

## **A Distinct Pattern of Myofascial Findings in Patients After Whiplash Injury**

**Archives of Physical Medicine and Rehabilitation**  
**Volume 89, Issue 7, July 2008, Pages 1290-1293**

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### FROM ABSTRACT

#### Objective

To identify objective clinical examinations for the diagnosis of whiplash syndrome, whereby we focused on trigger points.

#### Participants

Patients (n=124) and healthy subjects (n=24) participated in this study. Among the patient group were patients with whiplash-associated disorders (n=47), fibromyalgia (n=21), nontraumatic chronic cervical syndrome (n=17), and endogenous depression (n=15).

#### Main Outcome Measure

Each patient and control subject had a manual examination for trigger points of the semispinalis capitis, trapezius pars descendens, levator scapulae, scalenus medius, sternocleidomastoideus, and masseter muscles bilaterally.

#### Results

85.1% of the patients with whiplash had positive trigger points in the semispinalis capitis muscle.

The patients with whiplash had a significantly higher prevalence of positive trigger points in the semispinalis capitis muscle than any of the control groups.

For the other examined muscles, the prevalence of trigger points in the patients with whiplash did not differ significantly from the patients with fibromyalgia or nontraumatic chronic cervical syndrome.

It did differ from the patients with endogenous depression and the healthy controls.

#### Conclusions

Patients with whiplash showed a distinct pattern of trigger point distribution that differed significantly from other patient groups and healthy subjects.

The semispinalis capitis muscle was more frequently affected by trigger points in patients with whiplash, whereas other neck and shoulder muscles and the masseter muscle did not differentiate between patients with whiplash and patients with nontraumatic chronic cervical syndrome or fibromyalgia.

## THESE AUTHORS ALSO NOTE:

In addition to neck pain and stiffness, whiplash patients often complain about "headache, brachialgia (pain radiating into 1 or both arms), vertigo or dizziness, chewing and swallowing problems, visuomotor disturbances such as blurred vision and reduced coordination, fatigue and reduced energy, neuropsychologic dysfunction, depression, irritability, and sleep disorders."

Whiplash pain can be caused by injuries to the muscles, facet joints, ligaments, disks, and nerve roots.

Examination showed reduced range of motion of the cervical spine is a prominent finding in whiplash-injured patients.

Myofascial tension of the scalene muscles causes a functional thoracic outlet syndrome that may explain the complaint of brachialgia.

"The only consistent finding [to explain whiplash pain] reported in the literature is a painful facet joint dysfunction C1-2," verified by anesthetic injection.

These authors main hypothesis was that "patients with whiplash disorder would display more trigger points in the semispinalis capitis muscle, which is localized in the upper neck," consistent with a C1-C2 facet injury.

The time between the whiplash injury and the examination in our study was  $1.47 \pm 1.8$  years. The chronic cervical syndrome and fibromyalgia groups were symptomatic for more than 6 months.

The semispinalis capitis, lower trapezius, levator scapulae, scalenus medius, sternocleidomastoideus, and masseter muscles were evaluated because they can be identified unequivocally by palpation.

The marker muscles were as follows:

Semispinalis capitis	Upper cervical spine
Lower trapezius, Levator scapulae	Shoulder girdle
Scalenus medius, Sternocleidomastoideus,	Lower cervical spine
Masseter	Face

"The semispinalis capitis was included because its referred pain zone is parieto-occipital and periorbital, which is the most frequent pattern of referred pain to the head in patients with whiplash."

The criteria for myofascial pain syndrome are:

- 1) Palpable hardening (trigger point and/or taut band) in the muscle belly
- 2) Pressure pain in the trigger point or taut band
- 3) Referred pain while manipulating the trigger point in the taut band
- 4) Recognition of the elicited pain as the patient's known and familiar pain

A positive trigger point was diagnosed if 3 of the 4 described criteria were found.

## RESULTS

85.1% of the patients with whiplash injury had positive trigger points in the semispinalis capitis muscles; in 53.2% the trigger points were bilateral and in 31.9% they were unilateral.

“The prevalence of trigger points in the semispinalis capitis muscle was significantly higher in the whiplash injury group than in each of the other groups.”

### Prevalence of Trigger Points in the Examined Muscles, in %

Groups	Semispinalis Capitis	Trapezius	Levator Scapulae	Scalenus Medius	Sternocleido	Masseter
WAD	85	85	77	63	51	21
Fibromyalgia	58	91	86	48	48	33
CHR	35	65	65	47	41	24
Depression	27	53	27	13	33	0.0
Healthy controls	8	33	21	13	123	4

Abbreviations: CHR, chronic nontraumatic cervical syndrome; WAD, whiplash-associated disorder.

This study is the “first to demonstrate objective clinical findings in patients with whiplash that distinguish them from patients with fibromyalgia, nontraumatic chronic cervical syndrome, and endogenous depression, and healthy control subjects.”

