Range of Motion of the Upper Cervical Spine: Flexion, Extension, Lateral Bending, and Axial Rotation
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Clinical evaluation of upper cervical spine instability with manual therapy

In vitro simulation of the clinical test: 10 upper cervical spine specimens

Methodology

- Motion capture system (Vicon)
- Measure device (Faro)
  Coordinates of Vicon markers and anatomical landmarks ➔ Coordinate systems to quantify the motion
- Force and torque sensor (AMTI)

Results

<table>
<thead>
<tr>
<th></th>
<th>ROM (°)</th>
<th>Torque (Nm)</th>
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</thead>
<tbody>
<tr>
<td>Flexion</td>
<td>19.8 ± 5.3</td>
<td>0.7 ± 0.2</td>
</tr>
<tr>
<td>Extension</td>
<td>14.4 ± 7.7</td>
<td>0.9 ± 0.3</td>
</tr>
<tr>
<td>LB – R</td>
<td>4.7 ± 2.3</td>
<td>0.8 ± 0.2</td>
</tr>
<tr>
<td>LB – L</td>
<td>5.6 ± 3.2</td>
<td>1.0 ± 0.3</td>
</tr>
<tr>
<td>Rot – R</td>
<td>33.9 ± 6.6</td>
<td>0.6 ± 0.1</td>
</tr>
<tr>
<td>Rot – L</td>
<td>28.0 ± 6.9</td>
<td>0.6 ± 0.2</td>
</tr>
</tbody>
</table>

Conclusions

- Valuable results from a clinical point of view: first in vitro tests with C2 fixed (as in manual therapy)

Introduction

- Common symptom in adults: neck pain
- Manual therapy to examine patients: screening cervical spine instability

Objective

To quantify motion and applied torque


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