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AGE RELATED CHANGES AT THE LEVEL OF THE LATERAL CANTHAL COMPLEX BASED ON COMPUTED TOMOGRAPHY.

Ana Gavril, resident

Ilie Suharschi, PhD, Department of Oral and maxillofacial surgery and Oral Implantology "Arsenie Gutan".

Introduction. The lower eyelid can be an area of difficulty and confusion for the surgeon, if he is not familiar with the anatomy and age-related changes in this area. Age changes of the face have been the object of study of artists and scientists for decades. In youth, the face appears as a unique dynamic structure, which is characterized by the appearance of smooth facial contours and poorly expressed shadows between the facial features. With aging, changes occur in the superficial structures, in the skin thickness, in the composition of the subcutaneous tissue, the contour of the facial skeleton, the location and integrity of the supporting ligaments.

The anatomy of the lateral canthal complex has been controversial since the early 1900s, when for the first time the morphological description of this region was performed. The lateral canthal complex consists of the upper part of the upper tarsus and a lower part of the lower tarsus. Both sides of the canthal lateral ligaments emerge at the lateral edge of the tarsal plates to join the lateral retinaculum, which is a fusion of several anatomical structures that insert into the Whintall's lateral orbital tubercle (Image 1. and 2.).

Image 1. The lateral canthal complex anchors to the lateral orbital edge. (cadaveric material)

Image 2. The canthal ligament is inserted into the lateral orbital tubercle (Whintall's tubercle). (cadaveric material)

The lateral canthal ligament is positioned approximately 2 mm higher than the medial one. The functions of the lateral canthal tendon are to maintain the horizontal stability of the eyelid, to change the circular contraction of the orbicularis in a vertical vector of closure of the eyelids, and should be a substrate for the insertion of the anatomical structures, as the Lockwood's ligament, the side of the aponeurosis tail, the jugal laterally, and the orbicularis preseptal muscle. All these functions are maintained by the static stability of the lateral canthal tendon.

In addition to the static significance, it also has a dynamic property. The adduction and abduction movements can serve for the protection of the eyeball, for the preservation of the lateral field of vision and nonverbal communication. The lateral canthal ligament is a clinically important anatomical structure. Its lower part is used in canthopexy techniques, through plication and anchoring to the periosteum of the orbital margin.

Wide knowledge of the anatomy of the lateral canthal surface and insertion site on the Whintall's tubercle could prevent intraoperative and postoperative complications such as contusion of the lateral canthal tendon, ectropion, entropion, exposure keratopathy, orbital septum shortening, scleral show and "saggy face" appearance. Another significant importance is that the tubercle serves as the point of insertion of 4 out of 7 elements that form the lateral retinaculum. The lateral retinaculum is the most important supporting structure in the lateral canthal area and consists of the lateral jugal ligament, the Whintall's ligament, the intermuscular transverse ligament, the lateral horn of the elevating aponeurosis, the lateral canthal group, the orbital septum and the Lockwood ligament .

Key words: age changes, lateral canthal tendon, Whintall tubercle.

Purpose. Study of the topography and the relations of the lateral canthal complex with structurally significant anatomical formations at different age.

Material and methods. In a retrospective study were analyzed 40 CBCT scans, which were divided into two groups: the first group included 20 patients aged 18-25 years, which were divided into 2 subgroups 10 women and 10 men. The second group of 20 patients aged 50-80 years divided into 2 subgroups 10 women and 10 men.

The following parameters were measured in the bone density range: the distance of Whintall tubercle from the frontozygomatic suture; the orbital height. In the soft tissue range were performed the following measurements: the intercanthal distance and the canthal angle. Using both ranges, the minimum distance between the tip of the Whintall tubercle proeminence and the exochantion were measured. Measurements and images were made using 3D Slicer. The results were then compared according to the mentioned criteria.

Results. The description of the parameters:

WZF OD / OS (mm): the distance from the Whintall tubercle and zygomaticofrontal suture of the right and left eye.

ho OD / OS (mm): the height of the orbit of the right and left eye., **IcD OD / OS (mm):** the intercanthal distance of the right and left eye.

VC OD / OS (^{0}): the degree of canthal vector of the right and left eye.

