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## EFFECT OF A C1-C2 MULLIGAN SUSTAINED NATURAL APOPHYSEAL GLIDE (SNAG) IN THE TREATMENT OF CERVICOGENIC HEADACHE

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### Summary

**Introduction:** Cervicogenic headache (CGH) is a syndrome characterized by chronic hemicranial pain that is referred to the head from either bony structures or soft tissues of the neck.

**Purpose:** The purpose of this study was to determine the efficacy of the C1-C2 cervical rotation SNAG mobilisation in treatment of cervicogenic headache.

**Material and methods:** A total of 22 participants with CGH diagnosis were examined. To assess the disability associated with headache, The Headache Impact Test (HIT-6) and Headache Activities of Daily Living Index (HADLI) were used.

**Results:** Mean values in both questionnaires presented as follows (before vs after, P-value): HADLI:  $25,0 \pm 7,97$  vs  $2,4 \pm 0,6$ ,  $p < 0,001$ ; HIT-6:  $68,2 \pm 7,9$  vs  $44,1 \pm 5,6$ ,  $p < 0,001$ . Average values in FRT test was:  $28^\circ$  (SD=7°) vs  $40^\circ$  SD=5°,  $p < 0,001$ . Significant reduction of headache symptoms and improvement of range of movement in upper cervical region after use of Mulligan treatment were noted.

**Conclusions:** Present study demonstrated efficacy of Mulligan manual therapy in CGH treatment. However, further research is needed.

**Key words:** cervicogenic headache, Mulligan, SNAG.

## INTRODUCTION

Cervicogenic headache (CGH) is a syndrome characterized by chronic hemicranial pain that is referred to the head from either bony structures or soft tissues of the neck [1]. The prevalence of CGH in the general population is estimated from 2,5% to 4,1% [2-4]. The pathophysiological mechanism of this type of disorders arises primarily from musculoskeletal dysfunction in the upper segments of cervical spine. The pathway by which pain originating in the neck can be referred to the head is the trigeminocervical nucleus, which descends in the spinal cord to the level of C3-C4, and is in anatomical and functional continuity with the dorsal gray columns of these spinal segments. In this region sensory nerve fibers in the descending tract of the trigeminal nerve (trigeminal nucleus caudalis) are believed to interact with sensory fibers from the upper cervical roots. This functional convergence of upper cervical and trigeminal sensory pathways allows the bidirectional referral of painful sensations between the neck and trigeminal sensory receptive fields of the face and head [5,6].

Diagnosis of CGH still is a challenge due to the similarities of signs and symptoms among the many types of headache and distinguishing between cervicogenic headache and migraine is problematic [7,8]. According to the International Headache Society's, the diagnostic criteria of CEH are as follows [9]:

- A. Pain referred from a source in the neck and perceived in one or more regions of the head and/or face fulfilling criteria C and D.
- B. Clinical, laboratory and/or imaging evidence of a disorder or lesion within the cervical spine or soft tissues of the neck known to be, or generally accepted as, a valid cause of headache.
- C. Evidence that the pain can be attributed to the neck disorder or lesion based on at least one of the following:
  1. Demonstration of clinical signs that implicate a source of pain in the neck.
  2. Abolition of headache following diagnostic blockade of a cervical structure or its nerve supply using placebo or other adequate controls
- D. Pain resolves within 3 months after successful treatment of the causative disorder or lesion.

There are a several different manual therapy methods of a CGH treatment. Mobilization with movement discovered and developed by Brian Mulligan is a novel concept. One of the technique that are used - Sustained Natural Apophyseal Glides (SNAGS) are a separate technique involving a combination of a sustained facet glide with active motion, which is then followed by overpressure [10]. However, still is little known about efficacy of this approach in this group of patients.

## THE PURPOSE OF THE STUDY

The purpose of the study was to determine the efficacy of the C1-C2 cervical rotation SNAG mobilisation in treatment of cervicogenic headache. I hypothesize that mobilisation with movement would improve range of motion in FRT test and would reduce symptoms associated with headache.

