



Peripheral Nerve Surgery Versus Other Interventional Treatments for Chronic Headaches

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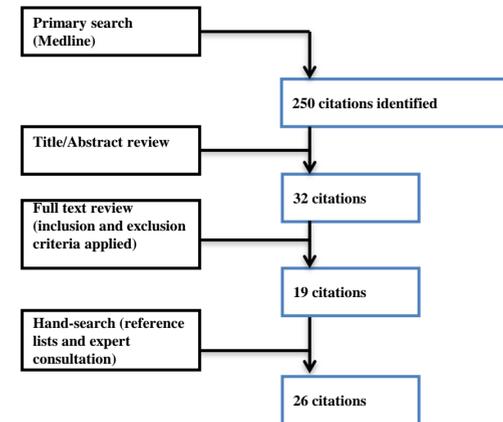


Introduction

- ◆ Multiple procedural modalities targeted at peripheral nerves are being offered to patients for the treatment of chronic headaches.
- ◆ No resources currently exist to compare the effectiveness and safety of these modalities.
- ◆ The objective of this study was to systematically review the literature to compare the published outcomes and effectiveness of peripheral nerve surgery, radiofrequency therapy, and peripheral nerve stimulators for chronic headaches, migraines, and occipital neuralgia .

Methods

- ◆ A systematic review of the MEDLINE and Cochrane databases.
- ◆ Search criteria were used to identify all citations of peripheral nerve stimulation, radiofrequency treatment, or surgical nerve decompression in combination with terms for headache.
- ◆ Inclusion and exclusion criteria limited the search to headache types with a proposed peripheral nerve treatment component, and to interventions using peripheral nerve stimulators, radiofrequency, or decompression surgery.
- ◆ Data were pooled for each modality and Chi square analysis was used to test for differences in success rates and complication rates between treatment types.
- ◆ Success was defined as >50% reduction in headache severity



Inclusion:
 English Language
 Any age subjects
 Clinical studies
 Headache type with peripheral nerve as proposed etiologic component
 -Migraine headaches
 -Chronic migraine headaches
 -Tension headaches
 -Occipital neuralgia
 -Supraorbital / supratrochlear / "frontotemporal" neuralgia
 Refractory to medical management
 Invasive procedure targeting peripheral nerves
 -Decompressive peripheral nerve surgery
 -Implantable peripheral nerve stimulation
 -Percutaneous radiofrequency intervention (pulsed RF or RF ablation)

Exclusion:
 Article predominantly studies headache type without proposed peripheral nerve etiology.
 E.g.:
 -Trigeminal neuralgia
 -Cluster headaches
 -Cervicogenic headaches
 Procedure targets intradural or intraspinal component of nervous system. E.g.:
 -Ganglionectomy
 -Rhizotomy
 Response rate not reported
 Studies with fewer than 10 patients
 Review articles
 Occipital nerve lower than C3

POOLED SUCCESS RATES BY PROCEDURE

| Procedure | N (pooled) | N Response (pooled) | % Responders |
|---------------------|------------|---------------------|--------------|
| Nerve Decompression | 1253 | 1072 | 86% |
| Nerve Stimulation | 184 | 126 | 68% |
| Radiofrequency | 131 | 72 | 55% |

POOLED COMPLICATION RATES BY PROCEDURE

| Procedure | N (pooled) | % Minor Complications | % Major Complications | % of Studies Reporting Major Complications |
|---------------------|------------|-----------------------|-----------------------|--|
| Nerve Decompression | 1253 | 11.1% | 0% | 0% |
| Nerve Stimulation | 184 | 37% | 31.5% | 78% |
| Radiofrequency | 131 | 4.9% | 0% | 0% |

POOLED LENGTH OF FOLLOWUP BY PROCEDURE

| Procedure | # of Articles | # of Articles with ≥ 1 Year of Patient Followup | % of Articles with ≥ 1 Year of Patient Followup |
|---------------------|---------------|---|---|
| Nerve Decompression | 14 | 13 | 93% |
| Nerve Stimulation | 9 | 6 | 66.7% |
| Radiofrequency | 3 | 0 | 0% |

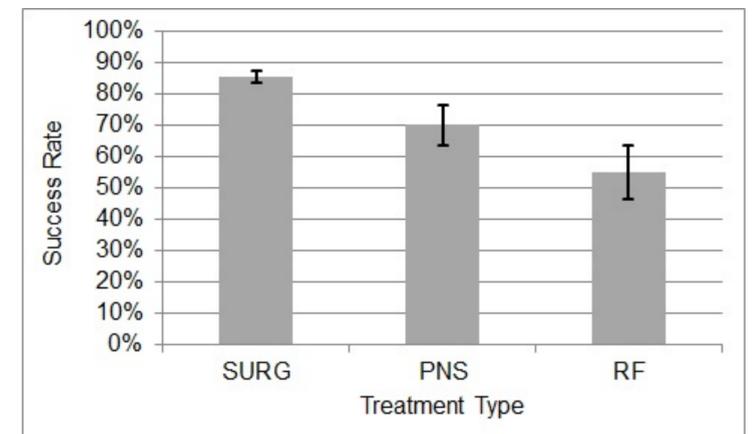
Results

- ◆ From a total of 250 citations, 26 studies fit our criteria.
 - ◆ 14 articles studied surgical decompression, 9 studied nerve stimulation, 3 studied pulsed radiofrequency.
 - ◆ No articles were found that studied the use of radiofrequency ablation
- ◆ Study populations and results were pooled. In total:
 - ◆ 1,253 patients underwent decompression surgery with an 86% success rate.
 - ◆ 184 patients had nerve stimulators implanted with a 68% success rate.
 - ◆ 131 patients were treated by pulsed radiofrequency with a 55% success rate.
- ◆ The differences in success rates between groups were all statistically significant
- ◆ Neither decompression surgery or pulsed radiofrequency reported complications requiring a return to the operating room, while implantable nerve stimulators had a 31.5% rate of such complications.
- ◆ Minor complication rates were similar among all 3 procedures.

Conclusion

- Patients seeking interventional treatment for their chronic headaches, migraines, or occipital neuralgia should be aware that:
- ◆ Surgical decompression of peripheral nerves is the best studied modality in terms of total number of studies, number of patients, level of evidence, and length of follow up
 - ◆ Reported success rates for nerve decompression tend to be higher than for nerve stimulation or pulsed radiofrequency treatments, although lack of high quality studies in the latter two groups prohibits an accurate comparative analysis.
 - ◆ Of the three procedures, nerve stimulator implantation was associated with the highest rate of complications requiring return to the OR.
 - ◆ There is no published literature to support the use of radiofrequency *ablation* for headache types not related to cervical arthropathy

STATISTICAL DIFFERENCE IN SUCCESS RATE BY MODALITY



Surg: surgical nerve decompression, PNS: peripheral nerve stimulator, RF: pulsed radiofrequency