2:28 pm

Anatomical Differences in the Relationship of the Orbital Rims to the Globe in Caucasian Patients with Lower Eyelid Retraction

Wenjing Liu[1], Aaron Noble[2], Adit Gupta[1], Robert Goldberg[1]
[1]Stein Eye Institute, UCLA, Los Angeles, California, United States of America, [2]Poriferous LLC, Newnan, Georgia, United States of America

Introduction: Abnormal relationships between the globe and the bony orbit have previously been correlated with inferior scleral show.[1] Several orbital rim onlay grafts have been designed to address this problem in patients with lower eyelid retraction and prominent eyes.[2-3] The purpose of this study was to more precisely determine the differences in the bony anatomy of the orbital rims in relation to the globe through three-dimensional (3D) reconstructions of computed tomography (CT) imaging from patients with and without lower eyelid retraction.

Methods: A retrospective review of high-resolution CT imaging of the orbit and face with associated clinical photographs was performed in the Oculoplastics Division of the Stein Eye Institute. Self-reported gender and race was used to stratify the patients into groups. The lower eyelid retraction group had an inferior scleral show of greater or equal to 2mm. The control group had an inferior scleral show of 0mm. 3D reconstructions were created from these CT scans and registered to each other by aligning the superior orbital rims, the midline of the nasal bones, and matching the rotational alignment of the zygomatic arch. A composite reconstruction was then created with the globe and measurements were taken from the globe to the orbital rims. An averaged 3D reconstruction of female patients without lower eyelid retraction was created and compared to an averaged 3D reconstruction of female patients with lower eyelid retraction and the difference between the two reconstructions was used to create a subtracted reconstruction. The same procedure was repeated for the male patients. The analysis and measurements were performed on computer software.

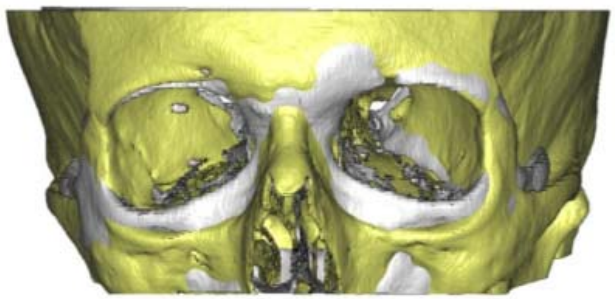
Results: 40 patients were identified composed of 10 female Caucasian patients with lower eyelid retraction as compared to 10 female Caucasian patients without lower eyelid retraction and 10 male Caucasian patients with lower eyelid retraction as compared to 10 male Caucasian patients without lower eyelid retraction. The 3D reconstructions of the CT imaging of the male and female groups separately showed a difference in the relationship of the inferior orbital rim to the globe in patients with and without lower eyelid retraction. The slope of the anterior maxillary face was also found to be different in patients with and without lower eyelid retraction. Subtracted reconstructions were created to show three-dimensional shapes describing the difference in the orbital rims between the lower eyelid retraction and control groups.

(continued)

(continued)

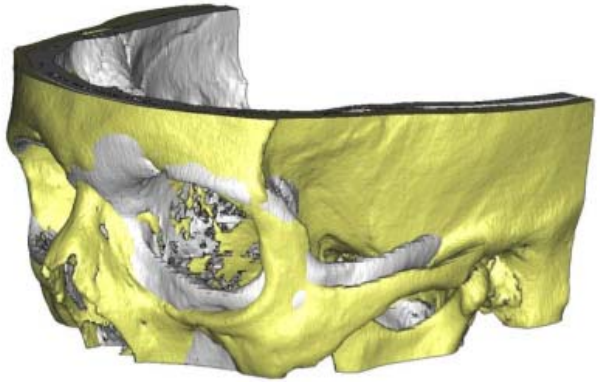
Conclusions: The relationship of the bony orbit to the globe is different in female Caucasian patients with and without lower eyelid retraction as well as male Caucasian patients with and without lower eyelid retraction. The difference in the 3D reconstructions of the CT imaging can be used to create more accurate standardized and individualized orbital rim onlay grafts for patients with lower eyelid retraction and prominent eye morphology.

Figure 1



Yellow: lower eyelid retraction group
Gray: control group

Figure 2



Yellow: lower eyelid retraction group
Gray: control group

References:
1. Goldberg RA, Relan A, Hoenig J. Relationship of the eye to the bony orbit, with clinical correlations. Aust N Z J Ophthalmol. 27(6):398-403.
2. Weinberg DA, Goldberg RA, Hoenig JA, Shorr N, Baylis HI. Management of relative proptosis with orbital rim onlay porous polyethylene implants. Ophthal Plast Reconstr Surg, 15(1):67-73.
3. Steinsapir KD. Aesthetic and restorative midface lifting with hand-carved, expanded polytetraÛuoroethylene orbital rim implants. Plast Reconstr Surg, 111(5):1727-37.