## MATERIAL AND METHODS

A total of 22 participants with CGH diagnosis (based on guidelines of the Headache Classification Subcommittee of the IHS [9]) were examined. It was 13 women (59%) and 9 men (41%) in age of 46-79 years (mean age:  $43,69 \pm 8,85$ ). The inclusion criteria were as follows: positive flexion-rotation test (FRT test) and restriction greater than  $10^\circ$ , unilateral or side-dominant headache without side shift, neck stiffness and/or pain, symptoms last over 3 months and occurrence at least once per week. Following exclusion criteria were also implemented: physiotherapy and physical treatment in the past 6 months, presence of muscle trigger points which ... of symptoms, contraindications to upper cervical spine mobilisation, spine and brain pathology condition in MRI and CT assessment.

To assess the disability associated with headache, two self-report instruments were used:

1. The Headache Impact Test (HIT-6) – questionnaire is composed of 6 items, from which one is directly related to daily activities (household work, work, school, social activities), two items are relate to the withdrawal of activity due to headache and last 3 items treat activities as one all-encompassing domain. The scale is a 5-point ordinal scale of frequency of effect: “never”, “rarely”, “sometimes”, “very often” and “always”. Score is obtained from simple summation of the six items and ranges between 36 and 78, with larger scores reflecting greater impact [11].
2. Headache Activities of Daily Living Index (HADLI) – is a novel instrument develop for assessing headache-related disability focusing solely on important activities of daily living (ADL). The scale consisted of 9 activity items: personal care, lifting, reading (include computers), sleeping, exercising, social activities, work, driving (include traveling), and recreation. Each of 9 items in the HADLI is scored from 0 to 5, for a total score of 45 [12].

In this study the cervical flexion-rotation test (FRT) were also used. The test is an easily applied and objective method of determining upper cervical joint dysfunction. Test is conducted with the cervical spine fully flexed in an attempt to block as much rotational movement as possible above and below C1/C2. The head is then rotated to the left and the right [13]. Normal range of movement is  $40-44^\circ$  to each side [14,15]. Subjects with C1/C2 dysfunction have significantly less rotation [16]. Hall et al., found that subjects with cervicogenic headache have an average of  $17^\circ$  less rotation toward the headache side in the FRT, in contrast to those with no headache or migraine with

aura [15]. Anecdotally, pain provocation during the flexion–rotation test is also a feature of a positive test result, however, pain is not a feature in asymptomatic subjects [15]. The FRT has high sensitivity (91%) and specificity (90%) in differentiating subjects with CGH from asymptomatic controls or subjects with migraine with aura [16].

The subjects were mobilized with C1-C2 cervical rotation SNAG [10]. Patients were undertaken by the same physiotherapist, in the therapy session lasting 5 days. Double measurements were performed: prior to treatment and after.

Statistical analysis was carried out using STATISTICA StatSoft version 10. Baseline values (means and standard deviations) were calculated. Comparison between groups were analyzed using a Wilcoxon test.

## RESULTS

Descriptive statistics (before and after therapy) of Headache Activities of Daily Living Index (HADLI) and Headache Impact Test (HIT-6) were presented in table 1 and table 2, respectively.

Table 1. HADLI: Headache Activities of Daily Living Index - descriptive statistics (M ± SD) and comparison between groups (p)

ITEM	Before	After	P-value
Personal Care	1,9 ± 1,1	0,0 ± 0,0	<b>0,0000</b>
Lifting	2,2 ± 1,6	0,2 ± 0,1	<b>0,0000</b>
Reading (Book or Computer)	3,4 ± 1,5	0,6 ± 0,2	<b>0,0121</b>
Sleeping (In General, Over the Last Week)	3,0 ± 2,1	0,4 ± 0,1	<b>0,0014</b>
Exercising (Fitness, Weights: In the Last Week)	2,7 ± 1,8	0,2 ± 0,1	<b>0,0000</b>
Social Activities	2,7 ± 1,3	0,2 ± 0,1	<b>0,0000</b>
Work	3,6 ± 1,7	0,5 ± 0,1	<b>0,0103</b>
Driving/traveling	3,2 ± 1,8	0,3 ± 0,1	<b>0,0096</b>
Recreation (Sports, Fun, Leisure)	2,3 ± 0,9	0,0 ± 0,0	<b>0,0000</b>
<b>HADLI: overall score</b>	<b>25,0 ± 7,97</b>	<b>2,4 ± 0,6</b>	<b>0,0000</b>

