Clinical Article

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Radiofrequency Ablation for Management of Lumbar Facet Syndrome: A Case Series

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Abstract

Background data: Radiofrequency Ablation (RFA) procedure for Lumbar facet arthritis and pain is a promising option for management of chronic low back pain due to facet arthropathy.

Purpose: The aim of this study is to evaluate the clinical outcomes in patients treated with Radiofrequency Ablation for lumbar facet syndrome.

Study Design: A retrospective clinical study.

Patients and Methods: Eighteen consecutive patients diagnosed with Lumbar Facet Syndrome were included in this study. The Radiofrequency Ablation procedure for Lumbar facets was performed for all of them in the period between 2016 and 2017. The clinical outcome was assessed by the Visual Analogue Scale (VAS) before procedure and at follow-up. Overall patients' satisfaction from the procedure outcome was graded according to Odom's criteria.

Results: Among the eighteen patients included in the study, eight patients were females and ten were males. The mean age was 46.5±6 (33-60)years. Duration of pain at presentation varied between 1-4 years with mean duration of 30.2 months. Fourteen (77.7%) patients received bilateral facet denervation while only four had unilateral facet ablation. After the intervention, the mean Visual Analog Score for back pain was significantly improved from 7.1±1.4 to 3.0±1.2 (P=0.01).At the end of the follow up, patient satisfaction according to Odom's criteria of outcome grading showed 34.8% of patients had good recovery and 30.2% had fair recovery.

Conclusion: Radiofrequency Ablation is an emerging treatment for lumbar facet syndrome; it improves the clinical outcome on short-term follow-up. Further studies are encouraged to assess its long term efficacy. (2018ESJ126)

Keywords: radiofrequency ablation; Lumbar facets; back Pain

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Introduction

Facet joint pain accounts for 15-30% of low back pain.[14.15] Other sources of low back pain include the intervertebral discs, the sacroiliac Joint and the coccyx. Pain becomes chronic if it persists for more than 3 months. The term lumbar facet syndrome is referred to the pain caused by facet joints.[13,21] Lumbar facet joints has the capacity to degenerate over time and cause low back pain, additionally pain can be referred to the lower extremities through the activation of adjacent nociceptive fibers in the patients suffering from chronic low back pain.[5,19]The medial

branch nerve of the dorsal ramus (MBN) is the source of pain in lumbar facet syndrome. MBN supplies the facet joints and multifidi muscles at each spinal segment.[11,26]

Facet-mediated pain is initially managed conservatively by non-steroidal anti-inflammatory drugs, postural re-education and physical therapy.[12]Interventional treatment including intra-articular injections, facet joint nerve blocks, and/or radiofrequency neurotomy is indicated.

RFA is indicated when the conservative treatment is failed.[2,23] RFA was first used by Shealy[25] in 1975, who applied a high-frequency electrical current runs through an insulated needle to control the facet joint pain. Radiofrequency Thermal MBN lesioning interrupts afferent nociceptive pathways supplying the facet joint; this is done through an electrode placed at the target MBN providing significant improvement in pain and analgesic use for 6-12 months.[24]

The aim of this study is to evaluate the clinical outcomes in patients with lumbar facet syndrome who are treated by the conventional thermal Radiofrequency Ablation.

Patients and Methods

This retrospective clinical study was conducted on eighteen patients diagnosed with Lumbar Facet Syndrome. The mean age was 46.5±6 (33-60) years. Radiofrequency Ablation intervention for lumbar facet joints was performed for all patients between 2016 and 2017 at Cairo University Hospitals. Patients were selected from the outpatient clinic of our hospital. Permission from ethical committee in our institution was obtained. All study participants provided informed consent. Facet pain whether unilateral or bilateral was diagnosed radiologically and clinically. Clinically facet pain is aggravated by back extension, there is tenderness over involved facet and pain does not radiating below the knee. Inclusion criteria were: 30 to 65 years of age, chronic back pain due to lumbar Facet Syndrome for more than 6 months, failed response to conservative treatment at least 3 months and relief from intra-articular facet injections. Exclusion criteria included: disc herniation, spondylolisthesis, radicular pain, spinal deformity, presence of neurological deficits and positive history of surgical interventions. Patients' demography and preoperative data are summarized in (Table 1).

