Shoulder Subluxation and Pain in Stroke Patients

Richard W. Bohannon, A. Williams Andrews

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Twenty-four patients with stroke were studied (a) to determine the interrater reliability of a clinical measurement of shoulder subluxation, (b) to confirm the interrater reliability of the Ritchie Articular Index (Bohannon & LeFort, 1986) for measuring shoulder pain, (c) to establish the relationship between the Ritchie index scores and shoulder lateral rotation range of motion measured at the point of pain (SROMP), and (d) to determine the relationship between shoulder subluxation and shoulder pain. The agreement between the two examiners’ (the authors) measurements of subluxation was “almost perfect” (Landis & Koch, 1977, p. 165). The agreement between the two examiners’ Ritchie index measurements was “substantial” (Landis & Koch, 1977, p. 165). The Ritchie index and SROMP measurements correlated significantly. Neither the Ritchie index nor the SROMP measurements correlated significantly with subluxation. Although the measurements used in this study were reliable, they did not support the association of shoulder subluxation with shoulder pain in stroke patients. Clinicians wishing to reduce shoulder pain in stroke patients should direct their treatment accordingly.

Complications involving the shoulder are a frequent consequence of stroke (Roy, 1988). Shoulder pain is one such complication that may be of the greatest concern to clinicians and patients alike. Although many of the publications addressing the issue of shoulder pain have made reference to the pain without first providing an operational definition, other publications have described the pain using clearly defined ordinal or interval/ratio measurement schemes. Among such measurement schemes are those proposed by Fugl-Meyer, Jääskö, Leyman, Olsson, and Steglin (1975), modifications of or scales similar to that of the Ritchie Articular Index (Bohannon & LeFort, 1986; Chalsen, Fitzpatrick, Navia, Bean, & Reding, 1987), and shoulder lateral rotation range of motion measured at the point of pain (SROMP) (Andrews & Bohannon, 1989). The reliability of the latter two measurement schemes has been reported. More specifically, Bohannon and LeFort (1986) reported 85.3% agreement ($\kappa = .759$) between two clinicians’ Ritchie index grades of shoulder pain in 34 patients with hemiplegia. Andrews and Bohannon (1989) reported intrarater and interrater reliability (intraclass correlation) coefficients of .874 to .989 for two clinicians’ measurements of SROMP. For patients with stroke, the relationship between various independent variables and shoulder pain has also been described with various measures of shoulder pain. Some of the independent variables shown to be related significantly with shoulder pain are range of motion (Bohannon, 1988; Bohannon, Larkin, Smith, & Horton, 1986), time since onset of stroke (Bohannon, 1988; Bohannon et al., 1986; Bohannon & LeFort, 1986), and muscle weakness (Bohannon, 1988; Chalsen et al., 1987).

What has not been established clearly in patients with stroke is the relationship between shoulder pain and subluxation, despite the emphasis that has been placed on the reduction of subluxation (Boyd & Garland, 1986; Moodie, Brisbin, & Morgan, 1986). Moreover, the reliability of clinical measurements of subluxation based on palpation has not been established, nor has the relationship between various measurements of shoulder pain. If clinicians are to use legitimate measurements in the assessment of patients with stroke, they must first be assured of the reliability and usefulness of these measurements.

The purpose of this investigation was (a) to determine the interrater reliability of a clinical measurement of shoulder subluxation based on palpation, (b) to confirm the interrater reliability of the Ritchie index for measuring shoulder pain, (c) to determine the relationship between two alternative measurements of shoulder pain, and (d) to establish the relationship between shoulder pain (with the use of two different measurements) and shoulder subluxation.
Table 1
Subluxation Grades of Stroke Patients With Paretic
Shoulders (N = 24)

<table>
<thead>
<tr>
<th>Examiner 1</th>
<th>Examiner 2</th>
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<tbody>
<tr>
<td></td>
<td>None</td>
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<tr>
<td>None</td>
<td>15</td>
</tr>
<tr>
<td>Minimal</td>
<td>0</td>
</tr>
<tr>
<td>Substantial</td>
<td>0</td>
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</table>

Note. Numbers indicate number of patients assigned the grade within each category.

Method

Subjects

The initial convenience sample for this study consisted of 28 consecutively admitted patients who (a) were undergoing rehabilitation for their first stroke (cerebrovascular accident), (b) could follow instructions, (c) provided informed consent, and (d) were aware of the position of their paretic limb in space. Four of the initial patients chosen were excluded from the study because of premorbid problems affecting their shoulders or because they had difficulty understanding the testing procedures. Of the 24 remaining patients—12 men and 12 women—12 were paretic on the left side and 12 on the right side. Their mean age was 61 years ± 11 years (range = 33 to 84 years). Their time since onset of stroke was 71 days ± 100 days (range = 11 to 511 days).

Procedure

Each of the two investigators looked at two basic measurements—paretic shoulder subluxation and paretic shoulder pain. The investigators obtained the latter measurement using two methods.

Shoulder subluxation was measured while the patients sat on the edge of a mat table with their paretic upper extremity dependent (i.e., hanging freely). Each examiner used his thumb to palpate the separation between the acromion and the head of the humerus. He then graded subluxation as none (0), minimal (1), or substantial (2).

