We examined 524 patients with whiplash injuries for delayed onset of shoulder pain in order to establish whether this was due to impingement syndrome. A total of 476 patients (91%) responded to a questionnaire of which 102 (22%) were entered into the study; 43 had both a positive impingement sign and Neer test. The incidence of impingement-type pain was 9%. After treatment 23 patients (5%) had a significant improvement in their symptoms, ten (2%) had a moderate improvement and nine had no improvement. Impingement-type pain can occur after whiplash injuries and can be successfully treated.

We have studied patients who sustained whiplash injuries to see if any developed late-onset shoulder pain. We also observed how many of these had altered scapulothoracic rhythm and subsequent impingement symptoms, characterised by pain over the anterior aspect of the acromion, worse on forward elevation of the shoulder in the plane of the scapula.

Patients and Methods

A consecutive series of 524 patients suffering whiplash injuries, identified from the records of the Accident and Emergency Department during a four-year period, was entered into this study. Each patient was sent a postal questionnaire, at least six months after the initial injury, containing general questions regarding the accident and specific questions regarding pain in the shoulder. Patients were also asked to complete a pain diagram of the upper body indicating the severity, site and radiation, if any, of their pain.

Patients who did not have pre-existing shoulder problems, but who developed pain in the shoulder, which was worse on moving their arm, were invited to attend a research clinic for further assessment. All those with a previous history of shoulder symptoms were excluded at this point. The remaining patients were asked the following questions:

1) Does the shoulder pain get worse when you move your neck?
2) Does the shoulder pain get worse on raising your arm?
3) Does the shoulder pain get worse on getting things off a high shelf?

The patients then completed a pain diagram to localise the origin and radiation of the pain. The neck and upper body of all patients were examined. Specifically, the following questions were addressed:

1) Is the anterior rotator cuff tender?
2) Is there a painful arc of shoulder movement?
3) Is there a positive Neer sign?
4) Is there a positive Hawkins test?

Those patients with three out of four of these signs were entered into the trial. All provided informed consent. If an injection of lignocaine (5 ml of 1% lignocaine; Neer’s test) into the subacromial space relieved both the pain and the painful arc of movement, depomadrone (40 mg) was injected into the subacromial space. All patients then under-
went a course of physiotherapy for 12 weeks to correct scapulothoracic rhythmic dysfunction and to strengthen the muscles of the rotator cuff.

Results

Of the 524 patients identified from the records, 467 initial questionnaires were returned (91% response rate). A total of 374 (79%) did not fit the initial criteria for shoulder pain. Of the 102 patients entered into the study, 59 (12%) did not fit the criteria for the impingement. Only 43 patients (9%) had positive signs of impingement and a positive Neer test on injection of lignocaine. Of these patients, 36 showed alteration of scapulohumeral rhythm.

Improvements in symptoms included abolition of pain, return to full movement of the shoulder and restoration of scapulohumeral rhythm. We graded patients with no pain and full movement as having a good response, those with some residual discomfort but with good movements as having a moderate response, and those with significant pain and/or abnormal movements as having a poor response. Overall, 56% of patients showed significant, 23% moderate and 21% no improvement. All patients in the good and moderate groups had restoration of normal scapulohumeral rhythm, while those in the poor response group had pain and abnormal scapulohumeral movement. The distribution of shoulder pain according to the position of the subject in the vehicle at the time of the initial accident, is shown in Figure 1.

Before being entered into this study, 25 patients had undergone physiotherapy for their neck pain, organised by their general practitioner, and 18 patients had not. The mean number of physiotherapy sessions attended by the 24 patients in the eventually good outcome group was 5.8. In the ten patients with a moderate outcome, the mean number of sessions was 4.5. Of the nine patients in the poor outcome group it was 4.1.

Discussion

Our study showed an incidence of 22% of shoulder pain after whiplash injury and is comparable with other studies. All patients had a delayed onset of shoulder pain. They fell into two groups. First, 12.3% (59/476) had referred pain from the neck to the shoulder, but 9% (43/476) had impingement-type pain, based on the questionnaire, clinical examination and the Neer test. Of these 43 patients, 36 showed alteration of scapulohumeral rhythm.

It is known that scapulohumeral movement is a composite of glenohumeral and scapulothoracic movement. The trapezius plays an important role in this with its different components acting to rotate, elevate, stabilise and abduct the scapula. When the trapezius muscle is paralysed, pain can develop as a result of loss of scapulohumeral rhythm causing subacromial impingement.

At the start of this study it was our belief, from clinical observation, that whiplash injuries cause neck pain which produces painful dysfunction of the trapezius muscle, particularly of its upper component, leading to an abnormal scapulohumeral rhythm. Our treatment protocol consisted of a combination of injection of steroid into the subacromial space and physiotherapy. The physiotherapy programme was specifically directed to correct altered scapulothoracic and scapulohumeral rhythm. We designed exercises first to co-ordinate shoulder flexion and abduction independently of the scapula and secondly to co-ordinate...
and tighten the stabilisers of the scapula. In following this regime we were able to recover normal scapulothoracic movement in all patients in the good and moderate response group. All patients in the poor outcome group still showed abnormal movement. Previous physiotherapy, which was directed at the neck, did not appear to have a significant effect on the eventual outcome.

In our series an improved outcome, as defined by range of movement and a visual analogue score for pain, was achieved both after subacromial injection of steroid and physiotherapy. Of the 467 responders with pain in the shoulder, any with immediate onset of pain, suggesting local direct injury, were excluded. The shoulder pain was therefore not thought to be due to a direct seatbelt injury or to holding on to the steering wheel at the time of the accident. We accept, however, that the tendency for drivers (of right-hand drive vehicles) to develop pain in the right arm may indicate that the seatbelt does play a role. Of note is the fact that the group of passengers who developed pain in the shoulder had a much more even distribution of pain between right and left shoulders (i.e. seatbelt and non-seatbelt sides), while the drivers had predominantly seatbelt-sided shoulder symptoms (Fig. 1). With this in mind we accept an alternative hypothesis that there is a suprascapular nerve injury causing impingement. In view of the fact that physiotherapy, directed at disordered scapulothoracic rhythm, improved symptoms in a large number of patients, we believe that palsy of the suprascapular nerve is unlikely.

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References