



Original Article

Headaches in the whiplash syndrome

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Study design: A prospective clinical analysis of headaches in whiplash injury.

Objectives: To provide a detailed clinical account of the nature, characteristics and natural history of headaches, and to examine their possible relation to the neck injury.

Setting: One medicolegal practice in UK.

Methods: This study consists of a prospective clinical analysis of headache symptoms in consecutive patients referred to the author for medicolegal assessment of whiplash injury, with no special reference to headaches.

Results: All 80 patients noted neck pain. Headaches were related as a consequence of the accident by 48 patients (60% of the total). The circumstances of injury did not differ from whiplash victims who did not have prominent headache. The headache onset was maximum in the first 24 h after injury. The failure to recall well documented pre-accident headaches in almost one fifth of patients is significant. The common types of headaches were non-specific, generalised, dull, aching pain (25 patients), a mixtures of aching and tightness, and tension type headache. Only three (6%) had migraine without aura.

Conclusion: Post-whiplash headache is a genuine common but short lived affair, constant headaches disappearing within 3 weeks in 85% subjects. In the minority complaining of headache after that period there was no evidence of persisting physical injury, nor of inability to work or other disability caused by headaches.

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Keywords: whiplash; tension headache; migraine; neck injury; organic mechanism; psychological factors

Introduction

A little known description of headache caused by disorders of the cervical spine is found in the fourth of 18 lectures given between 1860 and 1862 on 'Rest and Pain', in John Hilton's classical text.¹

'Suppose a person to complain of pain upon the scalp, is it not very essential to know whether that pain is expressed by the fifth nerve or by the great or small occipital? Thus pain in the anterior and lateral part of the head, which are supplied by the fifth nerve, would suggest that the cause must be somewhere in the area of distribution of the other portions of the fifth nerve. So if the pain be expressed behind, the cause must assuredly be connected with the great or small occipital nerve, and in all probability depends on disease of the spine between the first and second cervical vertebrae'.

Whiplash injury is the most common cause of spinal trauma of the neck and its supporting ligaments and muscles. Headache is second only to neck pain as a symptom of whiplash injury. The concept of cervicogenic headache is generally accepted,^{2,3} and neck injuries are one of its commonest causes. Its characteristics and natural history are not well described, since it is often accepted as part of the neck pain with which it may sometimes coincide; or, it is ascribed to the nervous stresses arising from the accident. However, headaches can occur separately from neck pain in whiplash patients and the clinical features and natural history merit further study.

The picture generally described⁴ is that headache succeeds whiplash injury in 70% to 90% cases; the most frequent type is tension headache which occurs in 85%. It is said 'that prolonged headache due to whiplash can be expected in patients with initially severe headache, a severe decrease of mobility of the cervical spine, with depressive mood, somatic-vegetative complaints, a history of pretraumatic headache

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and with increased age'. A study of 63 patients after whiplash injury showed that 47 complained of headache and pain in the cervical spine and 16 of pain in the cervical spine alone: '74% complained of tension-like pain, while only about 10% had identifiable post-trauma migraine headache with or without aura'.⁵

Methods

This study consists of a prospective clinical analysis of headache symptoms in consecutive patients referred to the author for medicolegal assessment of whiplash injury, with no special reference to headaches. Eighty patients fell into grades I and II of the Quebec classification,⁶ conforming to uncomplicated whiplash syndrome.^{7,8}

Grade

- 0= No complaint about the neck. No physical signs;
- I= Neck complaint of pain, stiffness or tenderness only. No physical sign(s);
- II= Neck complaint AND – Musculoskeletal sign(s) include decreased range of motion and point tenderness.

Grades III and IV were excluded by definition.^{9,10}

These exclusions were patients with concomitant head injury, or neurological signs of acute traumatic root lesions, myelopathy, acute traumatic disk lesions, fractures and subluxation of the spinal column. The clinical characteristics of headaches were explored in detail by one observer. Their possible relation to neck symptoms was examined. Headaches were classified according to IHS criteria.¹¹ Unless there were diagnostic problems, additional radiology was not performed.

Results

Table 1 shows the main features of the patients and the accident.

