A Quantitative Investigation of the Effectiveness of the Non-Invasive Halo in Restricting Passive Neck Motion in the Supine Position

Kaitlin Quan, Rex Mosley, Traci Bekkelund, Fan Gao, Ph.D.

University of Texas Southwestern Medical Center

A cervical thoracic orthosis (CTO) is commonly prescribed to immobilize the cervical spine after surgery or a traumatic injury. The conventional Halo design consisting of invasive pins has long been the standard of treatment to restrict cervical spine motion. However, a variety of non-invasive devices are currently available as alternative means of cervical injury management. The purpose of this study is to quantify the effectiveness of various CTOs in a compromising supine position frequently assumed by patients during the recovery process.

Two miniature electromagnetic motion sensors placed on the head and trunk were used to measure the passive cervical spine motion (flexion) of 20 healthy individuals while laying supine on a custom wooden-plinth with a 5” foam head cushion for 4 CTOs: 1) the Trulife Lerman Non-Invasive Halo, 2) the Trulife Lerman Minerva, 3) the Trulife Sternal Occipital Mandibular Immobilizer (SOMI), 4) the Aspen 4-Post CTO. The results of the study indicated that the Minerva CTO allowed the least amount of flexion on average (8.24°) and the SOMI allowed the greatest amount of flexion (31.10°); the Aspen 4-Post CTO allowed 9.19° of flexion and the Non-Invasive Halo allowed 10.56°. The current study also revealed that the amount of restriction provided by all the CTO devices tested, except for the SOMI brace, was significant when compared to no brace. However, a survey administered during data collection assessing the mean comfort and perceived restriction of each orthosis according to test subjects perception found the Non-Invasive Halo to be the most comfortable (6.25/10) and also perceived it to be the most restrictive orthosis (7.6275/10). The results of the study will be able to aid practitioners in recommending the most optimal orthotic treatment for immobilizing the cervical spine.