All patients underwent personal history taking, general and neurologic examinations. Patients were evaluated radiologically at presentation by X-rays and magnetic resonance imaging (MRI) which showed the facet joint effusion (T2 hyperintensity). Diagnostic temporarily block of the medial branch nerve was performed to all patients to identify the source of pain. Back pain was assessed using Visual Analogue Scale (VAS) before procedure and at follow-up after 1,6,12 months. Overall patients' satisfaction from procedure outcome was graded according to Odom's criteria. (Table 2)

Procedures:

After the diagnostic block of the medial branch nerve and selection of the targeted facet joints to be denervated, patients were positioned prone on a fluoroscopy table with a pillow under the abdomen to flatten the lumbar lordosis. The C-arm is positioned approximately 15° obliquely to the ipsilateral side of the involved facet joints to identify the targeted points of ablation. The same can be done in the contralateral side in the patients of bilateral facet joint ablation (Antero posterior X-ray view can be used if the patient had previous transpedicular screws insertion).After prepped with chlorhexidine, the targeted lumbar area is draped in a sterile manner. In some patient, Conscious sedation might be applied. Local anesthetics are infiltrated through the skin and subcutaneous tissues superficial to the target entry site. A17gauge electrode was inserted under the fluoroscopic guidance at the target point which is located in the lateral surface of the superior articular surface just above its junction with the root of the transverse process of the desired level. Anatomically, needle placement was parallel to the medial branch nerves. Sensory and motor testing was performed to confirm integrity of the corresponding exiting spinal nerve at each target. Thermal radiofrequency facet denervation lesion is performed at 80–85 °C for duration of 60 to 120 seconds. Local anesthetic is injected just before the ablation procedure because it is very painful and intolerable. Also, it could be injected after finishing

the ablation for pain analgesia.

Following the intervention, patients were observed for approximately 30 minutes then discharged with follow up plan after 4-6 weeks. (Figure 1)

Results

In our study, we reported eighteen patients with Lumbar Facet Syndrome. All patients had no relief of pain after proper conservative treatment. Eight patients (44.5%) were females and ten (55.5%) were males. Mean Duration of symptoms was 30±1.5 month. Thermal radiofrequency bilateral facet denervation was performed to 14 patients (77.7%) while only four (22.3%) had unilateral facet denervation. (Table 3)

The mean VAS pain score for back pain after the procedure were 3.0±1.2 compared with pre-procedural score of 7.1±1.4. There was a statistically significant relief of pain after the intervention at 12 month follow up.(P=0.01)(Table 4)

All the patients were followed up for at least one year. At last follow up, 72.2 % of patients included in the study showed pain relief. The Patient satisfaction was assessed using Odom's criteria of outcome grading, 6 patients (33.3%) had excellent recovery, and 7 patients (38.9%) had good recovery. Incomplete pain relief or persistent pain compared to pre-ablation pain was reported in 2 patients (11.1%) who had fair recovery and 3patients (16.7%) remained with the same symptoms and needed further treatment.

We didn't report any s1erious complications in our series apart from pain at the site of the needle insertion in 2 patients and bruising in one patient, the pain lasted for short period (within 4 days post procedure) and was self-limited.

Table 1. Patients Preoperative Data

Parameters	Results
Mean Age (y)	46.5 (range 33-60)
Male/female	10/8
Mean duration of pain (y)	2.5 (Range, 1-4)
Targeted facet joint side	Unilateral 22.3% Bilateral 77.7%

Table2. Odom's criteria

Excellent	All preoperative symptoms relieved, abnormal findings improved.
Good	Minimal persistence of preoperative symptoms, abnormal findings unchanged or improved.
Fair	Definite relief of some preoperative symptoms, other symptoms unchanged or slightly improved.
Poor	Symptoms and signs unchanged or exacerbated.

