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A prospective cohort study of the outcome of acute whiplash injury in Greece

M. Partheni,
C. Constantoyannis,
R. Ferrari, G. Nikiforidis,
S. Voulgaris, N. Papadakis

Department of Neurosurgery, University Hospital of Patras, Patras, Greece

Melpomeni Partheni, MD; Constantine Constantoyannis, MD; Robert Ferrari, MD, FRCPC (Internal medicine); George Nikiforidis, PhD; Spiros Voulgaris, MD; Nikolas Papadakis, MD, FRCS (Professor of Neurosurgery).

Please address correspondence and reprint requests to: Dr. R. Ferrari, 12779 - 50 Street, Edmonton, Alberta, Canada T5A 4L8. E-mail: rferrari@home.com

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ABSTRACT

Objective

An earlier pilot study suggested that the late whiplash syndrome is uncommon in Greece. The purpose of the present study is to extend the evaluation to a larger sample, and include the prevalence of specific symptoms in the evaluation.

Methods

In a prospective, cohort study, a total of 180 accident victims were consecutively recruited following Emergency ward presentation. A standard questionnaire asked about neck pain, headache, shoulder pain, limb numbness or pain, and dizziness. Accident victims were followed for 6 months.

Results

In the initial 4 weeks after the accident, accident victims reported neck pain, headache, shoulder pain, arm numbness or pain, and dizziness, but at 4 weeks more than 90% had recovered from these, the remainder of the subjects having minor symptoms (not requiring therapy), and returning to their pre-accident state of health (which included minor symptoms). There were no cases of chronic disability.

Conclusion

In Greece, symptoms after an acute whiplash injury are self-limiting, brief, and do not appear to evolve into the so-called late whiplash syndrome.

Introduction

A previous preliminary report was presented of 130 accident victims in Greece with grade 1 or 2 whiplash-associated disorder (graded as per Quebec Task Force 1995 [1]), of whom 91% no longer reported neck pain or headache after 4 weeks, the remaining 9% having minor symptoms of a degree that did not require therapy, did not interfere with daily activity, and were typical of pre-accident symptoms (2). In order to reaffirm that the results hold with a larger sample size, an additional 50 consecutive accident victims (totalling 180) have been followed. The earlier report of 130 patients did not include data regarding the prevalence and course of a number of specific symptoms commonly reported as part of the late whiplash syndrome, including shoulder pain, limb pain or numbness, and dizziness: the current report examines more fully the clinical syndrome of whiplash injury in Greece. One would expect these symptoms, if they are related to the acute whiplash injury, to resolve as do the headache and neck pain - within weeks.

Materials and methods

During a time period of 36 months (July 1995 - July 1998) patients involved in rear, frontal, or lateral collisions in a motor vehicle accident were identified consecutively from Emergency Department presentations at the University of Patras Hospital. This hospital serves a catchment area with a population of over 1 million. Patients were excluded if they had either Quebec Task Force Grade 3 or Grade 4 whiplash-associated disorder (WAD) (i.e., evidence of cervical spine fractures, dislocations, or clear-cut, objective neurologic lesions) (1). Also excluded were those with head injury, loss of consciousness, or prior neck injury.
All patients were examined within 2 days of the accident and had onset of symptoms within this period (most within 24 hours). They were then reassessed at 1, 3, and 6 months. Assessment included a recording of the details of the accident and subjective complaints (headache, neck pain, shoulder pain, arm pain or numbness, and dizziness), neurological and musculoskeletal examinations, and cervical spine x-ray (at first presentation). Questionnaires administered post-accident evaluated the presence or absence of symptoms, and the patients were asked if the accident resulted in any new symptoms or in a change in the character of any pre-accident symptoms. During the follow-up, so as not to confuse persistent symptoms with pre-accident symptoms, patients were asked if they continued to experience any new symptoms of altered character compared to their pre-accident state. Patients were permitted to use a collar and take analgesics.

