

## **The structure of the caruncula lacrimalis of Japanese**

By

**Masaru Mori**

The first Department of Anatomy, Faculty of Medicine,  
Kyushu University

The medial angle of the eye is prolonged for a short distance towards the nose, and the two eyelids are here separated by the lacus lacrimalis, in which a small redish and conical body, termed the caruncula lacrimalis, is situated. In the Handbuch der mikroskopischen Anatomie des Menschen Bd. III, 2 Teil, 1936, many works on the caruncula are introduced. The works on the caruncula of Japanese are very few in number.

### **Method**

The sagittal sections are made from the medial region of the eyelids, and the sections are stained with hematoxylin-eosin.

### **Observation**

1. Fetus, 4 months ♂. The eyelids are fused with one other, but the conjunctiva near the medial commissure of the lids is not fused, and in this space the caruncula lacrimalis is elevated. The caruncula is covered with the stratified epithelium, its basal-layer consists of the cylindrical cells. From the epithel layer 12 epithelcords elongate into the connective tissue of the caruncula. This cords consist of small cells with dark stained nucleus, and these are the anlagen of the hairs, but yet they present no typical structure of the hair and sebaceous gland. One cord has the anlage of the sebaceous gland.

Measurement of the caruncula lacrimalis. Height : 400  $\mu$ , Vertical length : 949  $\mu$ , Transverse length : 360  $\mu$ , Width of epithelcord : 48  $\mu$ .

2. Fetus, 5 months. I case ♂. The epithelium is the stratified type, and 6-8 cells are piled up, the cells in the basal layer are cylindrical, the cells in the superficial layer are flattened. The epi-

thelcords are elongated into the connective tissue of the caruncula, and the length of the cords are not equal, they consisted of small cells with relative large nucleus. Some of the epithelcords present the early structure of the hair and sebaceous gland. There are 6 epithelcords.

Measurement of the caruncula lacrimalis. Height: 940  $\mu$ , Vertical length: 630  $\mu$ , Transverse length: 840  $\mu$ , Width of epithelcord: 60–70  $\mu$ .

II case ♂. The eyelids are fused, but there is space in the lacrimal lake region, and the caruncula lacrimalis swells out into the space from the lower eyelid. The epithelium of the caruncula is thick, especially on the summit, and about 6 cells are piled up to make the epithelium. The epithelium on the slope of the caruncula is thin, and on the base of the caruncula the epithelium of the caruncula transforms into the epithelium of the conjunctiva. The epithelcords elongates into the connective tissue of the caruncula and are 8 in number. Some of the epithelcords represent the typical structure of the hair with sebaceous gland, and some of them are only the epithelcord.

Measurement of the caruncula lacrimalis. Height: 200  $\mu$ , Vertical length: 400  $\mu$ , Transverse length: 500  $\mu$ , Width of epithelcord: 60–70  $\mu$ .

3. Fetus, 6 months. I. case ♂. The eyelids are not fused and the caruncula lacrimalis is seen from the outside. The epithelium of the caruncula is very thick, and about 10 cells are piled up to make the epithelium. The basal cells of the epithelium are cylindrical, and they become polygonal towards the surface, and the superficial layer consists of the flattened cells. The hair represents the typical structure, but the grade of the development of the hairs is not equal. The hairfollicle has the sebaceous gland. Some of the sebaceous glands are developed very well, and their figures resemble the Meibom's gland.

There are lymphocyte-accumulations in the subepithelial connective tissue.

Measurement of the caruncula lacrimalis. Height: 470  $\mu$ , Vertical length: 1000  $\mu$ , Transverse length: 1200  $\mu$ , Width of epithelcord: 80  $\mu$ .

II case ♀. The eyelids near the medial commissure are fused, but the conjunctiva of the region of the lacrimal lake is not fused, and the lacrimal caruncle swells out from the base of the lower eyelid.

The stratified epithelium of the caruncula lacrimalis is thick, especially on its summit. From the epithelium elongate 9 epithelial

cords into the connective tissue of the caruncula. This cord is the anlage of the hair and sebaceous gland. Some of the cords represent the typical structure of the hair and sebaceous gland, the sebaceous gland pours always into the hairfollicle.