“Our findings show that 85.1% of patients with whiplash had positive trigger points in the semispinalis capitis muscles, 53.2% bilaterally and 31.9% unilaterally.”

“The patients with whiplash had a significantly higher prevalence of positive trigger points in the semispinalis capitis muscle than patients and subjects of any of the control groups.”

“Patients with whiplash syndrome therefore showed a distinct pattern of trigger point distribution that differed significantly from other patient groups and a healthy control group.”

“Our findings support the hypothesis that the most severe musculoskeletal pathology after whiplash is found in the upper part of the cervical spine.” They are consistent with the biomechanics of the injury and of a “painful C1-2 facet joint dysfunction. In contrast, trigger points in the other patient groups and in healthy people were predominantly found in the lower cervical spine and the shoulder girdle.”

Trigger points are a neuromuscular dysfunction at the motor endplate of a skeletal muscle fiber.

A mechanical trauma stimulates the release of excessive amounts of acetylcholine at the neuromuscular junction and increased intracellular calcium activates local muscle contraction. This causes increased metabolism [use of oxygen to produce ATP] and relative local ischemia; this leads to failure of the calcium pump which is required for the muscle to relax. "Consequently, the calcium continues to stimulate contraction, and a vicious circle develops."

## CONCLUSIONS

"Patients with whiplash syndrome showed a distinct pattern of trigger point distribution that differed significantly from other patient groups and healthy subjects."

"The semispinalis capitis muscle was more frequently affected by trigger points in patients with whiplash, whereas other neck and shoulder muscles and the masseter muscle did not differentiate between patients with whiplash and patients with nontraumatic chronic cervical syndrome or fibromyalgia."

## KEY POINTS FROM DAN MURPHY

- 1) 85.1% of the patients with whiplash had positive trigger points in the semispinalis capitis muscle.
- 2) The patients with whiplash had a significantly higher prevalence of positive trigger points in the semispinalis capitis muscle than any of the control groups, which is a distinct pattern of trigger point distribution that differed significantly from other patient groups and healthy subjects.
- 3) In addition to neck pain and stiffness, whiplash patients often complain about "headache, brachialgia (pain radiating into 1 or both arms), vertigo or dizziness, chewing and swallowing problems, visuomotor disturbances such as blurred vision and reduced coordination, fatigue and reduced energy, neuropsychologic dysfunction, depression, irritability, and sleep disorders."
- 4) Whiplash pain can be caused by injuries to the muscles, facet joints, ligaments, disks, and nerve roots.
- 5) Reduced cervical range of motion is a prominent finding in whiplash-injured patients.
- 6) Myofascial tension of the scalene muscles causes a functional thoracic outlet syndrome that may explain brachialgia.

- 7) "The only consistent finding [to explain whiplash pain] reported in the literature is a painful facet joint dysfunction C1-2," verified by anesthetic injection.
- 8) These authors main hypothesis was that "patients with whiplash disorder would display more trigger points in the semispinalis capitis muscle, which is localized in the upper neck," consistent with a C1-C2 facet injury.
- 9) The semispinalis capitis is an easily locatable marker for the upper cervical spine. "The semispinalis capitis was included because its referred pain zone is parieto-occipital and periorbital, which is the most frequent pattern of referred pain to the head in patients with whiplash."
- 10) The criteria for myofascial pain syndrome are:  
A)) Palpable hardening (trigger point and/or taut band) in the muscle belly  
B)) Pressure pain in the trigger point or taut band  
C)) Referred pain while manipulating the trigger point in the taut band  
D)) Recognition of the elicited pain as the patient's known and familiar pain
- 11) "The prevalence of trigger points in the semispinalis capitis muscle was significantly higher in the whiplash injury group than in each of the other groups." "Patients with whiplash syndrome therefore showed a distinct pattern of trigger point distribution that differed significantly from other patient groups and a healthy control group."
- 12) "Our findings support the hypothesis that the most severe musculoskeletal pathology after whiplash is found in the upper part of the cervical spine." They are consistent with the biomechanics of the injury and of a "painful C1-2 facet joint dysfunction. In contrast, trigger points in the other patient groups and in healthy people were predominantly found in the lower cervical spine and the shoulder girdle."
- 13) Trigger points are a neuromuscular dysfunction at the motor endplate of a skeletal muscle fiber.
- 14) A mechanical trauma stimulates the release of excessive amounts of acetylcholine at the neuromuscular junction and increased intracellular calcium activates local muscle contraction. This causes increased metabolism [use of oxygen to produce ATP] and relative local ischemia; this leads to failure of the calcium pump which is required for the muscle to relax. "Consequently, the calcium continues to stimulate contraction, and a vicious circle develops."
- 15) "The semispinalis capitis muscle was more frequently affected by trigger points in patients with whiplash, whereas other neck and shoulder muscles and the masseter muscle did not differentiate between patients with whiplash and patients with nontraumatic chronic cervical syndrome or fibromyalgia."