

## RADIOFREQUENCY DENERVATION IN LUMBAR FACET JOINT PAIN: OUR PRELIMINARY OBSERVATIONS

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Facet syndrome is characterized by a dull ache, due to degeneration of facet joints and a segmental instability with variations in alignment and leanings of zygoapophyseal joints, through our experience with pulsed and continuous radiofrequency treatment in patients with lumbar facet syndrome. Within 12 months we treated 36 patients, 20 males and 16 females, ages 43 to 84 years (mean:  $64\pm 8,53$ ) suffering from facet syndrome. All patients had, previously, joint infiltration with anesthetics and corticosteroids that produced a transient pain relief. All patients had pulsed and continuous radiofrequency neurotomy at one or more lumbar joints with fluoroscopy guidance. They were in a day-hospital setting. After the procedure we kept them under observation for about 120 to 240 minutes. Their hospital release was made in the presence of a caregiver, and the patients were told they needed bed rest for 24 hours. The follow-up occurred after 15, 30, 45 and 60 days evaluating pain through the NRS scale and disability through the Oswestry Index. No patients had any major complications. Mean NRS before the procedure was 6.7. It was  $4,3\pm 1,11$  at first check up and  $2,3\pm 0,45$  at the end of follow-up. The mean Oswestry Index before the procedure was  $65\pm 5,03$ , and  $32\pm 7,01$  at 60 days. We observed that radiofrequency neurotomy is a safe and relatively easy technique, following the evidence based guidelines. Side effects were transient. Latter analgesia data could be more significant with a statistically significant number of procedures.

Chronic low back pain has been described as a source of disability and work absence (1). Among the causes of chronic low back pain, lumbar facet joint (LFJ) related pain is reported to have a prevalence of 15% to 45% (2). The LFJ form the posterior lateral articulations connecting the vertebral arch of one vertebra to the arch of the adjacent vertebra. As true synovial joints, each LFJ has a distinct joint space capable of containing between 1 to 1.5 ml of fluid, a synovial membrane, hyaline cartilage surfaces, and a fibrous capsule (3). The LFJ capsule and surrounding structures are innervated by small medial branches of dorsal rami. Each facet joint is supplied by two medial branches. The course over the transverses processes at the levels constituting the joint (4). Chemical or mechanical stimulation of

the LFJ and the nerve supply elicits back pain (5). LFJ pain is predominantly caused by repetitive stress and/or cumulative low level trauma; the resulting osteoarthritis leads to inflammation, which can cause the facet joint to be filled with fluid and swell, therefore stretching the joint capsule and causing pain. The most frequent complaint is axial low back pain. Sometimes pain may be also felt in the groin or thigh area. Lumbar paravertebral tenderness is indicative of facetogenetic pain (6). When pain gets worse by flexion and extension, it may be considered a pathology of the lowest lumbar segments. LFJ pain has been managed by intra-articular injection, nerve blocks, and neurolysis of the medial branches (7). The use of intra-articular corticosteroid injections is controversial. Radiofrequency (RF) treatment of the

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facet joints was given 1B+ score in recently published practice guidelines (8). This score implicates a positive recommendation. We have observed pulsed plus continuous RF denervation of medial rami of lumbar facet joints.

## MATERIALS AND METHODS

### *Patient characteristics*

We studied consecutive patients, presenting chronic low back pain, within a 12 month period. Inclusion criteria were: chronic low back pain of > 6 months duration and not relieved by conservative treatment; pain diagram suggesting facet low back pain; MR or tomography excluding other causes of low back pain. All patients underwent a diagnostic block under fluoroscopic guidance of the affected joint with lignocaine 40 mg (2% 2 ml) before proceeding to RF. Patients who had consistent pain relief (NRS reduction > 5 points) were considered to be eligible for RF procedure.

The number of treated patients was 36 (20 female 16 male), the mean age was  $64 \pm 8,53$ .

### *RF lesioning technique*

RF lesioning was performed using an OWL 22G RF insulated Hybrid Cannula, (Length 100 mm Active tip 5 mm) under fluoroscopic guidance and maintaining asepsis. The skin insertion point was infiltrated with lidocaine 2%. Using fluoroscopy the needle was directed

toward the target between the transverse process and superior articular process. Final position was confirmed by 3 fluoroscopic views. After verifying the impedance, sensory stimulation of the target nerve was performed (50 Hz up to 1.0 V), followed by motor stimulation (2 Hz up to 2 V). During sensory stimulation, paraesthesia was elicited, whereas motor stimulation caused palpable and visible twitch of the multifidus muscle of the patient appropriate for the segmental level. Then pulsed RF was started by increasing electrode temperature to  $42^{\circ}\text{C}$  for 120 s. Thereafter, lidocaine 2% (1 ml 20 mg) was injected at tip. Continuous RF was started increasing electrode temperature to  $75^{\circ}\text{C}$  for 120 s.