Results

A total of 219 accident victims were assessed for suitability. Of these, 39 were excluded, 23 because of previous neck injury or cervical spine disorders (e.g.,

Table I. Age and gender distributions of the accident victims.

Accident victims	n = 180	Age yrs.	range
Males	87 (48.3%)	38 ± 11	14 - 74
Females	93 (51.7%)	39 ± 12	16 - 73

rheumatoid arthritis), and 16 because their injuries were assessed as either a Grade 3 or 4 whiplash-associated disorder (1) (i.e., cervical spine fracture, dislocation, or disc protrusion with objective neurologic deficit). This left 180 subjects for study, and we had 100% entry follow-up of these. The age and sex distribution, as well as the symptom prevalence, of this series is shown in Table I.

The impact direction was rear-end in 36.6% of the cases, lateral in 35.6%, and frontal in 27.7%. Approximately 42% of the accident victims were using seat belts at the time of the accident, and 58% were not. Furthermore, as reported by the accident victims, the spectrum of accident severity was equally distributed among minor (dents only), moderate (vehicle could still be driven), and severe damage (the vehicle could not be driven away from the scene of the accident).

All subjects reported the new onset or altered character of pre-existing neck pain after the accident, 86/180 (47.8%) having in addition new onset or an alteration of a previous headache type. In 90.6% of these subjects, this new neck pain resolved within 4 weeks after the accident. The remaining 9.4% who continued to report neck pain, described this as being minor, often requiring no therapy and not interfering with daily activities.

Other symptoms and clinical findings following the accident are noted in Table II. The prevalence of new onset and persistent symptoms in the accident victims over time is shown in Table III. At 4 weeks, new onset neck pain was still being reported by 9.4% of the accident victims. The pain severity and frequency after 4 weeks were usually rated as mild and intermittent. The 3 patients with neck pain at or beyond 3 months after the accident recalled having very similar symptoms before the accident, but perhaps of slightly greater frequency since the accident. Nevertheless, even these 3 patients felt they had returned to their usual state within 6 months after the accident. Beyond medications and/or a collar, subjects reported seeking no other therapies.

Four weeks after the accident, headache of new onset or altered character from pre-accident was still reported by 2.2% of the accident victims. In addition, the prevalence of new onset shoulder pain, arm pain or numbness in the accident victims was relatively low after 4 weeks. Shoulder pain was prevalent in 92/180 (51%) of the accident victims at the onset of the study, decreasing to 2/180 (1.1%) at 1 month, and 0% at 3 and 6 months. Arm pain or numbness was prevalent in 19/180 (10.6%) at the start of the study, decreasing to 3/180 (1.7 %) at 1 month, and 1/180 (0.55%) at 3 and 6 months.

There was no difference in seat belt use between the 91.6% (163/180) of patients who recovered at 4 weeks and the 9.4% (17/180) who did not.

Discussion

There are certain limitations to this study. First, there was no use of a pain scale to rate initial symptom severity. By the nature of their accidents, however, and with the gender distribution, it is likely that our patients are typical of whiplash patients with Grade 1 or 2 whiplash-associated disorders elsewhere. In the experience of the Greek co-authors, patients with trivial injuries will not visit an emergency ward at all, and thus the spectrum of injuries in this study group are likely to represent at least a self-perception of more significant injuries. Experience gained from many years of practice in this geographic region of Greece also suggests that accident victims with significant injuries do not go elsewhere for initial therapy either. Thus, there is little reason to believe that patients in Greece who visit an Emergency Department are any less severely injured than patients doing the same in other countries. Indeed, the presenting symptoms and signs of our Greek patients closely match those of a similarly se-

Table II. Historical, clinical and radiologic findings in the initial days following the accident.

