ABSTRACT

Title: Anatomical Investigation of the Lower Eyelid Tarsus

Objectives:
1. To characterize and compare gross and microscopic anatomy of the lower eyelid tarsus to that of the upper eyelid tarsus.
2. To describe and compare patterns of collagen I, II, and III expression in upper and lower tarsi.

Study Design: Descriptive anatomical comparison study.

Methods: Total of 16 human cadaver right upper and lower eyelids were harvested. Upper tarsi were used as a control. Height, width, and weight of these formalin-fixed tarsi were measured. Six male and four female upper and lower tarsi were processed for histology using hematoxylin and eosin stain. Immunohistochemistry for collagens I, II, and III were performed. Gross and microscopic anatomy and immunohistochemistry characterization of the upper and lower tarsi were compared.

Results: The gross anatomic evaluation of the upper and lower eyelids demonstrated height and weight difference of 0.54 ±0.12cm and 0.19 ± 0.07mg, respectively. Mean density of upper 1.15±0.16 mg/cm³ vs. lower 1.76±0.21 mg/cm³ showed statistically significant difference (p= 1.4 X 10^-6).

The purpose of this study was to promote a better understanding of the gross and microscopic anatomical characteristics of the lower tarsal plate ( synonymously used herein with terms inferior tarsus and lower tarsus) by analyzing the macroscopic structural dimensions of the tarsus along with the microscopic composition using histology and immunohistochemistry.

CONCLUSIONS

Gross examination of the inferior tarsus revealed shorter height but statistically significant higher density when compared to the upper tarsus. Similar patterns of collagen I and III distribution in both upper and lower tarsal plates confirm the comparable histological integrity of the upper and the lower tarsus, but the lower eyelid tarsus has more densely packed stromal collagens and abundant extracellular matrix. Tarsal plates provide skeletal and structural support of the eyelids for both upper and lower eyelids. In particular, the lower eyelid tarsus plays a unique anchoring role in comparison to the upper eyelid tarsus because it is the superior point of attachment for all other structures of the lower eyelid complex. It must provide a functionally rigid framework to overcome the gravitational pull exerted by the rest of the connective tissue components of the lower eyelid. Despite its reduced height compared to the superior tarsus, the substance of the inferior tarsus is denser compared to the superior tarsus, more densely packed with collagen when analyzed using immunohistochemistry. The inferior tarsus is higher in collagen content for both collagen I and III with the latter staining more strongly, perhaps suggesting the importance of collagen III, a key predecessor in recruiting collagen I into areas for collagen fiber crosslinking that contributes to the eventual wound contracture.

REFERENCES