A Time Course of Physical and Psychological Features Pre/Post Cervical Radiofrequency Neurotomy in Individuals with Whiplash: A Prospective Study

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ID: #389

## INTRODUCTION

- Individuals with chronic whiplash associated disorder (WAD) present with a complex clinical presentation, consisting of both physical and psychological factors.
- Physical features include features of central hyperexcitability, altered EMG of the upper quadratus muscles and reduced cervical range of motion (ROM).
- Psychological distress, pain catastrophizing and post traumatic stress symptoms have also been identified in those with chronic WAD.
- We have previously demonstrated that physical (central hyperexcitability and ROM) and psychological features (pain catastrophizing and psychological distress) of chronic WAD improve following successful cervical radiofrequency neurotomy (RFN) i.e. Reduction of posterior nociception.
- Not all patients undergoing RFN respond to the procedure. Midline tenderness is the only reported variable in the literature to predict success of cervical RFN.
- Certain clinical features of WAD are associated with poor prognosis.
- It is not known whether these clinical features predict a successful response to cervical RFN.

## AIM

- This study sought to provide a time course of physical and psychological manifestations of individuals with chronic WAD pre/post cervical RFN for both those who reported a successful response and also for those who reported a less successful response; and aimed to determine which clinical features may predict success to cervical RFN at the 3-month post-procedure.

## METHODS

### Design

- Prospective Cohort Observational Study
- Prospective Cohort

#### Inclusion Criteria:

- WAD III/IV (fracture); Non response to diagnostic facet joint procedures
- Chronic Neck Pain Intensity: Visual Analogue Score (0-100mm)
- Both Groups demonstrated reduced pressure hyperalgesia (locally and remotely
- With chronic WAD

#### Exclusion Criteria:

- WAD III/IV (Fracture). Non response to diagnostic facet joint injections; Previous history of neck pain or headache requiring treatment; Pregnancy; Central or peripheral neurological disorder; Peripheral vascular disorder

#### Measures:

- Demographic data inclusive of gender, age, duration of neck pain
- Neck Pain Intensity: Visual Analogue Score (0-100mm)
- Neck Disability Index (NDI) (0-100)

#### Quantitative Sensory Testing (QST)

- Pressure Pain Thresholds (PPT) via electronic pressure algometer in 3 sites bilaterally: C5/6 articular columns, Median Nerve in cubital fossa, TIBIALIS ANTERIOR (Somedic Advanced Medical Systems, Minnesota, USA - Fig. 4)
- Nociceptive Reflex Response (NRR) via electrical stimulation to the ulnar nerve (DigiNerve DSTA, Medtronic, UK - Fig. 6)
- Brachial Plexus Provocation Test

#### Psychological Questionnaires included:

- Pain Catastrophization Scale (PCS)
- Pain Interference Scale (PIS)

#### Outcome Measure (Success) = Global Rating of Change (GROC) ≥ 4

### RESULTS

#### Pain (VAS) ± SEM

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>SEM</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Success</td>
<td>56 (20)</td>
<td>52 (22)</td>
<td>19 (18)</td>
</tr>
<tr>
<td>Less Success</td>
<td>59 (19)</td>
<td>67 (15)</td>
<td>45 (21)</td>
</tr>
</tbody>
</table>

#### Results vs. Time

<table>
<thead>
<tr>
<th>Group</th>
<th>Success</th>
<th>Less Success</th>
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</thead>
<tbody>
<tr>
<td>PPT Tib</td>
<td>44 (18)</td>
<td>48 (18)</td>
</tr>
<tr>
<td>PPT MN</td>
<td>46 (14)</td>
<td>52 (14)</td>
</tr>
<tr>
<td>PPT Cx</td>
<td>25 (28)</td>
<td>34 (28)</td>
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</tbody>
</table>

#### Psychological Analyses

<table>
<thead>
<tr>
<th>Group</th>
<th>Success</th>
<th>Less Success</th>
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</thead>
<tbody>
<tr>
<td>NFR</td>
<td>42 (18)</td>
<td>44 (18)</td>
</tr>
<tr>
<td>PCS</td>
<td>13 (15)</td>
<td>13 (15)</td>
</tr>
</tbody>
</table>

#### GROUP Time Interactions

- Only individuals reporting a successful outcome to RFN demonstrated a reduction in pain, disability and pain catastrophization scores (p<0.05; Table 2).
- Both Groups demonstrated reduced psychological distress (p=0.0001; Table 2).
- No Group reported improvements in post-traumatic stress symptom severity post RFN (p=0.07; Table 2)

### Physical Measures

- Both Groups demonstrated reduced pressure hyperalgesia (locally and remotely) following RFN (p<0.0001; Table 2).
- No Group differences in elbow extension ROM during BPTT (p = 0.68).
- Both Groups improved elbow ROM post-RFN (p < 0.0001).

## CONCLUSIONS

- Both Groups demonstrated reduced thermal hyperalgesia following cRFN (p < 0.0001; Fig. 5).
- Only individuals reporting a successful response to RFN demonstrated an increased NFR threshold post-RFN (p=0.01; Fig. 7)

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