead>
<tr>
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<th>Before Treatment Mean±SEM</th>
<th>After Treatment Mean±SEM</th>
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<tbody>
<tr>
<td>McGill</td>
<td>40.629±3.048</td>
<td>21.555±2</td>
</tr>
<tr>
<td>Roland Morris</td>
<td>16.074±0.935</td>
<td>11.740±1</td>
</tr>
<tr>
<td>Oswestry</td>
<td>25.963±1.260</td>
<td>20.666±1</td>
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</tbody>
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### TABLE II: MCGILL, OSWESTRY, ROLAND-MORRIS---BEFORE AND AFTER (N=27)

**Figure 2:** SPF-NCS Data (n= 48)  
**X-Ray**
SPF-NCS Graph I: Right S1 severe rated dysfunction Botulinum injection.

SPF-NCS Graph II: S1 recovery after piriformis

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