TRAINING YOUR VESTIBULAR SYSTEM FOR POST CONCUSSION MANAGEMENT

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Abstract
Vestibular Training Services (VTS) provides non-invasive equipment and methods for improving balance in the post-concussion adult general public. Controlled rotation along a person's vertical axis by utilizing VTS equipment is proven to reduce postural sway. This paper presents valid evidence that the VTS equipment and methods improve adult balance, as shown by the balance plate analysis.

Introduction
VTS is 30-year-old technical company, and is a women owned, federally certified small business. VTS is a Verified Federal Vendor with CAGE code: 8HDB6. VTS has a USA Patent Number: 11,478,395 for our Fly/Harness system and a patented pending for our Rail system. VTS has registered our domain name and parked relevant social media. VTS gets effective real time results for those diagnosed with post-concussion symptoms.

Concussion damage, including loss of balance that can inhibit everyday activities, may continue for months to years after the concussion event[(1)]. Custom vestibular therapy is shown to work on concussed persons[(2)]. Recovery time from concussions can be reduced through VTS individualized management methods. Vestibular rehabilitation can help with post-concussion by improving balance [(3)].

VTS rail-system equipment consists of a non-invasive, duel directional, variable speed motorized rotational platform with handrails. The motorized rotational platform will rotate at a speed customized by VTS trained personnel. The motorized rotational platform has the power to rotate subjects ranging from 20 (9kg) to 400 (181kg) pounds.

Figure 1. VTS Rail System.

Methods
Data was collected from a sample of 43 generally healthy adults ranging in ages from 19 to 73 (mean age 44). Overall, there were 15 women (35%) and 28 men (65%) from various local communities. All participants gave written informed consent prior to participation in the study. All participants were voluntary. All participants suffered from concussion symptoms within the previous year prior to using the VTS equipment and method. The severity of the concussion varied by participant. VTS methods were adjusted to meet an individual's symptoms.

The VTS methods utilize pre rotation and post rotation comparison of postural sway. An initial pre-rotation test using The BTrackS Balance Plate and BTrackS Assess Balance software (BTrackS) creates a baseline. The BTrackS is a portable force plate used to determine center of pressure (COP) of postural sway[(4)]. The recorded path measures the path length (in centimeters) of the participant during pre-rotation and post rotation testing. VTS utilizes the Modified Clinical Test of Sensory Integration and Balance (CTSIB) which is programmed into the BTrackS tests for pre- and post-rotational testing. Lower postural sway path lengths equate to better balance[(5)].

Postural sway is defined as a mechanism whereby sustained oscillatory motion occurs about a fixed postural position[(6)]. Measurement of postural sway is a common means of assessing standing balance.

The surface of the BTrackS Balance Plate uses four-sensor technology to determine center of pressure (COP) with an accuracy and reliability that is comparable to other balance plates,

Figure 2. BTracks Plate

Each pre-rotation test followed a standardized script, consisting of a 20 second (20s) trial beginning and ending with an auditory tone. The trial required the participant to stand as still as possible on the BTrackS with eyes opened and closed, hands on hips, and feet shoulder width apart. A 10 cm foam pad was placed on the plate for another 20s trial with minimal inter-trial delays (<10s). The BTrackS Assess Balance software guided the test administrator through measurement of COP path length. Post-rotation testing followed the same standardized script as the pre-rotation test.

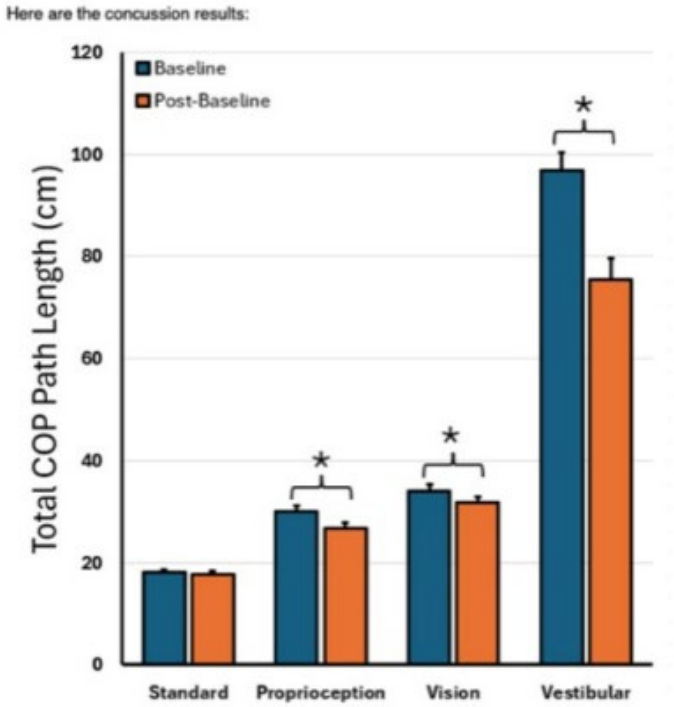
Figure 3. BTrackS Patient-on-Plate

The test subject steps onto the VTS equipment and is secured in a belt. The subject is rotated counterclockwise for several turns, then spun clockwise for several turns, and then counterclockwise again for several turns. The amount of turns, speed, and number of rotations, are customized due to the severity of the concussion. After a few minutes, the participant is tested again in the BTrackS. Changes in postural sway pre- and post-test are analyzed by comparing raw path length scores.

Results

67% of the participants experienced lower postural paths when averaged across all the four CTSIB tests. Analysis of the vestibular portion of the CTSIB testing indicated a lower postural path observed in 91% of participants with participants averaging a 22% reduction in the postural path.

Figure 4. VTS Training Results.



Discussion

Rotating along a person's longitudinal vertical axis has been shown to decrease the postural path which indicates better balance. The VTS equipment and concussion management techniques provide an affordable, rapid and non-invasive approach to managing post-concussion complications in adults.

Conclusion

The data supports a decrease in postural paths with the use of VTS. The decrease in postural paths equate to better balance. Vestibular Training has been shown to improve outcomes in individuals and athletes with post-concussion symptoms.

References

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