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**ABSTRACT**

<b>Title: A LABORATORY MODEL FOR THE STUDY OF THE EFFECT OF +Gz FORCES ON THE CERVICAL SPINE OF FIGHTER PILOTS</b>	
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<p><b>INTRODUCTION:</b> High performance fighter aircrafts are capable of generating high-sustained accelerations during combat maneuvers. High performance fighter aircrafts (F-16, M-2000 etc), are able of generating and sustain accelerations up to 9+Gz. This produces excess stress on the neck that results to spine injuries during aerial fighting, especially when turning the head behind to check his “six o clock” area. Although there are plenty of clinical data there is few biomechanical evidence. This is mainly due to the instability of the cadaveric cervical spine, that makes any attempt to test under a load equivalent to high +Gz impossible. The Follower Load model represents a unique opportunity to study in vitro the effects of loads similar to what a pilot experiences under 9 +Gz accelerations.</p> <p><b>MATERIAL – METHOD:</b> A total of 13 cadaveric cervical specimens (C3-T1) were used in this study. Three strain gauges (3-element rosettes) were implanted anterior on the body and posterior on the 2 lateral masses of C5. Preload was applied on the C3 cup through two cables that were connected to two loading arms. Two bags were attached to the loading arms and were filled with water through two arthroscopic pumps controlled by computer. Two positions of the cervical spine were tested: 1) neutral under loads of 250 and 500 N and 2) “check –six” up to 750 N. During testing the strain experienced by the body and the lateral masses of C5 was recorded.</p> <p><b>RESULTS:</b> All 13 spines were successfully loaded up to 500 N in the static neutral posture. This load is the equivalent of the force generated by an acceleration of 6 +Gz with a calculated head weight of 7.5 Kgr. A total of 12 spines were loaded up to 700 N (500-750) in the check-six position. This equals the load generated by +9Gz. Strain values were directly related to the load. Check-six generated the highest strain at the loaded facet compared to the neutral posture values.</p> <p><b>CONCLUSIONS:</b> The follower load can be used to simulate in vitro the loads experienced by fighter pilots during air combat maneuvers. Check-six position increased the strain experienced by the ipsilateral facet by 50% as a result of reducing the load transmitted through the vertebra body.</p>	
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