Finding	Prevalence (n = 180)	%
Reported recollection of frequency of pre-accident neck pain	14	7.8
Reported recollection of frequency of pre-accident headache	70	38.9
Neck pain post-accident	180	100
Headache post-accident	86	47.8
Dizziness	25	13.9
Arm pain or numbness	19	10.6
Shoulder pain	92	51.1
Neck muscle tenderness	130	72.2
Restricted range of neck motion	110	61.1
Objective neurologic deficit in limbs	5	2.8
Straightening of cervical lordosis	101	56.1
Reduced flexion-extension on x-rays	50	27.8
Signs of disc degeneration on x-ray	36	20
Seat belt used	76	42

Table III. Prevalence of new symptoms in accident victims over time (n = 180).

Time of assessment	Neck pain	Headache	Dizziness	Shoulder pain	Arm pain or numbness
First 3 days	180 (100)	86 (47.8)	25 (13.9)	92 (51.1)	19 (10.6)
1 month	17 (9.4)	4 (2.2)	0	2 (1.1)	3 (1.7)
3 months	3 (1.7)	2 (1.1)	0	0	1 (0.55)
6 months	2 (1.1)	1 (0.55)	0	0	1 (0.55)

lected cohort in Japan (3).

Second, we did not attempt to correlate the outcome with x-ray findings, impact direction, seat belt use, or initial symptoms. We did not do so, however, simply because there was no "negative outcome" to correlate these parameters with, i.e. there was not a single case of chronic pain beyond 6 months, nor disability beyond 2 weeks. Concerning seat belt use, while we appreciate that there is an ongoing controversy regarding whether seat belt use is associated with more severe whiplash injury, since the outcome was positive in all our patients, and far better than in most Western countries, the lack of seat belt use in some patients could not account for the favorable outcome. Moreover, there was no difference in seat belt use between the group of patients who recovered within 4 weeks and those who did not.

The argument that the most likely explanation for chronic neck pain and disability after accident is some form of chronic damage induced by acute whiplash injury falls flat in the face of vast cultural differences in the epidemiology of this puzzling disorder. When one compares the recovery rate to other studies which also excluded Grade 3 and 4 WAD, we see immense differences (4-8), so immense that methodologic factors cannot cross the span. The landmark studies regarding the culture-dependent epidemiology of the late whiplash syndrome were those reported from Lithuania in 1996 and 1999 (9, 10). Lithuania is reportedly a society with little perception of whiplash as a serious chronic pain disorder, little interaction with the insurance industry, and no litigation following accidents responsible for neck sprain.

The Greek situation is that of a modern society with an advanced health care system, insurance disability coverage for accident injury, and the possibility of litigation for personal injury if one is concerned about potential disability. Greece is also a society in which there is no cultural bias against chronic symptoms, as Greek physicians not only encounter chronic pain - such as sciatica with objective signs of neurologic deficit, or chronic hip pain from arthritis - but also perform surgery for the same. In Greece there is also considerable utilisation of health care services for chronic "medical" disorders in which psychosocial factors are considered relevant (i.e., irritable bowel syndrome) (11). Yet in Greece the acute whiplash process presumably underlying grade 1 or 2 whiplash-associated disorder is benign. This study further suggests that the mere existence of insurance disability and an opportunity for litigation is - on its own - insufficient reason for an epidemic of chronic pain, as this secondary gain is available in Greece as well.

The issue thus is not only "how do Greece and Lithuania differ from societies with the late whiplash syndrome epidemic?", but simultaneously "what do Greece and Lithuania have in common?" What do Canada, the United States, Norway etc. - countries with epidemic proportions of late whiplash syndrome - have in common that they do not share with Greece and Lithuania? It appears that the model recently set out by Ferrari and Russell addresses this complex issue (12).

They criticize the polarized manner in which others have insisted on debating the late whiplash syndrome, and emphasise the need to consider physical, psychological, and social factors in unison to resolve these issues. Reviewing their model, it is apparent that the cultural expectation of chronic pain following an acute neck sprain represents a critical factor. Without this, there is no motivation to seek extensive therapy or compensation. Ferrari and Russell then consider the importance of symptom amplification, and indicate that in order for symptom amplification to occur, not only must the patient view his/her symptoms as non-benign, but there must be an audience before which to repeatedly focus and report the pain. In some societies, receiving therapy frequently for weeks or months, being told by a lawyer to keep a detailed diary of all symptoms, and having numerous appointments with the insurer to establish that one is indeed injured and requires attention are all events that do occur, while in Greece - where the acute injury is viewed as benign, where people return to work within days, and where no one sees the need for these other measures - they do not.