### *Follow-up*

Treatment outcomes were measured by NRS and Oswestry Disability Index. For measuring NRS a standard 10 cm-scale, where 0 corresponded to “no pain” and 10 corresponded to “worst pain” patients had ever perceived, was used. ODI questionnaire was designed to understand how back or leg pain was affecting the patient’s ability to manage in everyday life. It was completed by the patients and then analyzed. The NRS and ODI were measured before procedure, and after 15, 30, 45 and 60 days.

### *Data analysis*

Numerical data obtained was expressed as mean  $\pm$  standard deviation. NRS and ODI scores before and after the procedure at different time points were compared using Student Test. A P value  $<0.05$  was considered to be

**Table I.** *Patient characteristics*

Number of patients	36 ( male 16 )
Age (Mean $\pm$ SD)	$64 \pm 8,3$
Duration of symptoms	$1.2y \pm 0.7$
Affected joints	Single 4 pts (11%)
	Double 25 pts (69%)
	Triple 7 pts (20%)

**Table II.** *Results of the analgesia.*

Outcome measure	Pretreatment	15 days	30 days	45 days	60 days
NRS (mean $\pm$ DS)	$6.75 \pm 1.15$	$4.27 \pm 1.11$	$3.38 \pm 0.49$	$2.50 \pm 0.56$	$2.27 \pm 0.45$
ODI (mean $\pm$ DS)	$64.83 \pm 5.03$	$49.75 \pm 6.53$	$42.72 \pm 5.28$	$36.77 \pm 6.26$	$31.69 \pm 7.01$

significant, and a  $P < 0.001$  as highly significant.

## RESULTS

The study interval extended from April 2012 to April 2013. All treated patients satisfied inclusion criteria. Mean NRS before procedure was  $6.7 \pm 1.15$ , at 15 days  $4.27 \pm 1.11$ , at 30 days  $3.38 \pm 0.49$ , at 45 and 60 respectively  $2.5 \pm 0.56$  and  $2.27 \pm 0.45$ . When the scores before procedure and after 15 days were compared the difference was highly significant ( $P < 0.001$ ), but, before procedure and after 60 days the difference was not very significant. Mean ODI before procedure was  $64.83 \pm 5.03$ , at 15 days  $49.75 \pm 6.53$ , at 30 days  $42.72 \pm 5.28$ , at 45 days  $36.77 \pm 6.26$  and at 60 days  $31.69 \pm 7.01$ . When the scores before procedure and after 15 days were compared the difference was highly significant ( $P < 0.001$ ) and before procedure and after 60 days was only significant ( $P < 0.05$ ).

There were no major complications based on the criteria of the Society of Interventional Radiology (9).

## DISCUSSION

We have observed that combined pulsed and continuous RF lesioning resulted in a significant reduction of pain and disability in patients with chronic lumbar facet arthropathy. There are many studies on continuous or pulsed RF alone, but no studies regarding both techniques at the same time.

The clinical results of RF denervation have been shown to be superior compared with sham therapy in double blind studies; other studies did not demonstrate any significant differences with respect to functional improvement and pain relief (10-11). It still remains unclear, from the outcome assessment of different studies, the quantum of pain relief, that can be deemed as a success, attributable to the procedure. Again, the duration of the pain relief required to consider the procedure successful remains ambiguous. (12) Continuous RF treatment was compared with pulsed RF treatment of facetogenetic pain in two randomized trials. Both showed continuous to be superior (13-14). The rationale of our protocol is based on the observation of the use of a lower amount of local anesthetic before continuous RF lesioning, with a

reduction of impedance resulting in a minor spread of radiofrequency with a more close lesion. The present study has some limitations. First of all, the follow-up was only at 60 days while RF is considered successful if its effects last for many months. Patients were under pharmacological treatment, and the scores can be affected by the effects of drugs. We cannot measure the accuracy of the RF lesion of medial branches, that's what we intended to achieve using both RF techniques. In conclusion, pulsed and continuous RF is a safe technique, it provides a reduction of pain and disability in carefully selected patients with lumbar facet joint arthropathy confirmed by diagnostic block. However, a longer follow-up is required to assess the long-term efficacy of this combined procedure.

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