Shoulder pain was measured during slow lateral rotation of the joint while the patients were supine. During all measurements, the patients’ shoulders were abducted about 45° and their elbows were held at 90° with their forearms pronated. Measurements were begun from neutral shoulder rotation. For measurements with the Ritchie index, the paretic shoulder was rotated laterally toward an end point of 90°. The patients’ responses were graded on the following scale: no pain (0), complaint of pain (1), complaint of pain and wince (2), and complaint of pain, wince, and withdrawal (3). For the measurement of SROMP, the patients’ shoulders were laterally rotated until they first expressed feeling pain in the shoulder, at which point the fluid-filled gravity goniometer, applied on a line from the olecranon to the lateral styloid process, was read. This procedure’s reliability had been documented previously in the same sample of patients (Andrews & Bohannon, 1989).

Data Analysis

The reliability of the two examiners’ measurements of shoulder subluxation and shoulder pain was determined by the calculation of a percentage agreement and through the use of the weighted kappa to determine the agreement beyond that expected by chance (Landis & Koch, 1977). Spearman rho correlations (r) were used to determine the relationship between the Ritchie index measurements of shoulder pain and the SROMP measurements obtained by the senior investigator and the relationship between paretic shoulder subluxation and both pain measurements.

Results

Table 1 shows the number of patients whose paretic shoulder was given one of three grades of subluxation. Most of the patients demonstrated no palpable subluxation. The two examiners’ independent judgments of subluxation using the ordinal grading scheme showed a 91.7% agreement. The weighted kappa score for the grades was .900, consistent with “almost perfect” agreement (Landis & Koch, 1977, p. 165).

Table 2 shows the number of patients with stroke whose paretic shoulders were given one of the four Ritchie index grades of pain. Most of the patients (70.8%) demonstrated enough shoulder pain to at least cause them to wince when their shoulders were rotated laterally 90°. The examiners agreed on 70.8% of their scores, thus yielding a weighted kappa (.677) consistent with “substantial” agreement (Landis & Koch, 1977, p. 165). The SROMP of the paretic side was measured as 64.5° ± 28.8° and 64.6° ± 28.9°.

Table 2
Ritchie Articular Index of Pain in Stroke Patients With
Paretic Shoulders (N = 24)

<table>
<thead>
<tr>
<th></th>
<th>Examiner 1</th>
<th>Examiner 2</th>
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<tbody>
<tr>
<td></td>
<td>(0)b</td>
<td>(1)c</td>
</tr>
<tr>
<td>(0)b</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>(1)c</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>(2)d</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>(3)e</td>
<td>0</td>
<td>3</td>
</tr>
</tbody>
</table>

Note. Numbers indicate number of patients who received the pain rating.

The Spearman correlation (−0.776) between the senior examiner’s measurements of shoulder pain (Ritchie index and SROMP) was significant (p < .001). Thus, patients with higher scores on the Ritchie index had fewer degrees of lateral rotation of the shoulder before pain was experienced. The relationship between the senior examiner’s measurements of subluxation and both measurements of shoulder pain was not significant (p > .05). The Spearman correlations were .199 and −.385 for the Ritchie index and SROMP measurements, respectively.

Discussion

The results of this study indicate that shoulder subluxation can be graded reliably with the use of a simple clinical scale of three levels: none (0), minimal (1), and substantial (2). Clinicians, however, should not assume that they themselves are reliable. As did the examiners in this study, they should first agree on terms and practice and then test their interrater reliability. Because measurements of shoulder subluxation based on palpation are highly correlated with more precise and objective radiologic measurements (Prevost, Arsenault, Dutil, & Drouin, 1987), they may be considered legitimate for clinical use.

The incidence of shoulder pain in this study was similar to that reported previously among poststroke patients (Bohannon et al., 1986; Bohannon & LeFort, 1986; Caldwell, Wilson, & Braun, 1969). The agreement between the examiners in using the Ritchie index in this study is somewhat less than that reported by Bohannon and LeFort. The magnitude of the weighted kappa, nevertheless, confirms the reliability of the index when modified and applied to patients with stroke. Because the ordinal Ritchie index was correlated significantly with a reliable ratio measurement of shoulder pain (SROMP), clinicians without a goniometer may wish to consider using the Ritchie index. Because the SROMP measurement uses ratio levels (i.e., degrees of pain free motion), it is more precise than the Ritchie index. Consequently the SROMP measurement should be more sensitive to changes in shoulder pain in patients with stroke. Decisions about the efficacy of interventions to reduce shoulder pain, therefore, may be tested more effectively with the SROMP measurement than with the Ritchie index.

As in a previous study in which the Ritchie index was used to document shoulder pain in stroke (Bohannon, 1988), subluxation was not related significantly with pain. The present study’s use of a three-level measurement of subluxation rather than a two-level measurement (Bohannon, 1988) did not alter the findings. The lack of a correlation in this study between SROMP measurement and subluxation provides further reason to question the supposed link between subluxation and poststroke pain. If such a link does not exist, then the treatment of subluxation to reduce pain would seem unnecessary. Other reasons, nevertheless, may exist for dealing with the malalignment.

References


