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Case Report

Using Radiofrequency Ablation for the Treatment of Restless Leg Syndrome

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Abstract

Restless legs syndrome or Willis-Ekbom disease is a neurological condition characterized by lower extremity akathisia associated with unpleasant sensations which resolve upon limb movement. Conventional treatment modalities such as dopaminergic agents, opioids, benzodiazepines and anticonvulsant agents may exacerbate symptoms with chronic use or have inconsistent data reported in the literature. Spinal cord stimulators and intrathecal pumps are invasive treatments with unpredictable results. We present a case of a 50-year-old male with refractory Restless leg syndrome, lumbar facet arthropathy and sacroiliitis who presented for Radio Frequency Ablation of the medial branch nerves at L3, L4 and L5 under fluoroscopic guidance for treatment of his back pain. His RLS had been initially diagnosed in childhood and was refractory to conservative treatment. After undergoing L3, L4 and L5 radio frequency ablation, at follow up 4 weeks, the patient reported resolution of right lower extremity RLS and continues to report freedom from RLS symptoms 1 year later. This case illustrates the potential for radiofrequency ablation in the treatment for refractory Restless leg syndrome. We present a treatment for RLS that is susceptible neither to pharmacological tolerance nor exacerbation of RLS symptoms and is less invasive than SCS and IT pumps. We found no published data in the literature describing radiofrequency ablation of the medial branch nerves at L3, L4 and L5 for treatment of RLS.

Keywords: *Radiofrequency Ablation; Restless Leg Syndrome*

Introduction

Restless legs syndrome (RLS), or Willis-Ekbom disease, is a neurological condition characterized by lower extremity akathisia associated with unpleasant sensations which resolve upon limb movement [1]. Conventional treatment modalities-dopaminergic agents, opioids, benzodiazepines and anticonvulsant agents-may exacerbate symptoms with chronic use or have inconsistent data reported in the literature [2]. Spinal cord stimulators (SCS) and intrathecal (IT) pumps are invasive treatments with unpredictable results. We present a treatment for RLS that is susceptible neither to pharmacological tolerance nor exacerbation of RLS symptoms and is less invasive than SCS and IT pumps. We found no published data in the literature describing radiofrequency ablation (RFA) of the medial branch nerves at L3, L4 and L5 for treatment of RLS.

Case Report

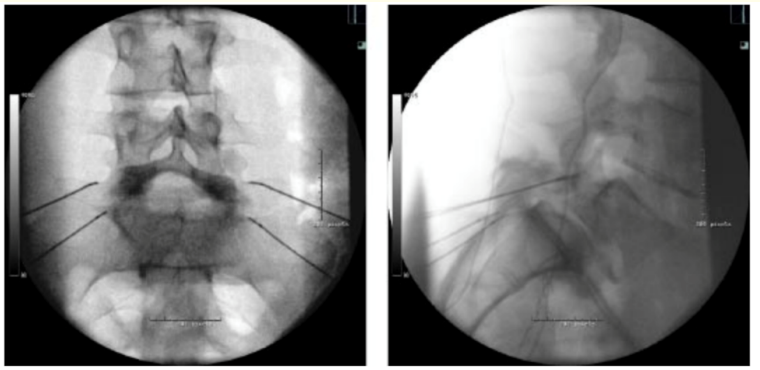
A 50-year-old male with RLS, lumbar facet arthropathy and sacroiliitis presented for RFA of the medial branch nerves at L3, L4 and L5 under fluoroscopic guidance. This therapeutic choice was made because he had reported significant pain relief from diagnostic lumbar medial branch nerve blocks. His RLS had been diagnosed in childhood and was refractory to conservative treatment. Lumbar facet

Speculated Interventions
Pregabalin
Iron supplements
Levodopa
Cabergoline
Long acting Oxycodone
Exercise
Acupuncture
Pneumatic Compression
Infrared Spectroscopy
Transcranial magnetic stimulation
Massage
Hot baths

Figure 1

arthropathy and sacroiliitis were diagnosed after a motor vehicle accident. Of note, patient does not have a history of depression or iron deficiency anemia.

Upon prone placement on the fluoroscopy table, the patient was given midazolam 1 mg intravenously for sedation and standard American Society of Anesthesiologists' recommended monitors were used. After sterile prepping and draping, lumbosacral anatomy was identified via fluoroscopy and radiofrequency cannulas were advanced to target L3, L4 and L5 right medial branch nerves.



