

# Nerve Injuries in Anterior Shoulder Dislocations

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## Summary

A retrospective study was conducted to determine the incidence of nerve injuries in anterior dislocations of the shoulder and to determine if a neurological examination is routinely performed in such cases. One hundred and fifteen shoulder dislocations in 100 patients (74 males, 26 females; mean age  $35 \pm 18$  years) were reviewed. Eighty-seven patients were examined for neurological injuries prior to reduction and 8 of these patients (9.2%) were found to have sustained neurological injuries. Following reduction, neurological examination was performed in 85 patients. Three patients who were not examined initially prior to reduction were subsequently found to have nerve injuries after reduction. Seven patients (7%) were not examined for neurological injury both before and after reduction of the dislocation. Eleven patients were found to have sustained nerve injuries in the final analysis. Axillary nerve injuries were the most common, occurring in 8 patients. In conclusion, nerve injuries are common in shoulder dislocations. The importance of performing and documenting the findings of neurological examination in anterior shoulder dislocations needs to be reiterated.

**Key Words:** *Anterior shoulder dislocation, Nerve injuries, Neurological examination*

## Introduction

In the management of an acute shoulder dislocation, it is important to examine the patient carefully for evidence of neurovascular injury before reduction is attempted, and also after reduction has been achieved<sup>1,2</sup>. This is because nerve injuries following an acute anterior shoulder dislocation is common. Based on clinical diagnosis alone, the reported incidence of nerve injuries ranged from 3-21%<sup>3-6</sup> while using electromyography (EMG), the incidence ranged from 19-65%<sup>7-9</sup>. Factors that have been associated with higher risks of nerve injuries include being in an older age group (above 50 years), a higher degree of trauma that resulted in the dislocation and the duration of the dislocation<sup>1,7</sup>.

The shoulder is the most common major joint to dislocate, accounting for 45% of all dislocations<sup>10</sup>.

Despite their common occurrence, the authors have seen cases whereby neurovascular examinations were not performed in patients with anterior shoulder dislocations and where the nerve injury was only diagnosed at the follow-up clinic. The aims of this retrospective study were to determine the incidence of nerve injuries in anterior shoulder dislocations, to determine how often the omission of a neurological examination actually is, and to identify the nerves that are commonly injured.

## Materials and Methods

All anterior shoulder dislocations treated between October 1998 and September 2000 were included in this retrospective cross-sectional study. A total of 141 shoulder dislocations were identified from the census

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book. Of these, only 115 dislocations were reviewed as 26 case notes were missing, giving a retrieval rate of 81%.

From the case notes, the patients' demographic data, the aetiology of the injury, and the documentation of nerve injuries was recorded onto a proforma. Post-reduction neurological examination refers to an examination which was performed after an attempt at reduction has been made and before the patient was discharged from the accident and emergency department or ward. If there was no documentation in the case notes of a clinical examination having been performed to identify the presence of a nerve injury, we considered that an examination was not performed. If a nerve injury was noted, the nerve involved, as well as whether it affected the sensory, motor or both components were then recorded. If after reviewing the case records there was any doubt regarding the presence of an injury, an attempt was made to verify this by inviting the patient to attend for a follow-up clinic for a physical examination even if the patient had been discharged from follow-up.

## Results

The 115 shoulder dislocations reviewed occurred in 100 patients (74 males, 26 females). There were 80 patients with primary dislocations; 75 of these patients had only a single known dislocation during the study period, and 5 patients went on to develop recurrent dislocations (16 dislocations). Seven patients had one previous dislocation and sustained their second dislocation and the other 13 patients with a history of recurrent dislocations accounted for the remaining 17 dislocations. The mean age of patients was  $35 \pm 18$  years (14-88 years).

Of the 100 patients, 87 patients were examined for neurological injuries prior to reduction. The status of the neurological function was not documented in 12 patients (12%). One patient could not be examined as he had cerebral concussion. We considered that a neurological examination had not been performed to

look for evidence of nerve injuries in those patients where there was no documentation of a neurological examination having been performed. Of the 87 patients who were examined, 8 patients (9.2%) were found to have sustained neurological injuries (see Table D).

Following reduction, neurological examination was performed in 85 patients and was not performed in 14 patients. One patient left the accident and emergency department before he could be re-examined. Three of the 8 patients with documented nerve injury before reduction had shown a recovery of their nerve function after reduction while the other 5 were not re-examined. Three patients who were not examined initially were subsequently found to have nerve injuries after reduction (see Table D). The neurological injury was only noted at follow-up clinic in 2 of these 3 patients. One of these 2 patients in fact required 2 attempts at reduction under sedation as the initial post-reduction radiograph showed that the joint had not been reduced. Seven patients (6.8%) were not examined for neurological injury both before and after reduction of the dislocation (see Table D). Therefore, a total of 11 patients (11%) were found to have sustained nerve injuries in the final analysis.

The details of the patients with neurological deficit are shown in Table II. Axillary nerve injuries were the most common, occurring in 8 patients; in 5 cases it was an isolated injury. There was one case of an isolated radial nerve injury and 2 cases with isolated ulnar nerve injuries. 10 patients had loss of sensory function and 5 patients had loss of motor function. Eight patients had acquired shoulder dislocation due to a fall, 2 were involved in motor vehicle accidents, and 2 patients suffered recurrent spontaneous dislocations.

The patients who had recovery of the nerve function immediately after the reduction were case 3, 6 and 7. Patient 11 made a slow but almost complete motor recovery but continued to have pain and slight alteration in sensation from the nerve injury. Only 2 patients (case 10 and 11) had EMGs performed.