Measurement of the caruncula lacrimalis. Height: 700  $\mu$ , Vertical length: 1100  $\mu$ , Transverse length: 1110  $\mu$ , Width of the epithelcord: 70-80  $\mu$ .

4. Fetus, 7 months. The epithelium is squamous stratified and 11-13 cells are piled up to make it. The basal layer consists of the cylindrical cells. Towards the surface the epithelial cells become flatter, and the cells of the superficial layer are almost flat, and they are stained with eosin deeply, it seems that they are ceratinized.

There are 12 sebaceous glands in the caruncula lacrimalis in one example, and 14 sebaceous glands in another example.

The structure of the hair is very typical, and each hairfollicle has well-developed sebaceous gland.

In one example there is a small lacrimal gland in the caruncula, it lies deeply in the base of the caruncula, and its duct goes laterally to pour into the crypt between the plica semilunaris and the caruncula lacrimalis. In this example there is striated muscle fiber in the caruncula.

Measurement of the caruncula lacrilamis ( $\mu$ ).

|           | Height | Vertical<br>length | Transverse<br>length | Width of<br>hair follicle |
|-----------|--------|--------------------|----------------------|---------------------------|
| I case ♂  | 730    | 1100               | 640                  | 80                        |
| II case ♀ | 490    | 1200               | 1700                 | 150                       |

5. Fetus, 8 months ♀. The caruncula lacrimalis swells out with broad base into the lacrimal lake. The epithelium of the caruncula is thick, especially on the summit, and about 10-12 cells are piled up to make the epithelium, and the basal layer consists of cylindrical cell. The cells near the outside are flattened and stained redly with eosin, it seems that these cells are ceratinized slightly.

The typical structure of hair and sebaceous gland is seen, and each sebaceous gland pours into the hairfollicle. There is a long hairfollicle and it throughout its length receives short ducts from individual saccules of the sebaceous gland, This condition resembles the tarsal gland.

Measurement of the caruncula lacrimalis. Height: 540  $\mu$ , Vertical length: 1300  $\mu$ , Transverse length: 960  $\mu$ , Width of hairfollicle: 100  $\mu$ .

6. 7 days after birth ♂. The number of the hairfollicle is 8, and each follicle has the sebaceous gland. The structure of the hair

and sebaceous gland are typical. There is no fat tissue in the caruncula lacrimalis. The caruncula lacrimalis has no lacrimal gland.

Measurement of the caruncula lacrimalis. Height: 800  $\mu$ , Vertical length: 1100  $\mu$ , Transverse length: 1000  $\mu$ , Width of hairfollicle: 80-110  $\mu$ .

7. 2 years of age ♂. The sebaceous glands are well developed, and they pour into the hairfollicle. The structure of the hair is typical, but the medulla of the hair has no pigment granules. There is no lacrimal gland in the caruncula lacrimalis.

Measurement of the caruncula lacrimalis. Height: 1.5 mm, Vertical length: 2.0 mm, Transverse length: 1.3 mm, Width of hairfollicle: 130  $\mu$ .

8. 13 years of age ♀. The typical hair are 11 in number, and each hair follicle has well developed sebaceous gland. One lacrimal gland is in the base of the caruncula lacrimalis and its duct runs laterally to open into the crypt between the caruncula lacrimalis and the semilunar fold.

Measurement of the caruncula lacrimalis. Height: 1.5 mm, Vertical length: 3.5 mm, Transverse length: 2.0 mm, Width of hairfollicle: 200  $\mu$ .

9. 21 years of age ♂. The epithelium of the caruncula lacrimalis is very thick, especially at its summit. About 15 cells are piled up to make the stratified epithelium.

The basal layer of the epithelium consists of cylindrical cells. The cells of the epithelium become flatter towards the outside. At the foot of the caruncula lacrimalis the epithelium continues on the conjunctival epithelium. The goblet cells are scattered in the epithelium.

The hairs are 10 in number, and each hair follicle has very well developed sebaceous gland. The hair consists of outer root sheath, inner root sheath and hairshaft. The bulbus pili and papilla pili are well developed, and there is no pigment granule in the hair shaft.