Incidence of headaches

All 80 patients noted neck pain of varying degree and duration. Headaches were related as a consequence of

Table 1 Characteristics of patients and accident

Age 18–64 mean age at injury 24
Sex: 51 females (mean age 23.0): 29 males (mean age 26.2)
Mechanism of accident where reported 70/80:
Rear-end shunt 48/70
Frontal impact 12/70
Sideways or oblique impact 10/70
Use of seat belt at time of impact 74/80
Head restraint fitted 77/80

Table 2 Onset of headaches

<i>Time of onset of headache (48 patients)</i>				<i>No headache</i>
0–30 min	30 min – 24 h	24–48 h	> 48 h	
13 patients	27 patients	4 patients	4 patients	32 patients

the accident by 48 patients (60% of the total). There were 31 females (64.6%) and 17 males (35.4%).

Onset

The onset of headache (Table 2) was between 0 min and 24 h in 40 of the 48 patients with headaches. The onset closely paralleled the onset of neck pain in these subjects. In four patients, the onset was between 4 and 21 days, raising the question of causation as considered below.

Characteristics of headaches

Location When asked what the initial headache was like and where was it mainly sited, headaches were located in the occiput or back of the head in 28 patients, generalised in 13, and vertex or frontal in four. There were three instances of hemicrania.

Description In the 48 subjects, the characteristics of the headache were:-

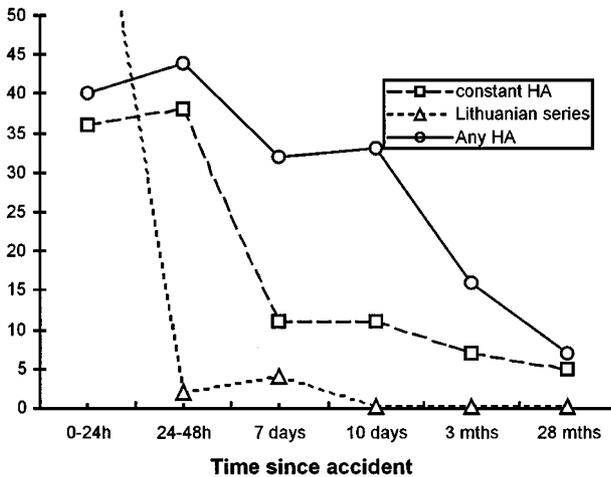
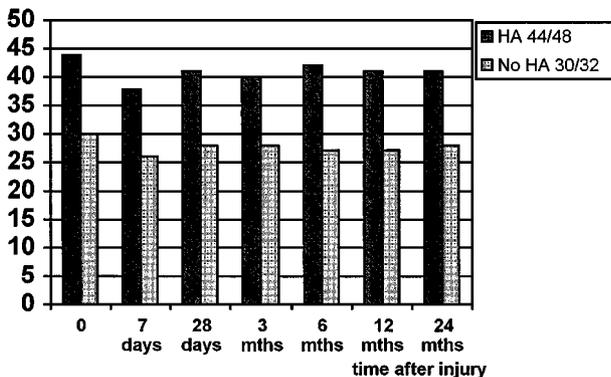
- (1) dull aching generalised pain with some features of IHS tension-type headache but not conforming to IHS criteria for migraine with or without aura, in 25;
- (2) throbbing hemicrania consistent with migraine without aura, in three;
- (3) gripping, tight band, or a heavy pressure, typical of tension-type headache, in six;
- (4) non-specific mixed aching and tightness approximating to non-IHS migraine (not classifiable as IHS migraine or IHS tension-type headache, in 12);
- (5) momentary stabbing or shooting pains, in two.

Constant pain had ceased by 10 days in 77.1% patients. Intermittent headache was present in 68.7% patients at 10 days but had declined to 33.3% at 3 months (Table 3) In response to specific questioning none said that the headache alone was sufficient to prevent work. Figure 2 compares the time to return to normal work or domestic activities in those with and without headache. Some subjects were unemployed on the date of the accident. No difference is shown between the two groups.

The quality of the initial headaches remained unchanged in 10 of the 12 subjects in whom it persisted. Two subjects described the initial pain as

Table 3 Declining pattern of headaches in 48 patients

Patients	0–24 h	24–48 h	10 days	3 months	28 months
Constant HA	36(75%)	38(79%)	11 (22.9%)	7(14.6%)	5(10.4%)
Any HA	40 (83.3%)	44 (91.6%)	33 (68.7%)	16 (33.3%)	7(14.6%)


Figure 1 Duration of headache in series, compared to Lithuanian series

Figure 2 Time to return to work

aching but the persisting pain changed to aching plus a heavy pain or constant pressure.