**Table I: The number of patients with neurological deficits in relation to the timing of the reduction of the dislocation**

	No. of cases
Found to have neurological deficit before reduction,	8
Improved after reduction	3
Not re-examined after reduction	5
Neurological function not documented before reduction,	4
found to have neurological deficit after reduction	3
found to have normal neurological function after reduction	1
Neurological function not documented before and after reduction	7

**Table II: Clinical details of the patients with nerve injury**

No.	Age/Sex	Mechanism of injury	Shoulder lesion	Neurological lesion(s)	Components affected
<b>Group I - diagnosed pre-reduction</b>					
1.	21 M	MVA	fracture-dislocation	ulnar nerve	sensory
2.	23 M	spontaneous	subcoracoid dislocation	median nerve	motor
3.	49 M	fall	fracture-dislocation	ulnar nerve	sensory & motor
4.	27 M	spontaneous	subglenoid dislocation	axillary nerve	sensory
5.	22 M	fall	subglenoid dislocation	axillary nerve	sensory
6.	66 F	fall	subcoracoid dislocation	axillary nerve	sensory
7.	40 M	fall	subcoracoid dislocation	axillary & radial	sensory
8.	22 M	fall	subcoracoid dislocation	axillary nerve	sensory
<b>Group II - diagnosed post-reduction</b>					
9.	19 M	MVA	subglenoid dislocation	axillary nerve	motor
10.	60 F	fall	subcoracoid dislocation	multiple plexus	sensory & motor
11.	44 F	fall	fracture-dislocation	axillary, radial & ulnar	sensory & motor

## Discussion

The incidence of nerve injuries found in this study was comparable to other retrospective studies where the diagnosis of nerve injury was made clinically. Rowe<sup>3</sup> found an incidence of 5.4%, Vermeiren et al<sup>6</sup> 3%, Kroner et al<sup>5</sup> found an incidence of 7.4%, Gumina and Postacchini<sup>11</sup> reported an incidence of isolated axillary nerve injury in 5.5% of 545 patients, while Perron et al<sup>12</sup> reported an incidence of 12.6% of sensory nerve deficits. Pasila et al<sup>15</sup> reported an incidence of 21% in a prospective study. Although there were more nerve injuries in the younger patients (<40 years) in this study, the incidence was in fact higher in the above 40 years age group (8.7% and 15.2%). This is consistent

with the finding that older patients are at a higher risk of developing nerve injuries.

The axillary nerve was the most commonly injured nerve following a shoulder dislocation in this study, although injuries to the other peripheral nerves were also found. This finding was in keeping with most other studies<sup>5,11,13</sup>. Rowe<sup>3</sup> found the ulnar nerve to be the most common isolated nerve injury (30%) followed by radial (18%), axillary (11%) and multiple lesions in 37%. Using EMG's, Visser et al<sup>9</sup> found an incidence of axillary nerve injury in 42% of patients, suprascapular nerve in 14%, musculocutaneous nerve 12%, ulnar 8%, radial 7%, and median 4%. The mean number of nerves involved was 1.8, although an isolated nerve injury was

seen in 51%. Toolanen et al<sup>8</sup> found an incidence of axillary nerve injury on EMG's in 65.4% and suprascapular nerve injury in 3.6% in patients aged over 40 years. An injury can occur to either the sensory or the motor component or to both components of the nerve<sup>7</sup>. Examination of sensation in the axillary nerve was found to be not reliable as an indication as to the presence of lesions of the motor nerves<sup>9</sup>. This suggests that clinical examination should include not only the motor and sensory components of the axillary nerve but also the other peripheral nerves as well.

Although it is encouraging to see that neurological examination was performed in nearly 90% of patients, it is a nevertheless, a little worrying at a time of increasing medical litigation to find that nearly 10% of patients did not have a neurological examination performed in a commonly seen injury that is associated with an incidence of nerve injury of up to 21%. Of the 12 patients who did not have their neurological function documented prior to reduction, 3 of them were later found to have nerve injuries. As the nerve injury was only documented or found after the reduction, the injury could easily be attributed to an iatrogenic injury, and the clinicians may thus be held responsible for the injury. Although some of these patients may indeed have been examined and had the injury before the reduction, the absence of documentation in the medical notes could only lead to difficulties in cases of alleged medical negligence. In

addition, the identity of the person who performed the reduction, and the types of analgesics and the method of reduction were also usually not documented in the case notes. Based on our experience, it is our opinion that often the reductions were in fact performed by the medical assistants, who usually have greater experience than most medical officers at these procedures. This may have contributed to the lack of documentation of the neurological status in some patients.

It is generally agreed that nerve injuries following an anterior shoulder dislocation has a good prognosis. Perron et al<sup>12</sup> found that 75% of patients with initial sensory nerve deficits had improved following reduction. Visser et al<sup>9</sup> reported that 33 of the 37 patients who had EMG evidence of nerve injury showed complete or almost complete recovery on EMG with return of normal strength, although the function of the shoulder in those patients with axillary nerve injury continued to show significant loss of movement. We were unfortunately not able to study the clinical outcome of the nerve injuries, as many of the patients were lost to follow-up and there were insufficient detail on the examination in others.

In conclusion, nerve injuries are common associated injuries in anterior shoulder dislocations. The message that it is mandatory to examine and document any nerve injuries in shoulder dislocations both before and after reduction must be reiterated to all clinicians involved in the management of these acute injuries.

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