(Left) AP fluoroscopic view with RFA needles in place for bilateral L4 medial branch and L5 dorsal rami RFA procedure. (Right) Lateral fluoroscopic view with RFA needles in place for bilateral L4 medial branch and L5 dorsal rami RFA procedure.

Figure 2

Satisfactory sensory responses and negative motor responses for the right lower extremity were obtained. Two ml of 2% lidocaine were injected before lesioning at 80 degrees Celsius for 90 seconds. Subsequent injection of Sarapin 2 mL, Kenalog 40 mg and 0.5% bupivacaine 2 mL was administered at each level. The patient tolerated the procedure well without complications. At follow up 4 weeks, the patient reported resolution of right lower extremity RLS and continues to report freedom from RLS symptoms 1 year later.

Discussion

RLS is a common neurological disorder first described by Thomas Willis in 1685 [3] and further characterized by Karl-Axel Ekbom in 1945 [4]. The International Restless Legs Syndrome Study Group detailed the disorder as an urge to move the lower extremities which may be associated with akathisia, worsened symptoms during rest or decreased movement, improvement of symptoms upon movement and intensified symptoms during the evening or night [5]. The prevalence of RLS in the general population is 1 - 15% [6]. Data shows women are typically twice more affected than men, populations of North American and European descent tend to be affected more than those of African descent [7] and no significant relationship established between age and onset of disease.

Goulart., *et al*. proposed a significant relationship exists between RLS and chronic pain as painful sensations have been reported in as many as 61% of RLS diagnosed patients [8]. Among patients with pain syndromes including fibromyalgia, migraines and somatoform pain disorders the prevalence increases to 23.4 - 42.6% [9-11] approximately 25%, [12-14] and 42%, [15] respectively.

There is no universal consensus on the pathophysiology of RLS. The beneficial effects of dopaminergic agents in treating RLS symptoms has implicated iron in contributing to RLS as it affects dopamine transmission [16]. Among patients with iron deficiency anemia, Allen., *et al*. showed a 31.5% prevalence of RLS [17]. Specifically, iron deficiency within the central nervous system due to inadequate transportation via the blood brain barrier may result in aberrant dopamine transmission [18]. Efficacy of opioids in treating RLS symptoms has been well described and RLS symptoms treated with opioids resumed with naloxone administration [19,20]. Beta-endorphins, endogenous mu opioid receptor ligand, were shown to be reduced within the thalamus of RLS patients in a posthumous study suggesting the mu opioid receptor contributes to RLS pathophysiology [21]. Efficacy of invasive procedures including SCS and IT pumps for RLS is scarce and limited to case reports [22,23]. Xiao-Min Xu., *et al*. proposed that RLS symptoms can be significantly decreased by other non-invasive approaches such as compression devices, exercise training, compression devices, light therapy, strenuous exercise, acupuncture and transcranial magnetic stimulation [29]. However, review of the literature does not describe radiofrequency ablation (RFA) as a means for treatment.

RFA is a minimally invasive procedure that utilizes electrical current and heat to destroy target tissue. The destruction of nervous tissue interrupts the nociceptive pathway with the goal of decreasing pain. RFA of the lumbar medial branch nerves is classically performed to treat pain of the lumbar zygapophysial joints, portions of lumbar multifidus muscles, the interspinal muscles and the interspinous ligaments [24]. Several studies have shown the benefit of RFA in treating lumbar facet joint pain [25-28]. There are no published data correlating radiofrequency ablation with RLS, iron levels, dopamine transmission, or opioid receptors [30-31].

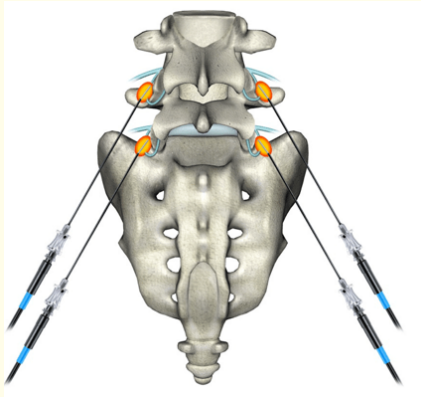


Figure 3

Conclusion

We propose RFA of the lumbar medial branch nerves as a minimally invasive therapeutic alternative for patients with RLS refractory to conservative, pharmacological therapy who refuse implanted medical devices such as SCS and IT pumps. Further investigation is needed to clarify the relationship between RLS and RFA of the lumbar medial branch nerves.

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