

Documenting rotation at the glenohumeral joint

A technical note

V Prem Kumar and Satku K Satku

Present methods of documenting internal rotation of the shoulder joint are based on the point reached over the back by the tip of the fully extended thumb. Disease or stiffness of the joints distal to the shoulder gives a false measure of internal rota-

tion. Using the interepicondylar line of the humerus in the coronal plane as the neutral position, internal rotation can be documented accurately as the angle formed by this line with the coronal plane when the shoulder is rotated inwards.

Department of Orthopedics, National University of Singapore, 5 Lower Kent Ridge Road, Singapore 0511, Republic of Singapore. Tel +65-7725549. Fax -7732558
Submitted 93-12-27. Accepted 94-04-16

The wide range of movements possible in the shoulder girdle makes it important that accurate documentation be carried out when monitoring a patient's progress through a treatment program. While abduction, adduction, flexion and extension occur through a synchrony of movement at the glenohumeral, acromioclavicular, sternoclavicular and thoracoscapular joints, internal and external rotation are less complex, occurring almost entirely at the glenohumeral joint. While external rotation is easily measured, documenting internal rotation is not so simple.

Rotation can be measured both in the neutral position and with the shoulder abducted to 90 degrees. The neutral position is more relevant to activities of daily living and also more practical in clinical situations where the shoulder is stiff and abduction to 90 degrees not always possible. Rotation in maximum abduction, possible for a particular patient, may still be used to monitor progress with treatment.

The Michael Reese Hospital and Medical Center Shoulder Protocol (Post 1988) documented internal rotation in increments of 30° from 0° to 80°, without stating how this measurement is performed. The American Academy of Orthopedic Surgeons and the Society of American Shoulder and Elbow Surgeons assessed internal rotation by the point reached over the back by the tip of the fully extended thumb, the greater trochanter, sacrum and lumbar 4 spinous process being some of the bony landmarks. The Presbyterian Hospital Shoulder Evaluation Protocol (Neer 1990) also documented internal rotation by a similar method.

We find 3 drawbacks with these methods of measurement.

First, the rotation measured is not pure internal rotation but a composite movement of extension of the shoulder joint and internal rotation.

Secondly, the extent of internal rotation of the shoulder will be affected by mobility of the elbow, radioulna, wrist and even joints of the thumb. How high the tip of the thumb will reach on the back will be determined not only by the amount of pure glenohumeral internal rotation but also by the flexibility of all these other joints. Stiffness or disease at any one or more of these joints will affect the amount of "internal rotation" at the shoulder joint. Figure 1A shows a patient with an old left elbow injury resulting in restriction of flexion to 90°. With the present method of documenting internal rotation (Post 1988, Neer 1990), the patient's right thumb reached thoracic 6 spinous process, while his left thumb only reached the lumbar 2 spinous process (Figure 1B) leading to a false underestimation of the amount of internal rotation in the patient's left shoulder which was completely normal.

Thirdly, it is not always easy in everyday practice to determine the bony landmarks of the back. Distinguishing Lumbar 3 from Lumbar 4 or 2 spinous process may not always be easy.

We propose a simpler and a more practical measurement of internal rotation. The external and internal epicondyles of the humerus which are easily palpable are the bony landmarks chosen. In the neutral position of the shoulder the interepicondylar line is in the coronal plane (Figure 2). As the shoulder is internally rotated the interepicondylar line also rotates inwards from the coronal plane. With the examiner's thumb and index finger on the external and internal



Figure 1A. Patient with a stiff left elbow having flexion up to 90°.

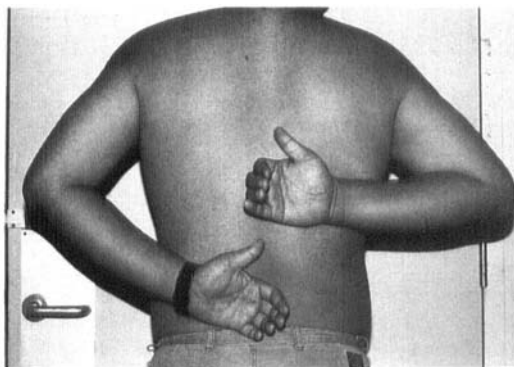


Figure 1B. Same patient showing a falsely impaired internal rotation of the left shoulder.

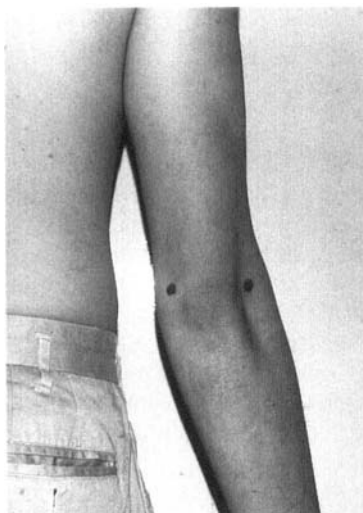


Figure 2. The internal and external epicondyles are marked. In the neutral position the interepicondylar line is in the coronal plane.



Figure 3. The interepicondylar line is at 90 degrees of internal rotation with respect to the coronal plane, indicating 90 degrees of internal rotation of the right shoulder.

epicondyles, respectively, the amount of internal rotation of the shoulder is easily measured by the angle between the interepicondylar line and the coronal plane (Figure 3).

Such a measurement, we consider, gives an accurate measure of pure internal rotation of the glenohumeral joint in the neutral position independent of the mobility of the more distal joints. It may be used in everyday clinical practice and also for accurate documentation in shoulder movement protocols.

Acknowledgements

The authors thank Mr S H Tow for the photography and Ms M F Ng for typing the manuscript.

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