Duration Constant pain had ceased by the end of 10 days in 37 patients and by 3 weeks in 41 (85%). Figure 1 shows that by the time of medicolegal examination (8–52 months, mean 28 months, after injury) the headaches had disappeared in 41/48 patients. In the seven with persisting headache, it had the same qualities as those immediately after the accident in four, but had increased in frequency and/or severity in three. This is contrasted (Figure 1) with the Lithuanian series of patients not attuned to compensation in whom the median duration of headache was 4.5 h and no one had accident induced headache beyond 20 days. These

workers found at 1 year, frequent headaches (>7 days/month) were reported by 4% of accident victims and 6.7% of controls. Headaches occurring on ≥ 1 day/month was reported by 27.5% of accident victims and by 33.2% of controls. Most described their pain as mild to moderate.

Associated factors

All those with headache also had initial neck pain with varying radiation to the shoulders, interscapular area or up to the occiput. Some complained of brief periods of aching, tingling or numbness in the neck, shoulder(s) or upper part of the arm(s). These were never constant, and generally lasted from a few seconds up to 10 to 15 min, commonly postural on waking at night, or pressure-related after leaning on the arm. A segmental radicular distribution was not found, nor were there physical signs of root compression in relation to injury.

Relation of headache to neck pain or movement

Patients were asked if they had headache only when they had neck pain or discomfort, or if the two symptoms occurred at separate times. Forty patients only had headache when they had neckache, most commonly when the neckache was severe. Turning the head or neck in conversation or when driving or reversing their cars aggravated both neck and head pains in 36 of these 40 subjects. Eight patients had headaches at times when they were unaware of neck pain. The numbers are too small to justify statistical analysis (Table 4), but the quality of headaches was not different in these two groups.

Pre-accident headache

Each patient was asked about recurring or continuous pre-accident neck pain and headaches. Sixteen (33.3%) gave a past history of headaches before the accident, 12 conforming to tension type headache, three to common migraine, one to classic migraine (IHS criteria). One of these was in the group of patients without post-whiplash headaches. More than one entry for medical attention for headache was found in general practitioner notes in an additional nine patients (18.7%) who had forgotten or suppressed this history.

'Inappropriate' physical signs

Tenderness of the neck and shoulder girdle muscles is susceptible to wide variations of technique and subjective responses, and has been found unreliable.

Table 4 Characteristics of headache occurring with and separate from neck pain

	<i>Headache only occurring with neck pain</i>	<i>Headache separate from neck pain</i>
Number	40	8
Aching	23 (57.5%)	2 (25%)
Throbbing	2 (5%)	1 (12.5%)
Tight, gripping or heavy	3 (7.5%)	3 (37.5%)
Aching and tight or heavy	10 (25%)	2 (50%)
Stabbing or shooting	2 (5%)	0
HA aggravated by neck movement	36 (90%)	1 (12.5%)
'Inappropriate' signs	12 (30%)	3 (37.5%)

The author relies on active movements and deliberately does not test passive movements in these claimants. Examination showed spurious signs in the neck and upper limbs in 15 (33%) patients (Table 3). These consisted of non-anatomical, varying weakness of grip or other arm muscles, often globally from axilla to finger tips, tremulous voluntary movements, noisy grunting and grimacing when attempting to contract muscles. Non-anatomical sensory loss and disproportionate restriction of active neck movements were common observations.

Cervical spondylosis

Initial (0–12 days) radiographs were available from the accident department or the General Practitioner in 37 of the 48 subjects. In the eight subjects aged less than 25, no abnormality was seen. Six of the 19 (31.5%) 25–40-year-olds showed some degree of disk space narrowing and/or osteophyte formation. Similarly, degenerative changes were identified in five of the 10 (50%) subjects aged 41–65 years. These changes were not associated with the complaint of headache. Traumatic lesions of the disks, facet joints, prevertebral haematomata, fractures and subluxations were not seen.

Discussion

Headache occurred in 60% (48/80) subjects, which confirm that headaches are a common complaint in whiplash injuries. The clinical profile of patients (Table 1) and the types of accidents, use of seat belts and head restraints did not differ from whiplash victims who did not have prominent headache. The headache onset, as with other whiplash symptoms, is maximum in the first 24 h after injury. It is of interest that 4/48 subjects dated the onset after 48 h, which is generally accepted as excluding a cause and effect relation. In these patients, headache neither resulted from a blow to the head, nor was overshadowed by other more severe painful sequelae of the accident. Yet, these claimants insisted that the neck injury caused their headaches. The failure to recall well documented pre-accident

headaches in almost one fifth of patients is likewise significant.

