Original article:

The Role of Gabapentin in the Prevention of Postoperative Neuritis following Radiofrequency Ablation of Cervical and Lumbar Medial Branch Nerves

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Abstract:

Background: Symptomatic neuritis is a very common problem in the interventional pain clinic, reported anecdotally by up to 30% of patients undergoing radiofrequency ablation of medial branch nerves in the cervical and lumbar spine. The importance of negating the effects of this debilitating complication cannot be understated. We therefore undertook this study to determine whether gabapentin has a role in reducing the incidence of neuritis after these procedures.

Objective: To determine whether gabapentin has a role in reducing the incidence of postoperative neuritis following radiofrequency ablation of medial branch nerves in the cervical and lumbar spine.

Methodology: We identified a total of 215 patients who underwent radiofrequency ablation (RFA) in the cervical and lumbar spine for pain management within the last two years. 145 patients underwent lumbar RFA, and 70 patients underwent cervical RFA. Using a retrospective chart review, we then determined 1) whether any of these patients had been taking gabapentin at a minimum dose of 300 mg by mouth daily within 2 weeks prior to the procedure and 2) whether any of these patients experienced symptomatic neuritis in the first month following their RFA.

Results: 25 out of 215 (12%) patients experienced symptomatic neuritis within 1 month of their RFA. Of these, 21 (84%) were not taking gabapentin and 4 (16%) were taking gabapentin. 190 out of 215 (88%) patients did not experience symptomatic neuritis following their RFA. Stated differently, only 4 out of 56 (7.1%) patients in the gabapentin treated group experienced neuritis, whereas 21 out of 159 (13.2%) of patients in the non-gabapentin treated group experienced neuritis. This implies a protective effect of gabapentin, with an odds ratio of experiencing symptomatic neuritis of 0.51 (95%CI= 0.17-1.54) in the gabapentin-treated group (2-tailed p value = 0.24).

Limitations: This was not a prospective study, rather a retrospective chart review. The study is also limited by a small sample size and a lack of uniformity between the doses and duration of treatment in the gabapentin-treated group.

Conclusion: Most notably, there was a significant decrease in the incidence of symptomatic neuritis following RFA of medial branch nerves in the cervical and lumbar spine in the gabapentin-treated group. This suggests that there may be a role for gabapentin in the prevention of symptomatic neuritis following RFA. It might be useful for clinicians to add gabapentin to the patient's medication regimen at least 2 weeks prior to a planned RFA procedure.

Key words: Radio-frequency , neuritis, pain management, gabapentin

INTRODUCTION

Symptomatic neuritis is a very common problem in the interventional pain clinic, reported by up to 30% of patients undergoing radiofrequency ablation of medial branch nerves in the cervical and lumbar spine. In our clinical experience, patients typically report feeling burning, shooting, and/or stabbing pain in the area of the intervention starting within several days of the procedure and disappearing within 4 weeks. Finding a way to prevent this painful and debilitating complication would undoubtedly improve many patients' postoperative course. A common practice to prevent postoperative neuritis at some institutions in southern California has been to add gabapentin to the patient's medication regimen several weeks before performing RFA. There has been no study to date offering proof that this is an effective strategy.

METHODOLOGY

215 patients who underwent radiofrequency ablation (RFA) of cervical or lumbar medial branch nerves over a 1-year period between January 2011 and January 2012 at Cedars-Sinai Medical Center and Arrowhead Regional Medical Center were identified. A retrospective chart review was approved by the institutional review boards of both hospitals involved in the study. All of the patients who had undergone radiofrequency ablation had signed informed consent forms prior to undergoing the procedure. The patients included in the study were between the ages of 30 and 90 with an approximately equal distribution of males and females. No attention was paid to surgical history or ethnic background. Using a retrospective chart review, 70 patients who had undergone cervical RFA and 145 patients who had undergone lumbar RFA were identified. Those patients who were taking gabapentin at a minimum dose of 300 mg by mouth daily for a minimum of two weeks prior to the date of their RFA were identified and recorded. The patients who experienced symptomatic neuritis in the first month after their RFA were then identified using the documented progress notes from their post-procedure follow-up visit. The most common symptoms described in association with neuritis were recorded. These included burning (67%), numbness (23%), tingling (15%), weakness (3%), and a severe generalized increase in pain (2%).

STATISTICAL ANALYSIS

The 2-tailed p value was calculated at 0.24. Given the small sample size of 215 patients, the 2-tailed p value was thought to be less relevant to understanding the data. The odds ratio of experiencing symptomatic neuritis in the gabapentin treated group was calculated at 0.51 (95%CI= 0.17-1.54).