Table3. Distribution of Targeted Lumbar Levels

Targeted level	Unilateral ablation (No.)	Bilateral ablation (No.)
L 2-3	-	2
L 3-4	-	3
L 4-5	3	4
L 5-S1	2	5

Table4. Clinical Outcome of Patients (Measured by VAS Score)

Parameters	Value
Pre-procedural	7.1 ± 1.4
One month follow up	4.3 ± 1.2
Six month follow up	3.3 ± 1.1
12 month follow up	3.0 ± 1.2

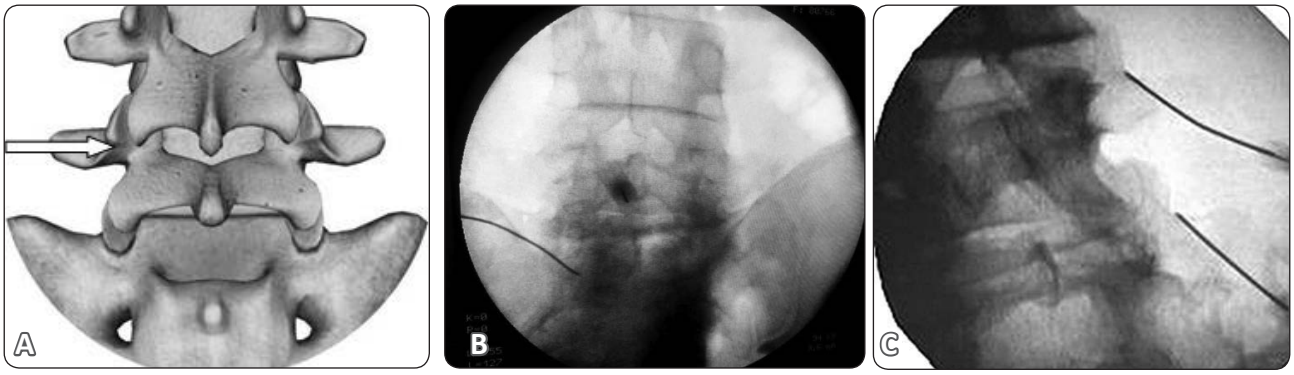

Figure 1. (A) White arrows on the target point which lies in the lateral surface of the superior articular surface just above its junction with the root of the transverse process on three dimensioned Computed tomography. (B,C) X-ray image of lumbar spine represents the positioning of RF electrodes during the procedure.

Discussion

Radiofrequency Ablation is emerging treatment for patients suffering from lumbar facet syndrome refractory to conservative management**;** it is aimed to interrupt pain signals in spinal nerves using heat**.**[9,22]

Multiple researches performed to evaluate the efficacy of radiofrequency ablation intervention to denervated the facet joint in patients with chronic low-back pain; it mentioned different procedural techniques which included conventional, pulsed and cooled RFA. In our study we reported the functional improvement in patients treated by the conventional thermal RFA for refractory lumbar facet syndrome.[6,10] Inspite of the variations in ablation parameters, the target points have remained unchanged in all studies. Also, diagnostic intra-articular facet injections are considered the primary clinical test to justify an RFA after pain relief is achieved.[16]

Anatomically, it is crucial to apply appropriate radiofrequency needle-placement technique to ensure proper ablation of the facet joint innervations. In our technique we placed the needles parallel to the medial branch nerves in order to achieve the desired facet joint denervation. Lau et al,[17] reported in his series that many RFA techniques fail due to the non–parallel needle placement to the medial branch nerves.

In our research the mean age of participants was 46.5 years and 55.5%were males. In other studies as Jeffrey et al,[20] study which was done on 94 patients treated with RFA for lumbar facet syndrome between the years of 2008 and 2012,the mean age was57.8 and the male predominance was 41.5%.