Measurement of the caruncula lacrimalis. Height: 3.0 mm, Vertical length: 5.0 mm, Transverse length: 2.0 mm. Width of hairfollicle: 200  $\mu$ .

10. 22 years of age ♂. The epithelium of the caruncula lacrimalis is very thick, and there is a great abundance of the goblet cell. There are 12 typical hairs in the caruncula lacrimalis, and each hair follicle has well developed sebaceous gland.

Measurement of the caruncula lacrimalis. Height: 1.5 mm, Vertical length: 3.0 mm, Transverse length: 2.5 mm. Width of hair

follicle : 200  $\mu$ .

11. 28 years of age ♀. There is a great abundance of the goblet cell in the epithelium of the caruncula lacrimalis. There are five hairs, and each has sebaceous gland pouring in the hair follicle. Each sebaceous gland has a long axial duct, which throughout its length receives short ducts from individual saccules, and these figures resemble the tarsal gland. In the subepithelial layer there are accumulation of the lymphocytes. There is a small lacrimal gland in the base of the lacrimal caruncle.

Measurement of the caruncula lacrimalis. Height : 1.8 mm, Vertical length : 2.3 mm, Transverse length : 1.2 mm, Width of hair follicle : 300  $\mu$ .

12. 75 years of age ♀. The epithelium of the caruncula lacrimalis is not thick, and there is no accumulation of the lymphocyte in the subepithelial layer. The caruncula lacrimalis consists of the connective tissue and there is no hair and sebaceous gland.

Measurement of the caruncula lacrimalis. Height : 1.1 mm, Vertical length : 0.8 mm, Transverse length : 1.1 mm.

### Summary

1. In the sagittal section of the eyelids the caruncula lacrimalis has intimate connection to the inner surface of the lower eyelid attaching to the base of it.

2. In the fetus of four months the caruncula lacrimalis is seen as a small swelling. From the epithelium of the caruncula elongate the epithelcords into the caruncula lacrimalis. This elongation is the anlage of the hair and sebaceous gland.

3. The epithelium differs from that of the conjunctiva, its nature is near to the skin. The epithelium of the caruncula lacrimalis is stratified and very thick at the summit of the caruncula lacrimalis. The goblet cells are scattered in the epithelium.

4. The development of the hair follicle is very well, and hair is seen in it always. The hair consists of outer root sheath (cylindrical cell layer and polygonal cell layer), inner root sheath (Henle's and Huxley's layer), and hairshaft. Some of the hair have a small amount of pigment granules. The nature of the hair is lanuginous.

5. The development of the sebaceous gland is very well, and all of them are closely associated with the hair, into the follicles of which they empty. The sebaceous gland resembles the tarsal gland.

6. There is no sudoriferous gland in the caruncula lacrimalis.

7. The accessory lacrimal gland is found in the caruncula lacrimalis, but it is not always, in my 16 examples five examples have it. The accessory lacrimal gland is always one and always small. The acinous cell has very small granules. The lumen of the acinus is very fine.

The duct of the lacrimal gland runs laterally to pour into the crypt between the caruncula lacrimalis and the semilunar fold. The duct is always one.

8. The presence of the striated muscle in the caruncula lacrimalis is very seldom.

9. The accumulation of the lymphocytes is seen frequently in the subepithelial layer.

### References

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### Explanation of the figures

1. Fetus: 4 months ♂. One epithelcord presents typical structure of hair and has anlage of sebaceous gland. → caruncula lacrimalis. △ Lower eyelid. × Canaliculus lacrimalis.
2. Fetus: 5 months ♂. Typical structure of hair and sebaceous gland →.
3. Fetus: 6 months ♂. Typical hair and sebaceous gland.
4. Fetus: 6 months ♂. Typical hairroot →. × Canaliculus lacrimalis.
5. 7 days after birth ♂: Well-developed hair and sebaceous gland.
6. 2 years of age ♂: Well-developed hairshaft →.
7. 21 years of age ♂: Accessory lacrimal gland →.
8. 28 years of age ♀: Sebaceous gland resembles the Meibom's gland.