In the 48 subjects, the most common types of the headaches were non-specific, generalised, dull, aching pain (25 patients) and a mixture of aching and tightness, and tension type headache. Only three (6%) had migraine without aura.

This approximates to epidemiological studies¹² that indicate an overall lifetime prevalence of classic migraine of 5% with a male to female ratio 1:2, and for common migraine 8%, M:F ratio 1:7. The three patients with migrainous headaches had all experienced similar attacks before the accident. They had each suffered from a more continuous aching pain for 2, 5, and 8 days respectively after injury, and subsequent migraines occurred with roughly the same severity and frequency as before it. One patient had a remission of 14 months, not experienced before the accident. This conforms to other accounts⁴ where either tension-type headache and non-specific head pains of non-migrainous type are the principal clinical features.^{4,5}

Neck movements aggravated both neck and head pains in 36 of these 40 subjects. Eight patients had headaches at times when they were unaware of neck pain, but the type of pain was not different in these two groups. Head pain occurring on neck movement and in conjunction with neck pain is likely to be cervicogenic, and in the acute stages is related to the soft tissue injury of the neck. It is difficult to find evidence that headache occurring quite separately from neck movement and apart from neck pain is derived from the neck. It probably has explanations unrelated to the physical injury, but may relate to the subject's reaction to the circumstances of the accident.

In Lithuania, there is no preconceived notion of chronic pain arising from rear end shunts, and usually no involvement of the therapeutic community, insurance companies or litigation.¹³ The importance of these factors is highlighted by a median duration of headache of 4.5 h and the fact that no one had accident induced headache beyond 20 days in this study. That some headache complaints reflect the experience of the 'normal' uninjured population is shown by frequent headache (>7 days/month) reported by 4% of accident victims and 6.7% of controls. Headaches occurring on ≥ 1 day/month were reported by 27.5% of accident victims and by 33.2% of controls. Most described their pain as mild to moderate.²¹ This suggests that much of the prolonged headache shown in the present study is attributable to factors other than whiplash injury. A random survey of 10 000 uninjured adults showed that 34.4% had experienced neck pain within the last year, one third of them for more than 6 months.¹⁴

Findings similar to the present results were found in a retrospective study⁵ of 63 patients who had suffered whiplash injury and who had persistent chronic pain. Forty-seven patients complained of headache and pain in the cervical spine and 16 of pain in the cervical

spine alone. Among the patients with headache 74% complained of tension-like pain, while only about 10% had identifiable post-trauma migraine headache with or without aura. The authors suggested that 'not only trauma but also extra-trauma factors unrelated to whiplash were involved'.

The possible causes of symptoms⁹ are:

- (1) Organic pathology caused by injury
- (2) Underreporting of pre-accident symptoms
- (3) Pre-accident symptoms which have continued
- (4) Psychological illness in response to injury
- (5) Exaggeration and malingering

Various mechanisms caused principally by soft tissue injury probably operate in the short lived headaches succeeding whiplash injury. Cervicogenic headache is common, especially in the over-50s. The mechanism is largely obscure since it depends on pain referred along the upper three cervical roots where there is very rarely any demonstrable radiological lesion.¹⁵ Referred headaches that arise from and are primarily caused by disorders in the cervical spine are exemplified by spondylosis and the transient soft tissue injury of acute whiplash injury.¹⁶ Involvement of the third occipital nerve, or the zygapophyseal joints has been postulated. Lord *et al* in 100 whiplash patients on two separate occasions blocked the nerve with either lignocaine or bupivacaine, in random order. The diagnosis of third occipital nerve headache was made only if both blocks completely relieved the patient's upper neck pain and headaches and the relief lasted longer with bupivacaine. The prevalence of third occipital nerve headache was only 27%.¹⁷ This leaves the remaining 73% with no such explanation. Percutaneous radiofrequency neurotomy was similarly unsatisfactory in Lord *et al*'s attempted treatment of the zygapophyseal joints that they believe are responsible for much whiplash neck and head pain.¹⁸

The present study disclosed that nine patients (18.7%) had forgotten or suppressed their history of pre-accident headache. The reasons lend themselves to conjecture, and relate to other factors in some of those seeking compensation. Inappropriate signs were usually found when there was a marked discrepancy between accidental injury and the severity of subsequent complaints, suggesting some degree of exaggeration.¹⁹ Conscious simulation of illness or attempted deception is not interpreted as psychological illness.