In this study, the patient symptoms were assessed using the Visual Analogue Scale before the intervention and post-ablation. We reported improvement of the mean VAS score for low back pain from 7.1±1.4 pre-procedural to 3.0±1.2 at 12 months follow up after the intervention, our result showed the significant improvement of VAS score after RFA (P=0.01).This agreed with Tekinet al,[27] who reported in his study that there was a statistically significant reduction in back pain assessed by VAS after ablation. He reviewed 20 patients treated by RFA for facet joints with a baseline VAS score of 6.5±1.5 and 2.4±1.1 after the ablation. Most of outcome studies considered show short-term clinical outcome, only few studies assessed functional outcomes beyond 12 months.[4] In Leclaire et al,[18] study, He reviewed 36 participants after RFA of lumbar facet joints for 2 month and stated that there is no evidence of statistically significant benefit is reported.

In our study, 72.2% of patients included in the study showed pain relief after the ablation at last follow up after one year, patients a had excellent and good recovery. Our results coincide with the result by Dreyfuss et al,[7] who reported that after RFA about 60%–80% of patients continued to experience pain relief at 12 months.

Complications of radiofrequency neurotomy procedure is considered to be of a lower-risk .it includes needle site pain, infection, bruising, neuritis, and paresthesias**.**[3] In our study we reported

complication rate of 11.1%.Complications were unserious in the form of bruising and pain at the site of the needle insertion. In this aspect our results coincide with other authors[1,8] who reported in his study that the complications rate in his series was between 5% and 10 %.

Conclusion

Radiofrequency Ablation is an emerging treatment for lumbar facet syndrome. It improves the clinical outcome on short-term follow-up. Further studies is encouraged to assess its long term efficacy.

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الملخص العربي

إزالة التعصيب بواسطة الترددات الحرارية لإدارة متلازمة الوجه القطنية: سلسلة الحالات

البيانات الخلفية: إجراء ا إزالة التعصيب بواسطة الترددات الحرارية (RFA) لوجهات أسفل الظهر يظهر خيارا واعدا لإدارة آلام الظهر المزمنة الظهر

الغرض: الهدف من هذه الدراسة هو تقييم النتائج السريرية في المرضى الذين عولجوا باستخدام الموجات الترددات الحرارية لمتلازمة الوجه القطني.

تصميم الدراسة: دراسة الحالة السريرية بأثر رجعي.

المرضى والطرق:أدرجت في هذه الدراسة ثمانية عشر مريضا على التوالي متلازمة مع متلازمة الوجه القطني. أجريت عملية إزالة التعصيب بواسطة الترددات الحرارية للوجه القطني لجميعهم في الفترة ما بين 2016 و 2017. تم تقييم النتيجة السريرية من قبل مقياس التماثلية البصرية (VAS) قبل الإجراء والمتابعة. تم تصنيف رضى المرضى بشكل عام عن نتيجة الإجراء وفقًا لمعايير أودوم.

النتائج:من بين ثمانية عشر مريضا في الدراسة ، كان ثمانية مرضى من الإناث وعشرة من الذكور. كان متوسط العمر 46.5 (33-60) سنة. تتراوح مدة الألم في العرض بين 1-4 سنوات مع متوسط مدة 2.5 سنوات. أربعة عشر (77.7٪) من المرضى تلقوا إزالة التعصيب للوجه على الناحيتين في حين أن خمسة فقط تم إزالة التعصيب من جانب واحد. بعد التدخل ، تم تحسين متوسط معدل النظرة البصرية لآلام الظهر بشكل ملحوظ من 7.1 ± 1.4 إلى 3.0 ± 1.2 (P= 0.01). في نهاية المطاف ، أظهر رضا المريض وفقا لمعايير أودوم لتدريج النتائج أن 34.8٪ من المرضى لديهم الانتعاش الجيد و 30.2 ٪ كان الانتعاش عادلة

الاستنتاج: الترددات الحرارية أظهرت دورًا مهمًا في الحد من آلام أسفل الظهر المزمنة في المتابعة على المدى القصير ، وستكشف المزيد من الدراسات عن فعاليتها على المدى الطويل.