Wexct OD / OS (mm): the minimum distance between the tip proeminence of the Whintall tubercle and exochantion (the lateral point of closure of the upper eyelid and the lower eyelid).

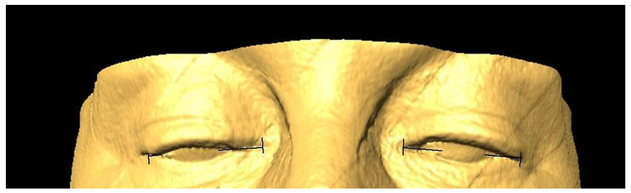
A: the average value, **F1:** female patients aged 18-25 years., **F2:** female patients aged 50-80 years., **B1:** male patients aged 18-25 years.

B2: male patients aged 50-80 years.

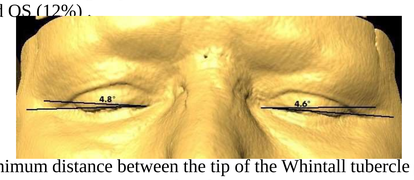
The distance from the Whintall tubercle to the zygomaticofrontal suture was measured in the **bone density range** for both age categories of patients, female and male, in both eyes. We obtained the following data: the average distance in patients in the F1B1 group is 5.78 mm at OD and 5.82 mm at OS; and in patients in the F2B2 group, 7.87 mm at OD and 7,304 mm OS. We observed that once with the age this parameter increases for, OD by 2.09 mm, (27%) and to OS by 1.47 mm, (21%).

In the same range we determined the height of the orbit. The average height in patients F1B1 is 31.65 mm in OD and 32.97 mm in OS, and in those F2B2, 32.97 mm in OD and 33.45 mm OS; once with the aging the *h* increases by 1.23 mm, (4%) OD and 0.48 mm, (2%) bone.

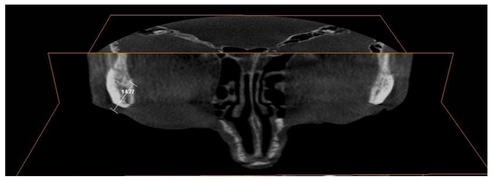
In the **soft tissue range** we determined the following: the average intercanthal distance F1B1, OD-28.15 mm and OS-28.63 mm; and in the group F2B2, OD-26.23 mm and OS-26.19 mm, the value of this parameter decreases following aging changes in OD by 1.92 mm (7%) and in OS by 2.44 mm (8%).

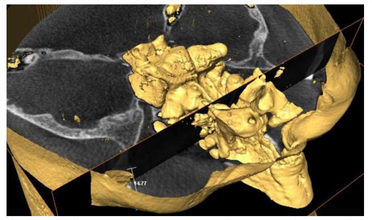


We also appreciated the canthal vector, in the F1B1 group, OD-6,13^0 and OS-6,06^0, and in the F2B2 group, OD-5,72^0 and OS-5,33^0, which in turn decreases by about 1^0, OD (7%) and OS (12%) .



Using **both ranges** we measured the minimum distance between the tip of the Whintall tubercle prominence and exochantion; the average values obtained in the F1B1 group, OD-9.62 mm and OS-9.68 mm; and in the F2B2 group, OD-11.47 mm and OS-10.71 mm. We observe that with 1.85 mm, (17%) OD and 1.03 mm, (10%) OS, this distance increases as a result of aging.





Conclusions. We consider that the results of the study have a relative degree of relevance with the following primary conclusions: the height of the orbit remains relatively constant at different age categories. The distance between the Whintall tubercle and the zygomaticofrontal suture increases with age.

The Whintall's tubercle is an important place of attachment for the lateral retinaculum. We found that the zygomaticofrontal suture was a safe marker for its identification. These data could help surgeons to avoid the wrong fixation of ligament or suboptimal reconstruction during interventions such as post-traumatic orbital reconstruction, orbital decompression, tumor exertions in the periorbital region, and reconstruction of eyelid deformities.

The values of the intercanthal distance and canthal vector decrease due to age changes. And the minimum distance between the tip of the Whintall tubercle proeminence and exochantion increases with the age. We also want to mention that at each evaluated parameter there is a clear asymmetry between the right and the left eye. To present data with a bigger veracity it is necessary to enlarge the research sample.