Psychological factors require consideration, though the low incidence of simple tension headache (IHS criteria) argues against anxiety induced tension pain as a major factor. This agrees with Wallis *et al* who comment: 'Patients with whiplash-associated headache were not significantly different from those with other forms of post-traumatic headache or with whiplash-associated neck pain without headache. However, when compared to normal data, ... they differed only on somatization, obsessive-compulsive, depression and hostility subscales, and the global severity index.

...Patients with whiplash-associated headache suffer psychological distress secondary to chronic pain and not from tension headache and generalised psychological distress'.²⁰

This study has not confirmed any increased frequency of migraine, or shown any patients who started with migraine *de novo* in up to a mean of 28 months after whiplash. There was no evidence of inability to work or disability caused by those with persistent headaches compared to those free of headaches (Figure 2). Protracted complaints of neck pain and many other symptoms (detailed and appraised in other publications^{6,9,13,21}) were, however, often suggested by claimants as reasons for inability to work.

Chronic whiplash headaches?

The nosological validity of chronic whiplash syndrome (conventionally longer than 6 months) has been seriously questioned,^{9,13,22,23} and I shall not further discuss it here, save in the immediate context of headache. However, evidence for a chronic,⁹ as opposed to acute, transient whiplash syndrome has yet to be substantiated by the consistent demonstration of attributable mechanisms.

Investigations of clinical, radiological and MRI features have not shown an organic pathogenetic mechanism in the present series or in many other publications.^{8,13,21,23} Thus, chronic headache like chronic neck pain has some other explanation.

Where compensation is not a factor, headaches and neck pain last on average for a few days, and the maximum duration is about 3 weeks (Figure 1).^{13,22} The high prevalence of headache in the uninjured community²¹ is seriously underestimated though evident in all epidemiological surveys.¹² Radanov *et al* found a history of pretraumatic headache a significant risk factor for trauma related headache.²⁴ This is confirmed by the present findings. The continuation of either tension headaches or migraine is not surprising and in the absence of increased severity or frequency after injury can not relate to trauma. However, anxiety about the circumstances of the accident, hostility and resentment are potent factors in perpetuating symptoms. Psychiatric and other authorities, cited here, principally ascribe psychological symptoms to consequences of physical effects of injury, not causes of prolonged pain. That conclusion is debatable.

A variety of psychosocial factors unrelated to the accident²³ can lead the victim into a voluntary chronic sick role, and accounts for many chronic disabilities. Exaggeration is an important factor in certain claimants. The scientifically acceptable criteria for attribution fail in relating organic effects of acute neck sprain to chronic headache symptoms. There appears to be no objective basis for the concept of chronic whiplash induced headache, and research has shown no coherent or meaningful pathophysiology related to trauma.

Conclusion

This study confirms that headaches are common in whiplash injury patients. Headache occurred in 48/40 subjects and was therefore a common but not a constant symptom. The profile of patients and the types of accidents are similar to whiplash victims who do not have prominent headache. The characteristics of the headaches were non-specific in most cases. Dull aching pain not conforming to IHS criteria for migraine with or without aura was the commonest pattern in about half the patients, with mixed aching and/or tension-type headache (IHS) in a quarter. The three patients with migrainous headaches had all experienced similar attacks before the accident, and subsequent migraines occurred with roughly the same severity and frequency as before injury.

Post-whiplash headache is a genuine common but short lived affair, constant headaches disappearing within 3 weeks in 85% of subjects. In the minority complaining of headache after that period there was no evidence of persisting physical injury, nor of inability to work or other disability caused by headaches. Protracted complaints of neck pain and many other symptoms, detailed and critically appraised elsewhere, can however, apparently interfere with work in a minority of subjects. Complex psychosocial factors unrelated to injury can induce the victim to adopt the chronic sick role.

Much of the earlier literature is sententious, and is based on small numbers, inappropriate selection of cases with complicating radicular or disk damage, or fracture-dislocations, and importantly on absence of controls.^{6,8,13,21} In proffering tendentious opinions, many clinicians have failed adequately to question the vital issue of attribution.^{9,21} Careful assessments have shown no evidence of persisting physical injury as sufficient cause of continuing headache or other chronic symptoms after uncomplicated whiplash injuries. Recent scientifically controlled data have led to an evolving consensus of disbelief.

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