A Review and Methodologic Critique of the Literature Refuting Whiplash Syndrome

Spine
January 1, 1999; Vol. 24; No. 1; pp. 86-98

Michael D. Freeman, Arthur C. Croft, Annette M. Rossignol, David S. Weaver, Mark Reiser

This article reviews, from a methodologic perspective, the literature refuting whiplash syndrome, and after reviewing more than 2000 articles, lists 49 references. A significant methodologic flaw was defined as “a potential threat to the validity of the study in light of the study’s conclusions regarding whiplash syndrome.” “Whiplash syndrome was defined as injuries and their sequelae resulting from indirect trauma to the spine after MVCs of low to moderate severity. Late whiplash was defined as whiplash syndrome persisting for longer than 6 months.”

“The purpose of the current critique is to provide an overview of some of the weaknesses and strengths of the literature on whiplash.”

FROM ABSTRACT:

The validity of whiplash syndrome has been a source of debate in the medical literature for many years.

Some authors have published articles suggesting that whiplash injuries are impossible at certain collision speeds; others have stated that the problem is psychological, or is feigned as a means to obtain secondary financial gain.

These articles contradict the majority of the literature, which shows that whiplash injuries and their sequelae are a highly prevalent problem that affects a significant proportion of the population.

The authors of the current literature critique reviewed the biomedical and engineering literature relating to whiplash syndrome, searching for articles that refuted the validity of whiplash injuries. Twenty articles containing nine distinct statements refuting the validity of whiplash syndrome were found that fit the inclusion criteria. The methodology described in these articles was evaluated critically to determine if the authors’ observations regarding the validity of whiplash syndrome were scientifically sound.

The authors of the current critique found that all of the articles contained significant methodologic flaws with regard to their respective authors’ statements refuting the validity of whiplash syndrome.
The most frequently found flaws were inadequate study size, nonrepresentative study sample, nonrepresentative crash conditions (for crash tests), and inappropriate study design.

As a result of the current literature review, it was determined that there is no epidemiologic or scientific basis in the literature for the following statements: whiplash injuries do not lead to chronic pain, rear impact collisions that do not result in vehicle damage are unlikely to cause injury, and whiplash trauma is biomechanically comparable with common movements of daily living.

KEY POINTS FROM THIS ARTICLE:

1) “More than 30 epidemiologic studies have been published that document the cumulative incidence (risk) of chronic (lasting longer than 6 months) whiplash symptoms, or ‘late whiplash’.”

2) Epidemiologic literature supports a substantial risk of chronicity after acute whiplash injury.

3) About 33% of acutely injured persons continue to experience symptoms at 33 months after injury.

4) In the US in 1995, about 900,000 new cases of late whiplash occurred.

5) Approximately 15.5 million Americans currently have late whiplash.

RESULTS

6) The literature search revealed 20 articles containing statements that were interpreted as refuting whiplash syndrome, and all 20 articles were found to have significant methodological flaws relative to their proclamations regarding the validity of whiplash syndrome.

7) “The methodologic flaws most frequently found in the reviewed studies were the use of a nonrepresentative study sample (60% of studies), inadequate study size (60%), nonrepresentative crash conditions (50%), and inappropriate study design (45%). Other flaws found were unsupported conclusions (25% of studies), unsubstantiated/unreferenced claims (15%), misquoted literature (5%), improper use of terminology (5%), and misleading illustrations (5%).”

8) “If the study methods were significantly flawed, the results of the study could not be extrapolated to any population outside the study.”

9) “It is doubtful that any study size or design will define a threshold for whiplash injury, because it is probable that one does not exist. This presumption is based on the confirmed existence of numerous risk factors for whiplash injury that contribute to a highly variable individual susceptibility to injury.”
10) Factors that have been shown to increase whiplash injury risk include:
A) Female gender
B) Increased age
C) Pre-existing degenerative changes in the spine
D) Out-of-position occupant in the vehicle during impact
E) Rotation of the head during impact
F) Lack of preparation before impact
G) A slender physique
H) Direction of impact
I) Presence and position of a head restraint
J) Presence of a shoulder restraint
K) Car seat construction
L) Bumper dynamics, to produce injury

11) It is probable that volunteer crash testing is a “highly unlikely study design for delineating an injury threshold for an entire population.”

CONCLUSIONS
12) “It may be concluded, as a result of this literature critique, that there is currently no epidemiologic or scientific basis for the following statements:

A) Acute whiplash injuries do not lead to chronic pain.
B) Chronic pain resulting from whiplash injuries is usually psychogenic.
C) Whiplash injuries are unlikely to result in chronic pain in countries where there is no compensation for injury.
D) Rear-impact collisions that do not result in vehicle damage are unlikely to cause injury.
E) Whiplash trauma is biomechanically comparable with common movements of daily living.
F) There is insufficient force generated at the TMJ during whiplash trauma to cause injury.
G) TMJ injuries are not associated with whiplash trauma.
H) There is a direct correlation between vehicle damage and the probability of developing chronic pain after whiplash trauma.
I) Chronic pain following acute whiplash injury is caused or worsened by treatment and diagnostic testing.
J) The risk of chronic neck pain among acutely injured whiplash victims is the same as the prevalence of chronic neck pain in the general population.”