



Whiplash injury of the shoulder : Is it a distinct clinical entity ?

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The pathophysiology of shoulder pain after whiplash injury remains uncertain. Patients with shoulder pain after a whiplash injury were recruited from the accident and emergency department in a prospective study to determine the nature of indirect shoulder trauma after a whiplash injury. Twenty patients fulfilled the inclusion criteria. Magnetic resonance imaging (MRI) was obtained in 18 patients. Three MRI scans confirmed acute shoulder injuries. Two patients underwent arthroscopic subacromial decompression after failure of non-operative treatment. In conclusion, whiplash injuries can result in indirect acute shoulder trauma, possibly through an acceleration-deceleration mechanism, and may be a distinct entity.

Keywords : shoulder ; whiplash injury.

whiplash injury is uncertain. Acceleration and deceleration forces act on the shoulders at the time of a collision. The shoulder itself has a relatively immobile (scapula and clavicle) and a mobile (humeral head) interface at the shoulder joint. Consequently the humeral head may move suddenly in relation to the rest of the shoulder joint, causing *acute* injury to the glenoid, labrum, capsule, rotator cuff and attached muscles (10). Chauhan *et al* (3) identified patients who presented with chronic shoulder impingement syndrome after a whiplash injury and attributed it to painful dysfunction of the trapezius muscle, resulting in abnormal scapulohumeral rhythm, leading to impingement. It remains uncertain if acute tendinous

INTRODUCTION

Whiplash and whiplash-associated disorders are common in the UK, with an incidence of 250,000 cases each year (12). Patients present with a variety of symptoms known as whiplash-associated disorders (12). Rear-end collisions resulting in whiplash injuries may have a substantial impact on health complaints a long time after a collision (1). Neck pain is the commonest reported symptom. Shoulder pain is a well recognised associated symptom. The shoulder pain is usually attributed to referred pain from the cervical spine. However, the exact pathophysiology of shoulder pain following

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or labral injuries occur due to indirect injury to the shoulder as a consequence of rear end collisions.

The aim of this study was to determine the presence and nature of acute soft tissue injuries to the shoulder in association with a history of rear-end collision, by clinical assessment, radiographs and magnetic resonance imaging (MRI).

METHODS

A prospective study was performed from February to November 2003. Patients were recruited from the Accident and Emergency (A & E) department. The inclusion criteria were : symptoms and signs localised to the shoulder, following a clear history of a rear end collision and whiplash injury. Exclusion criteria were : pre-existing shoulder symptoms and a history of direct impact injury to the shoulder. Ethics committee approval was obtained, as well as informed consent from all patients who agreed to participate in the study. All patients were assessed in the orthopaedic clinic by a consultant orthopaedic surgeon with an interest in shoulder surgery. The mechanism of injury, nature of the accident, the use of a seat belt, the time of onset of symptoms, history of direct injury to the shoulder during the accident, the site of the pain and any past medical history of shoulder problems were documented. Clinical examination included a detailed examination of the cervical spine, both shoulders, neurological examination of the upper limbs and radiographic assessment of the painful shoulder.

Patients with shoulder pain, localised shoulder tenderness and reduced shoulder mobility, when compared to the other side, were offered a magnetic resonance imaging of the shoulder. These MRI images were evaluated by an experienced consultant radiologist with a special interest in musculoskeletal radiology.

RESULTS

Twenty-five patients were referred from A&E to the orthopaedic clinic during the study period. Symptoms and signs localised to the shoulder were confirmed in 20 patients (80%), and consent was obtained from these patients for an MRI scan of the shoulder. Two patients were excluded from the study, as MRI scanning could not be performed due to claustrophobia and obesity. The mean age of the remaining 18 patients (72%) was 38.7 years (range : 19 to 63). There were 11 females and

7 males. All subjects wore a seatbelt at the time of the accident, and the shoulder symptoms started acutely within half an hour. Fourteen patients were drivers and four passengers. The left shoulder was involved in 13 cases.

Three out of 18 MRI scans confirmed acute shoulder injuries. These patients were 21, 41 and 56 years of age. Two were female and one was male. The left shoulder was injured in two cases. All three patients were drivers. Two patients had acute partial supraspinatus tendon rotator cuff tears ; clinically there was evidence of subacromial impingement, and both patients subsequently had arthroscopic subacromial decompression after a period of failed non-operative treatment with local injections and physiotherapy. Both patients had excellent pain relief and improved shoulder movement after surgery. Another patient had an MRI appearance of an acute superior labral tear ; the symptoms persisted with non-operative treatment but declined after surgery.

Eight patients who had no previous shoulder problems had degenerative subacromial changes on MRI scanning. Seven patients had a completely normal MRI examination.

DISCUSSION

The incidence of shoulder pain after a whiplash injury is approximately 22% (3, 6). The pathophysiology of shoulder pain following a whiplash injury is unknown. Shoulder pain may be due to referred pain, direct seatbelt injury or due to holding on to the steering wheel at the time of the accident. Chauhan *et al* (3) reported a 9% incidence of late, chronic impingement-type shoulder pain following a whiplash injury. Symptoms were attributed to painful dysfunction of the trapezius muscle, leading to altered scapulohumeral rhythm, finally resulting in chronic impingement. Improvement in pain and mobility, correlated with improvement in scapulothoracic and scapulohumeral rhythm, was achieved through a course of physiotherapy for 12 weeks. However, the diagnosis of impingement syndrome was made on clinical grounds.

We are not aware of any prospective study investigating the nature of shoulder injuries after

whiplash injuries, using a combination of clinical, radiographic and magnetic resonance imaging. In the present study the diagnosis of shoulder pathology was established on clinical symptoms and signs ; confirmation of the diagnosis was obtained with corresponding radiological imaging. This is imperative, as many patients with whiplash injuries claim compensation ; the concept of secondary gain following whiplash associated injuries is well known (4). Magnetic resonance imaging is considered the investigation of choice for the evaluation of disorders of the shoulder (5, 8, 9) and a highly sensitive and specific tool for the diagnosis of rotator cuff lesions (2, 7, 13). However, magnetic resonance imaging of asymptomatic individuals has identified a high prevalence of tears of the rotator cuff (11). Assessment of possible shoulder pathology with magnetic resonance imaging must therefore be preceded by careful clinical examination of the shoulder.

The findings from this study suggest that whiplash injury to the cervical spine may result in concomitant injury to the shoulder resulting in acute rotator cuff or shoulder labral injury. Absence of direct shoulder contusion during a whiplash injury may not preclude the presence of an acute shoulder injury. During the study period, 3 patients were identified with acute shoulder pathology following indirect injury to the shoulder. All three patients had shoulder symptoms that failed to improve with non-operative intervention. However, the incidence of whiplash injury to the shoulder is uncertain. An acute shoulder pathology has not been demonstrated in every patient with shoulder symptoms after a whiplash injury. Fifteen out of the 18 patients who were found to have shoulder symptoms by a consultant orthopaedic surgeon had no evidence of significant shoulder pathology on MRI. This study demonstrated the presence of acute rotator cuff tears and an acute superior labral tear in patients after a whiplash injury. Other shoulder pathologies may occur after an indirect should-

er injury due to a whiplash injury. Larger prospective trials are needed to identify associated shoulder pathologies due to indirect trauma after a whiplash injury.

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