Simultaneously, Ferrari and Russell also argue that while the chronic pain reported as part of the late whiplash syndrome is not due to some form of "chronic injury", they do not view the pain as being "psychiatric" or "all in one's mind". They state that the pain may have a variety of physical sources, the severity of which is changed by the psychological and social factors underlying symptom amplification, expectation, and attribution. Indeed, we do not know what the physical basis is for the minor aches and pains of the general population, yet we presume that they do have a physical basis in many cases. These can then form the sources for chronic pain, but only if the psychosocial circumstances permit.

Ferrari (13) has argued, for example, that the facet joint may be a cause for chronic neck pain in the general population. Although others have proposed that acute whiplash injury may somehow lead to a facet joint disorder (14, 15), this conclusion is untenable. While the facet joint may indeed be a cause of chronic neck pain, the disorder cannot be attributed to the pathologic effects of acute whiplash injury because then clearly Greek whiplash victims would suffer from these also. Yet, they have an excellent outcome. It may be that such isolated facet joint injury as a result of trauma does occur, but extremely rarely, and if so it would hardly seem to represent a useful model for the "source" of the injury responsible for the strikingly frequent chronic pain syndrome seen in, say, North America (6, 16). The other reason why the facet joint studies conducted thus far are not useful is that the researchers have not been studying whiplash patients, but rather a belief system - namely the belief that an accident some 44 years ago may be the cause of one's neck pain today. That is, the two studies of Barnsley, Lord *et al*. are not verifiably studies of whiplash patients. Of the 39 patients they chose to study, for example, 3 of them had had their accident 21, 27, and 44 years earlier. Surely some other events occuring in that interval may be responsible for their neck pain. They also included 5 individuals who not were involved in a motor vehicle accident, and 2 individual who had no pain until 3

months after the accident, after which their neck pain was labelled as "whiplash". Clearly, studying this group of subjects tell us little about acute whiplash injury, its natural history, or its long term (if any) effects (13, 17, 18). The view that psychosocial factors are not important in the determination of whether or not chronic pain reporting ensues is obviously also erroneous. This is not surprising, as such a view arose out of research which was not actually designed to discover this effect (19, 20).

And so one is left with the need to re-evaluate the polarized approach of "physical versus psychological", and is compelled to adopt a biopsychosocial model, one which can account for the epidemiology of whiplash (12). Such models could also explain why whiplash patients in some countries report chronic neurological and cognitive symptoms (21), as well as symptoms labeled as temporomandibular disorder (22), while in other countries, such as Greece, such phenomena are absent. Taking into consideration the above data, plus data from Lithuania (9, 10) and from volunteer whiplash experiments (12, 18), it would appear that while acute whiplash injury remains a valid concept, the notion of chronic injury from this whiplash injury as an underlying basis for chronic pain is unlikely to be valid. Indeed, there now exist specific criteria that should be met before one can reasonably accept any notion of chronic injury as the basis for chronic pain in grades 1 and 2 whiplash-associated disorders (23, 24).

