Pain Medicine

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Intradiscal Combination of Pulsed Radiofrequency and Gelified Ethanol for the Treatment of Chronic Discogenic Low Back Pain

Dear Editor,

Discogenic pain affects approximately 45% of patients suffering from chronic low back pain, and it is caused by chemical and mechanical changes of the intervertebral disc [1]. Many different minimally invasive techniques have been used for the treatment of this condition, with various results. We report the combination of intradiscal pulsed radiofrequency combined to gelified ethanol application for the treatment of chronic discogenic low back pain.

Pulsed radiofrequency mechanism of action has been well discussed [2,3]. Gelified ethanol is an implantable medical device in which an opaque agent in X-rays (the tungsten) was added [4,5]. The implant is administered within the affected intervertebral disc's nucleus pulposus, via a fine needle that is guided into the center of the disc, transdermally, under fluoroscopic guidance [4,5]. To our knowledge, this is the first report of the combination of the two methods via the same radiofrequency needle, for the treatment of chronic discogenic low back pain.

The patients enrolled suffered from discogenic low back pain, refractory to conservative treatment and physiotherapy for at least 6 months, and reported concordant pain during provocative discography. Pain scores (numeric rating scale 0–10) and satisfaction rates (visual analogue scale 0–10, where 0: "worst" satisfaction and 10: "the best") were assessed before the intervention, and after 1, 3, and 6 months postoperatively.

After screening 172 patients with low back pain, 44 had possible discogenic pain, and 18 proceeded with discography. Seven of these patients had a negative discography and 11 a positive one. Twenty-two painful discs, with concomitant degenerative signs on the magnetic resonance imaging (MRI) were treated (Table 1). The discography was applied manually with a 5 mL syringe using 3 mL of contrast media. Positive criteria for discogenic pain were: pain immediately after beginning of injection; increase of pressure in the target disc causing concordant pain up to completion of infusion of 3 mL of contrast media; reproduction of patient's chronic pain; severity of pain >7/10 numeric rating scale [NRS]; and no pain during discography of the adjacent disc.

In the posterior anterior (AP) fluoroscopic view, the targeted intervertebral disc space was identified. Then the C-arm image intensifier (Phillips Allura Exper FD 20, Holland) was rotated obliquely, until the superior articular process of the inferior vertebra was in the center of the intervertebral disc space. A metal forceps guide was placed on the patient's body, in order for its tip to project right on the lateral edge of the superior articular process in the middle space of the intervertebral disc, to identify the appropriate entry point. After local anesthesia, an

Table 1 Patient's demographics, MRI findings, painful degenerated discs treated, Numeric rating scale (NRS 0–10) of pain intensity and patients' satisfaction rate (0–10) of the combination of gelified ethanol/pulsed radiofrequency in the 11 patients studied

Patients	Sex	Age	Painful Discs Treated	MRI degenerated discs	Preoperative NRS	1 month NRS	3 months NRS	6 months NRS	Patients' Satisfaction (6 months)
1	M	63	L4,L5	L4,L5	7	0	0	0	10
2	M	37	L4,L5	L4,L5	8	0	0	0	10
3	F	60	L4,L5	L4,L5	7	4	4	4	2
4	M	37	L4,L5	L4,L5	8	0	0	0	10
5	M	20	L4,L5	L4,L5	7	0	0	0	10
6	F	67	L4,L5	L3,L4,L5	7	0	0	0	10
7	M	65	L4,L5	L2,L3,L4,L5	7	0	0	0	10
8	F	60	L4,L5	L4,L5	8	8	8	8	0
9	F	53	L4,L5	L3,L4,L5	7	0	0	0	10
10	F	57	L3,L4	L3,L4	7	0	0	0	10
11	M	50	L2,L5	L2,L4,L5	8	0	0	0	10

F = female; MRI = magnetic resonance imaging; NRS = numeric rating scale; M = male.

