Radiofrequency lumbar facet joint denervation

- Lumbar facet joint denervation targeting the medial branch in the sub-mammillary fossa: An anatomical optimization study
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- Lumbar Facet Joint Radiofrequency Ablation With a 3-Tined Cannula: A Technical Report and Observational Study
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First described by Shealy in 1975 [1] , radiofrequency denervation is a procedure that involves lesioning the medial branches with a combination of electric and magnetic fields. If these nerves become insensate from the process, they cannot relay pain from the facet joints. Radiofrequency ablation of the medial branches is now a commonly used procedure to provide more long-term relief of facet joint-mediated pain.

As with diagnostic medial branch blocks with local anesthetic, the technique and protocol employed for radiofrequency lesioning can have significant impact on the success of the procedure.

Indications

Chronic low back pain CLBP that are refractory to more conservative treatment options.

see Lumbar facet joint denervation.

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see also Lumbar facet joint syndrome.

see also Lumbar facet joint nerve block.

Lumbar medial branch radiofrequency ablation may provide benefit to well-selected individuals, with medial branch blocks (MBB) being more predictive than intra articular IA injections. More stringent selection criteria are likely to improve denervation outcomes, but at the expense of more false-negatives. Clinical trials should be tailored based on objectives, and selection criteria for some may be more stringent than what is ideal in clinical practice [2]

Radiofrequency denervation (RFD) of the medial branch nerve (MBN) is a minimally invasive percutaneous procedure.

Radiofrequency (RF) energy is delivered along an insulated needle in contact with the target nerve. This focused energy heats and denatures the nerve. It is unclear how effective RFD is at relieving LBP. NICE 2016 (NG59) guidance [3] on LBP recommends RFD as a treatment option for people with suspected facetogenic LBP who fail to respond to conservative treatment and respond positively to medial branch blocks (MBBs). A subsequent (2017) Dutch study (MINT), found no benefit from the addition of RFD to an exercise program for people with LBP who had responded positively to a MBB [4].

Recent trials have been criticized for using a sub-optimal intervention technique.

To achieve consensus on a best practice technique for administering radiofrequency denervation of the lumbar facet joints to selected people with low back pain.

A consensus of expert professionals in the area of radiofrequency denervation of the lumbar facet joints.

They invited a clinical member from the 30 most active UK departments in radiofrequency pain procedures and two overseas clinicians with specific expertise to a 1 day consensus meeting. Drawing on the known anatomy of the medial branch, the theoretical basis of radiofrequency procedures, a survey of current practice and collective expertise, delegates were facilitated to reach consensus on the best practice technique.

The day was attended by 24 UK and international clinical experts. Attendees agreed a best practice technique for the conduct of radiofrequency denervation of the lumbar facet joints.

This consensus was based on a 1 day meeting of 24 clinical experts who attended and took part in the discussions. The agreed technique has not been subject to input from a wider community of experts.

Current best practice for radiofrequency denervation has been agreed for use in a UK trial. Group members intend immediate implementation in their respective trusts. We propose using this in a planned Randomised Controlled Trial (RCT) of radiofrequency denervation for selected people with low back pain [5].

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28 patients with low back pain, with a duration, > 6 months and a 50% pain reduction on the numeric analog scale (NAS) after a diagnostic block. All patients received endoscopic facet joint denervation of three facets on the left and right side using only one incision on each side with an exploration of the surrounding tissue. Telephone interviews were conducted with all patients. The outcome was determined with Odom's criteria, percentage reduction NAS, subjective assessment of the patient, and duration of the effect.

According to Odom's criteria, 68% of the patients showed “acceptable” to “excellent” results and confirmed that denervation helped them manage their daily lives better. The average pain reduction

in the responder group was 47% with an average duration of 7.8 months.

In this retrospective study, Woiciechowsky and Richter from the Vivantes-Humboldt-Klinikum, Spine Clinic, Spine Center Berlin, Charité Medical Faculty Berlin, demonstrated the practicability and effectiveness of the endoscopic facet joint denervation procedure in the treatment of chronic low back pain using only one incision for three facets. Further studies should investigate if this procedure is more effective than percutaneous radiofrequency denervation [6)].

The lumbar facet joints have been implicated as one of the causes of low back pain syndromes. About 15-40% of patients who presented with chronic low back pain was attributed to lumbar facet joint syndrome.

In 3 randomized clinical trials of participants with chronic low back pain originating in the facet joints, sacroiliac joints, or a combination of facet joints, sacroiliac joints, or intervertebral disks, radiofrequency denervation combined with a standardized exercise program resulted in either no improvement or no clinically important improvement in chronic low back pain compared with a standardized exercise program alone. The findings do not support the use of radiofrequency denervation to treat chronic low back pain from these sources [7)].

The purpose of a study was to analyse whether radiofrequency denervation is better than SHAM procedure in treating chronic low-back pain caused by lumbar zygapophysial joints pathology. From the four identified randomised control trials, there is conflicting evidence at an intermediate 3-6-month stage, however; one study demonstrates statistical significance of radiofrequency denervation at 3 months. Longer-term follow-up is needed to prove the efficacy of radiofrequency denervation technique [8)].

Clinical studies of cryotherapy for lumbar facet joint syndrome (LFJS) have reported promising outcomes. However, few studies have focused on the technical aspects of cryoneurolysis for LFJS. The aim of a study was to determine the size and shape of cryolesions in vitro and to determine how they are affected by the duration of freezing, size of the cryoprobe and distance and angulation to an osseous boundary layer.

Two different cryolesion generators were used. Cryolesions were generated in tempered physiologic NaCl solution in the vicinity of an osseous surface. The size of the cryoprobes, duration of freezing, distance to the bone surface and angulation of the probe were studied. Cryolesions were recorded with a video camera during their emergence. Images at distinct time points were analysed using digital image processing software.

The probe size, the system in use and the duration of the freezing cycle were the main determinants for the size of the cryolesion. The vicinity of the osseous boundary resulted in a modest increase in the size of the cryolesion. Angulation of the cryoprobe towards the osseous boundary is of minor importance for the size of the contact area to the nerve.

For cryoneurolysis of LFJS, duration of freezing, temperature and probe size are the main

determinants of lesion size and thus the probability of success of the procedure. A tangential approach of the probe is not essential [9].

Technique

see Lumbar facet joint denervation technique.

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