EFFECTS OF S3 BRACE ON SCAPULAR RESTING POSITION AND KINEMATICS

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Objectives: Initial conservative treatment of common shoulder injuries focuses on correcting posture and establishing scapular neuromuscular control. This study evaluated a new Spine and Scapula Stabilizing brace (S3) on scapula kinematics at rest and during active arm elevation.

Methods: 30 volunteers (age 31 ± 10 years, ht 1.7 ± .08 m, mass 75 ± 14 kg), fifteen injured subjects with scapular dyskinesis and fifteen healthy subjects took part in the study. Three-dimensional scapular and humeral kinematics were collected using electromagnetic sensors attached to the thorax, bilateral acromion and humerii. The independent variables were S3 brace on and off. The dependent variables were scapular internal rotation (IR), upward rotation (UR), and posterior tilt (PT). These variables were measured at scapular position at rest and at 10 degrees intervals between 20-90 degrees during elevation and lowering of forward flexion on the dominant and non-dominant sides.

Results: Repeated measure ANOVAs revealed that during resting posture scapular PT increased significantly by 4 degrees and UR increased by 2 degrees while wearing the brace, while IR was not affected ($P < 0.05$). Evaluation of the S3 effect during active elevation was determined with independent repeated measure ANOVAs for each scapular rotation using a 2 within variables (brace, angle) and one between variable (group) design. A significant brace by angle interaction was present for dominant PT, dominant and non-dominant UR, and non-dominant IR ($P < 0.05$). Bonferroni post-hoc analysis revealed that the S3 significantly increased PT by 3 degrees in the first and last 30 degrees of elevation ($P < 0.05$). The brace decreased UR in the dominant arm by 4 degrees at 90 degrees of elevation, while increasing UR in the non-dominant arm by 2 degrees in the first and last 40 degrees of elevation ($P < 0.05$). The S3 also decreased IR by 3.5 degrees during the lowering phase of elevation ($P < 0.05$).

Conclusions: This is the first evidence that a brace may affect scapular kinematics at rest and during motion. The primary affect appears to be in the lower ranges of motion. This may be due to the subjects' arms being at their side while donning the brace. The increased PT and decreased IR from wearing the brace may assist the scapular muscles in controlling scapular motion. Future research needs to address if the kinematic alterations are beneficial to patients with shoulder pathologies and those at risk for developing injuries.