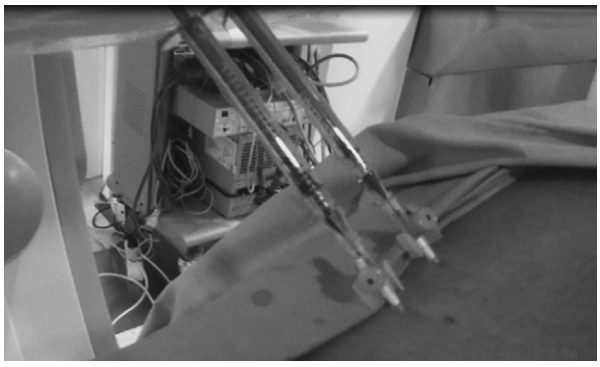

Figure 1 Gelified ethanol implant injection at the L4–L5 & L5–S1 intervertebral spaces.

introducer angiocath needle (16G, GST Corporation, UK) was inserted superficially until it was gripped from the tissues. It was then advanced under tunnel-view fluoroscopic guidance, with the needle tip aiming at the center of the disc, just lateral to the edge of the superior articular process. After stilette removal, the radiofrequency, sharp curved needle (sharped curved, 20 g, 150 mm or 200 mm, 20 mm active tip, Diros Tech, ON, Canada) was advanced slowly and carefully for about 3 cm, and then the depth and the direction of the needle were checked with a true lateral and AP views. The tip of the needle was introduced into the disc and advanced in the lateral view.

After final needle placement in the center of the disc, the stilette was removed and the electrode (TCH-15S, 20G reusable probe; D-466- 020- TCOWL, 20G single use probe, Diros Tech) was introduced into the RF needle. Pulsed radiofrequency (PRF) was applied (frequency 2 Hz, pulse width 10 ms, 60 V), for 20 minutes [3] using the OWL-URF-3AP (Diros Tech) generator. Then the electrodes were withdrawn and before the gelified ethanol (Discogel®, Gelscom, Hérouville-Saint-Clair, France) syringes were attached to the same RF needles, 1–1.5 mL of sterile N/S 0.9 % was injected into the disk. Gelified ethanol was then injected in small increments, under fluoroscopy, in a total time of 5 minutes (Figures 1 & 2). The volume of the implant injected in every disc was 1 mL. Then the stilettes were introduced again into the needles and left in place for 2 minutes before removal. All patients tolerated the procedure well, without serious procedural pain or discomfort that necessitated modification of analgesia. All patients were observed postoperatively for vital signs, pain, sensory and motor deficits, and were discharged after 6 hours.

Preoperative NRS ranged between 7 and 8 points on NRS 0–10. Nine of eleven patients (81.8%) had 100% pain reduction (Table 1) with 95% confidence interval of ±22.8. All patients reported no pain in deep pressure between the spinous processes immediately after the procedure, in contrast with the preoperative sensitivity to the same test.

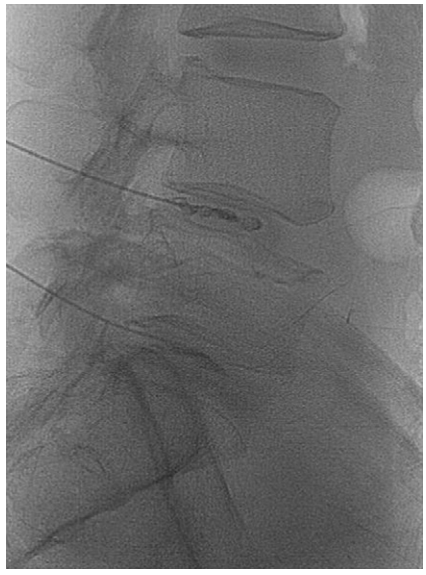

Figure 2 Fluoroscopic image of gelified ethanol implant injection into the nucleus of L4–L5 and L5–S1 intervertebral spaces.

The authors' idea of injecting gelified ethanol in combination with PRF for the management of discogenic pain was based on the mechanism of action of gelified ethanol. As soon as the implant is injected under fluoroscopy, in the center of the disc, it fills the annulus fibrosus tears and draws the water that already has been injected via the same RF needle, toward the center of the disc, due to the osmotic characteristics of ethanol, reinforcing in that way the nucleus pulposus [4,5]. Nine of the eleven patients studied with the combined technique showed excellent results immediately as well as 6 months postoperatively. However, findings represent a small number of patients and cannot be conclusive as for efficacy of the technique on pain and functional outcome.

Gelified ethanol implant combined to pulsed radiofrequency on intervertebral discs through the same radiofrequency needle, may represent a promising, minimally invasive technique to treat chronic discogenic pain. Further research is required in order to investigate the success rate and long-term outcome of the technique in comparison with other minimally invasive methods.

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