RESULTS

25 out of 215 (12%) patients experienced symptomatic neuritis within 1 month of their RFA. Of these, 21 (84%) were not taking gabapentin and 4 (16%) were taking gabapentin. 190 out of 215 (88%) patients did not experience symptomatic neuritis following their RFA. Stated differently, only 4 out of 56 (7.1%) patients in the gabapentin treated group experienced neuritis, whereas 21 out of 159 (13.2%) of patients in the non-gabapentin treated group experienced neuritis. This implies a protective effect of gabapentin, with an odds ratio of experiencing symptomatic neuritis of 0.51 (95%CI= 0.17-1.54) in the gabapentin-treated group (2-tailed p value = 0.24).

DISCUSSION

RFA of medial branch nerves has been shown to be an effective method for treating facetogenic pain in the cervical and lumbar spine. One of the major complications of this procedure is the development of postoperative inflammatory neuritis. The presumed mechanism for this is the irritation of nociceptive

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fibers in the neural bundles undergoing ablation. We attempted to determine whether pretreatment with gabapentin is an effective method of preventing this complication. The study was inspired by anecdotal reports of successfully reducing the incidence of postablative neuritis using gabapentin at the interventional pain clinic at Arrowhead Regional Medical Center.

According to the journal Anesthesia, the exact mechanism of action of gabapentin is unknown. It is hypothesized that gabapentin acts on voltage-gated calcium channels to mediate neural impulses. Gabapentin is thought to act on the post-synaptic voltage-dependent calcium ion channels in the dorsal horns (3,4,5,13). The fact that gabapentin acts on these channels is believed to account for its ability to interrupt neuropathic pain sensation (13, 21-38). Numerous studies have demonstrated gabapentin's efficacy at relieving neuropathic pain in animal models (13, 35). In human studies, gabapentin was shown to be effective at relieving neuropathic pain caused by diabetic neuropathy and post-herpetic neuralgia. Gabapentin is frequently prescribed in these settings in common clinical practice due to its efficacy, favorable side-effect profile, and lack of major drug interactions (13).

From a molecular standpoint, gabapentin is an analog of the neurotransmitter GABA. It is available only in oral form and is absorbed in the small intestine. Gabapentin is not metabolized in humans and is excreted in the urine unchanged (9, 11, 13). In addition to its effect on voltage-gated calcium channels, gabapentin is thought to elicit an increase in activity of the enzyme glutamic acid decarboxylase, which is responsible for producing GABA. Gabapentin also may decrease activity of GABA decarboxylase, the enzyme responsible for breaking down GABA (3, 13, 18-20). This may account for gabapentin's longer-lasting effects. Most importantly, gabapentin has been shown to inhibit ectopic discharges from injured peripheral nerves (13, 21-22), which may account for its ability to reduce post radiofrequency ablation neuritis.

Dosage of gabapentin is typically begun at 300 mg once daily, at bedtime to minimize sedation. This is increased to 300 mg twice daily on the second day and 300 mg with meals on the third day. Dose may be titrated upwards if efficacy is not achieved (13, 39).

CONCLUSION

The presumed mechanism for gabapentin's role is that its GABA-ergic properties down-regulate excitatory mediators in the neural bundles. This implies a use for gabapentin to inhibit postoperative radiofrequency neuritis in much the same way as gabapentin is used to treat painful neuralgias related to shingles or diabetes. Our research seems to suggest a measurable protective effect of gabapentin exists in this context. Considering gabapentin's hypothesized mechanism of action, its protective effect in the setting of radiofrequency ablation seems intuitive. The data suggest an overall 49% reduction in the presentation of post-ablative neuritis at 1 month in patients treated with gabapentin in contrast to those who were not. Although the data were not statistically significant, it is probable that the p value was elevated due to the small sample size of two hundred and fifteen patients. We believe, in light of our clinical experience, the results of this retrospective review, gabapentin's favorable side effect profile, and lack of major drug interactions, that gabapentin should be considered in patients undergoing radiofrequency ablation of their facet joints. Adding gabapentin to the patient's regimen at a starting dose of 300 mg per day at least two weeks prior to a planned radiofrequency ablation procedure

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should allow the interventional pain physician ample time to titrate the dose upward to 900 mg daily before the date of the procedure.

STUDY LIMITATIONS

A retrospective rather than prospective study design and lack of uniformity between dose and duration of gabapentin treatment were limitations of the study.

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