References

1. SPITZER WO, SKOVRON ML, SALMI LR *et al.*: Scientific monograph of the Quebec Task Force on Whiplash-Associated Disorders. *Spine* 1995; 20 (Suppl. 8): 1S-73S.
2. PARTHENI M, MILIARIS G, CONSTANTAYANNIS C, VOULGARIS S, SPIROPOULOU P, PAPADAKIS N: Whiplash injury [letter]. *J Rheumatol* 1999: 26: 1206-7.
3. MATSUMOTO M, FUJIMURA Y, SUZUKI N, TOYAMA Y, SHIGA H: Cervical curvature in acute whiplash injuries: Prospective comparative study with asymptomatic subjects. *Injury* 1998; 29: 775-8.
4. RADANOV BP, STRURZENEGGER M, DE STEFANO G, SCHNIDRIG A: Relationship between early somatic, radiological, cognitive and psychosocial findings and outcome during a one-year follow-up in 117 patients suffering from common whiplash. *Br J Rheumatol* 1994; 33: 442-8.
5. GARGAN MF, BANNISTER GC: The rate of recovery following whiplash injury. *Euro Spine J* 1994; 3: 162-4.
6. GENNIS P, MILLER L, GALLAGHER EJ, GIGLIO J, CARTER W, NATHANSON N: The effect of soft cervical collars on persistent neck pain in patients with whiplash injury. *Acad Emerg Med* 1996; 3: 568-73.
7. MAYOU R, BRYANT B: Outcome of 'whiplash' neck injury. *Injury* 1996; 27: 617-23.
8. HILDINGSSON C, TOOLANEN G: Outcome after soft-tissue injury of the cervical spine. *Acta Orthop Scand* 1990; 61: 357-9.
9. SCHRADER H, OBELIENIENE D, BOVIM G *et al.*: Natural evolution of late whiplash syndrome outside the medicolegal context. *Lancet* 1996; 347: 1207-11.
10. OBELIENIENE D, SCHRADER H, BOVIM G, MISEVICIENE I, SAND T: Pain after whiplash - A prospective controlled inception cohort study. *J Neurol Neurosurg Psychiatry* 1999; 66: 279-83.
11. MADIANOS MG, MADIANOU-GEFOU D, STEFANIS CN: Drug use and somatic illness with psychological component: A nation-wide survey among adolescents in Greece. *Psychother Psychosom* 1993; 60 (3-4): 177-85.
12. FERRARI R, RUSSELL AS: Epidemiology of whiplash - An international dilemma. *Ann Rheum Dis* 1999; 58: 1-5.
13. FERRARI R: Whiplash-associated headache [letter]. *Cephalalgia* 1998; 18: 585-6.
14. BARNSLEY L, LORD SM, WALLIS BJ, BOGDUK N: The prevalence of chronic cervical zygapophysial joint pain after whiplash. *Spine* 1995; 20: 20-6.
15. LORD SM, BARNSLEY L, BOGDUK N: The utility of comparative local anaesthetic blocks versus placebo-controlled blocks for the diagnosis of cervical zygapophysial joint pain. *Clin J Pain* 1995; 11: 208-13.
16. HARTLING L, BRISON RJ, PICKETT W: A prospective study of acceleration-extension injuries following rear-end motor vehicle collisions. *World Congress on Whiplash-Associated Disorders*, February 7-11, 1999; Vancouver, Canada.
17. KWAN O, FRIEL J: The dilemma of whiplash. *Cephalalgia* 1998; 18: 587-8.
18. FERRARI R, RUSSELL AS: Author's reply [letter]. *J Rheumatol* 1998; 25: 1438-40.
19. RADANOV BP: Common whiplash - research findings revisited. *J Rheumatol* 1997; 24: 623-5.
20. KWAN O, FRIEL J: Comment on Radanov *et al.* [letter]. *J Rheumatol* 1999; 26: 1205.
21. FERRARI R, LEONARD M: Whiplash and temporomandibular disorders - a critical review. *JADA* 1998; 129: 1739-45.
22. FERRARI R, RUSSELL AS: Development of persistent neurological symptoms in patients with simple neck strain. *Arthritis Care Res* 1999; 12: 70-6.
23. FERRARI R: *The Whiplash Encyclopedia. The Facts and Myths of Whiplash*. Gaithersburg, Maryland, Aspen Publishers, Inc., 1999.
24. FERRARI R, KWAN O, RUSSELL AS, SCHRADER H, PEARCE JMS: The best approach to the problem of whiplash? One ticket to Lithuania, please. *Clin Exp Rheumatol* 1999; 17: 321-6.