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MetroHealth Medical Center

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Abstract Submission Form

Poster Title: Influence of augmented C2-T1 translaminar rod in conjunction with standard posterior rod construct on cervicothoracic joint stability

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Category: Clinical Research

Introduction: The posterior approach to cervical fusion is commonly used but has drawbacks, including extensive muscle dissection, post-operative pain, and risk of junctional kyphosis. Here, a comparison was made between a standard two-rod fusion of C2-T1 and a C2-C7 fusion with an additional C2-T1 translaminar rod. We hypothesized that the addition of a single translaminar rod could approximate motion reduction of the C7-T1 level while reducing muscle dissection and sparing the T1 pedicles. This novel model could offer a safer approach to posterior fusion across the cervicothoracic junction.

Materials/Methods: Four human cadaveric spines were instrumented with screws and posterior rods (Stryker) from C2 to T1 (skipping C6). C2 received pars screws, C3-C6 received lateral mass screws, and C7 and T1 received pedicle screws. Following construct implementation, each spine was secured with motion tracking markers at C7 and T1 while a virtual sensor was placed at T2. For testing, the specimens were mounted to a robot (simVITRO®) and underwent flexion/extension (FE), axial rotation (AR), and lateral bending (LB). After testing, the existing construct was reduced to C2-C7 and a C2-T1 translaminar rod was instrumented. The specimen was placed back on the robot and the testing protocol described above was applied to the 3-rod construct. Overall spine, C7-T1, and T1-T2 range of motion (ROM) were recorded for each loading trajectory in the 2- and 3-rod constructs.

Results: The focus of our measurements was the change in motion between the standard 2-rod and the new 3-rod structures, treating the standard as the control. The addition of the 3rd rod led to an increase in C7-T1 motion in all three primary degrees of freedom while leading to no notable change in T1-T2 motion. From a quaternion difference perspective, the change in rod led to a noticeable change in the stability of C7-T1, though the magnitude of the impact varied across specimens.

Conclusions: The novel construct with translaminar instrumentation across the cervicothoracic junction did not provide as much motion reduction at the C7-T1 level compared to the standard construct. If implemented, this may result in poor stabilization of the C7-T1 level, potentially leading to pseudoarthrosis and requiring revision. Surprisingly, we did not find any noticeable changes to the recorded motion between T1-T2 levels in both constructs. These findings require further testing to determine their significance.