Table 2. HIT-6: Headache Impact Test – descriptive statistics (M ± SD) and comparison between groups (p)

ITEM	Before	After	P-value
1. Pain Severe When Headache	10,5 ± 6,2	8,2 ± 5,1	<b>0,0106</b>
2. Limit Ability to Do Daily Acts	12,4 ± 7,0	7,0 ± 3,2	<b>0,0001</b>
3. Wish Could Lie Down	10,6 ± 6,7	7,9 ± 3,7	<b>0,0093</b>
4. Too Tired to Do Work or Daily Acts	11,3 ± 6,9	8,0 ± 4,3	<b>0,0052</b>
5. Feel Fed Up/Irritated Because of Headache	11,6 ± 7,3	6,4 ± 3,9	<b>0,0000</b>
6. Limit Ability to Concentrate	11,8 ± 6,3	6,6 ± 4,1	<b>0,0000</b>
<b>HIT-6 score (overall)</b>	<b>68,2 ± 7,9</b>	<b>44,1 ± 5,6</b>	<b>0,0000</b>

Based on the four impact categories derived from HIT-6 scores, frequencies and percentages of headache staging (before treatment vs after treatment) were as follows {n(%)}: (1) little or no impact: 0(0%) vs 16(72,72%); (2) some impact: 4(18,18%) vs 6(27,27%); (3) substantial impact: 8(36,36%) vs 0(0%); (4) severe impact: 10(45,45%) vs 0(0%).

In 15 of 22 participants the direction of FRT restriction was to the right and the remainder to the left. All subjects has restriction of movement in headache dominant side. Mean values of FRT was 28° (SD=7°). After five manual therapy session, rotation significantly increased by 13° to 40° (SD=5°). In every case, amount of rotation in upper cervical spine region improved after manual therapy - compared to the data noted before therapy.

## DISCUSSION

Manual therapy is often advocated for managing of cervicogenic headache. In a few recent research evaluated the effectiveness of this type of interventions for specific headache disorders. Jull et al., and Schoensee et all., showed that manual therapy was an effective form of management for CGH [17,18]. Systematic reviews of randomized control trials using manual therapy in CGH patients suggest better outcomes compared to no treatment [19]. Bronfort et al., reported that both neck exercise and spinal manipulation were effective in the short-term and long-term for CGH [20]. Another studies suggested that spinal manipulative therapy is effective for CGH, particularly if those focused on the upper cervical segments [21-23]. Furthermore, Jull et al. found that effectiveness of therapeutic exercise and manipulative treatment was not substantially affected by age, gender, or headache chronicity in patients with moderate to severe pain intensity [24]. However, both both mobilization and manipulation are effective for treatment of patients with cervical pain, although manipulation appears superior to mobilization in the short term [25].

Although the Mulligan concept is frequently used in clinical practice, there is limited

evidence for its effect. The results of the study presented here were directly designed to evaluate an efficacy of SNAG technique in the treatment of this type of disorders. First of all, this study found a significant differences in intensity of cervicogenic headache symptoms measured by The Headache Impact Test and Headache Activities of Daily Living Index (Table 1 and Table 2). Furthermore, its important to note, that this differences revealed in overall score, as well as, in every components of both scales. Using the two questionnaires, the assessment of disability associated with headache was more complex and enabled to evaluate a widely spectrum of daily living activities. It also advantage that measurement was not restricted only to patient's head pain assessment.

Some studies have reported diminished cervical ROM in subjects with CGH with limitation of active movement in the sagittal plane, in particular extension, as the major loss [26,27]. In the present paper, restricted range of movement was noted in all of 22 subjects. Mean values of rotation range was 28°, but similar results were observed in the another studies [14,16].

Results of this study demonstrated efficacy of the Mulligan concept in reducing of CGH symptoms and improving cervical range of movement. The explanation of reducing headache symptoms is neuromodulation effect of joint mobilization. According to Gate Control Theory, stimulation of mechanoreceptors within the joint capsule and surrounding tissues causes an inhibition of pain at the spinal cord [28]. In case of the increase in cervical rotation range, mobilization most likely decreased joint stiffness, broke down adhesions and stretch surrounding tissues. However, immediately therapeutic effect suggest, that explanation of effectivity of this technique could be more related with a neurophysiological change in pain modulation.

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