

Morphological Aspects of the Parotid Gland in Rabbits

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Abstract. Anatomohistological researches on the parotid gland were made on four rabbits at the Centre of Biological Researches of the University of Medicine and Pharmacy.

The morphological investigations were done according to ordinary standards, after a previous dissection of the cephalic area. They had in view the topographic situation, size and shape of the parotid.

The histological investigations were done on samples taken from the parotid. These samples respected the standard procedure for a histological sample.

The anatomohistological observations led to the main specific features of the parotid gland as compared to normal standards.

Keywords: salivary gland, anatomohistological, topography, parotidian lodge.

MATERIAL AND METHODS

A number of 5 Supercuniro breed rabbits, between 8 to 10 month of age, 2 females and 3 males, were anesthetized and then euthanized by sectioning the jugular vein. An incision was made starting from the base of the ear, passing the ramus of the mandible, to the neck region. After the removal of the skin, we have exposed the superficial fascia which covers the parotid gland. The slightly lobate aspect of the gland is noticeable through it. We have made anatomical assessments of the gland's topography, shape, size and macroscopic appearance.

To assess the microscopic aspects, we cut 5 mm thick samples, that we fixed in a 20% solution of saline formalin for 24 h and another 7 days in a 10 % solution of saline formalin. The samples were then embedded in paraffin, cut at 6 µm and stained following the Hematoxylin-Eosin and the Tricrom Masson var. Goldner techniques. The examination of the sections was made with a Karl Zeiss Jena microscope, Ergaval type.

RESULTS AND DISCUSSION

The parotid gland (*Glandula parotis*) is an accessory gland of the digestive system – a major salivary gland, which effuses its contents at the level of the oral mucosa through the Stenon duct.

The parotid gland is situated in the subauricular region, at a small distance from the oral cavity, in the space between the ramus of the mandible and the wing of the atlas – the parotidian lodge (Fig.1, Fig.2 and Fig.3). The gland is prolonged dorso-ventrally and is flattened laterally. It goes from the base of the ear to the cranial insertion of the sternomandibular muscle. In this species we can't refer to a demarcation of a head, a body and a tail of this gland, so we will assess it a whole. The dorsal border the gland is placed under the pavilion of the ear, it being divided in two branches which surround the base of this pavilion.

The ventral border nears the superior border of the submandibular gland. The lateral face is almost flat - partially covered by the parotido-auricular muscle, and has a small excavation in the middle area, and the medial face is uneven and moulds on the structures of the parotidian lounge (Fig.1).



Fig.1. Parotid gland in the rabbit - Topography.



Fig.2. Parotid gland in the rabbit - Morphological aspect.

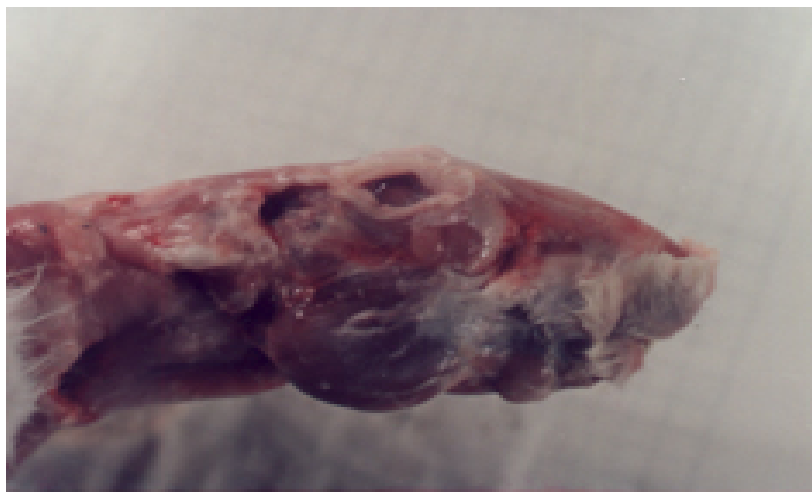


Fig.3. Parotid gland and Stenon duct in the rabbit.

The gland's canal - *Stenon*, comes from the merging of several interlobular canaliculi, after which it detaches itself from the oral border of the gland and it opens in the lateral oral vestibule, on a level with the third or fourth upper molar. None of the subjects examined by us presented a noticeable parotidian tubercle at the opening orifice of the Stenon canal. The parotidian duct is almost rectilinear, from the oral border of the gland to the maxillary molars, being placed in the middle of the distance between the orbit and the body of the mandible, on the surface of the masseter muscle (Fig.1 and Fig.3).

Arterial irrigation of the gland is supplied by branches of the common carotid artery, and, mostly, by parotidian branches of the external carotid artery. The venous branches are many and they empty into the maxillary vein, through the superficial temporal vein and the caudal auricular vein. The lymphatic vessels go into the parotidian lymph nodes, placed in between the oral border of the gland and the masseter muscle.

Sympathetic innervation comes from the external carotidian plexus, and parasympathic innervation from the auriculotemporal nerve, branch of the mandibular nerve, branch of the trigeminal nerve. The sympathetic fibers are vasomotor and follow the arteries. The parasympathetic fibers come from the glossopharyngeal nerve and merge with the trigeminal nerve through the tympanic nerve. They are excito-secretory and receive fibers from the otic ganglion. Other excito-secretory fibers are offered by the intermedio-facial nerve at the level of the parotidian trajectory.

Microscopic examination of the parotid samples has underlined the fact that from a histo-architectonic point of view, the gland much resembles those of other mammals (Fig.4).

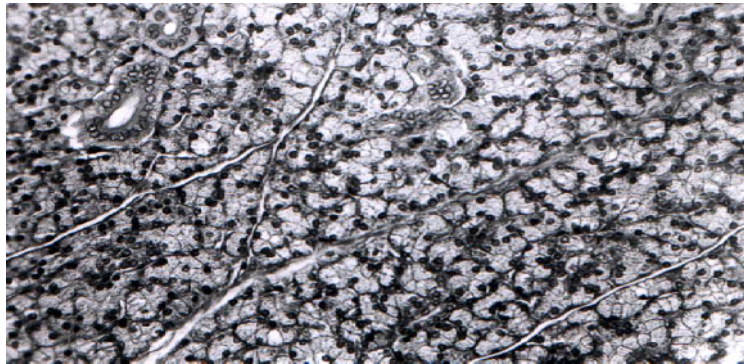


Fig.4. Section of the parotid gland in the rabbit - general view
(Trichrome Masson - var. Goldner stain, 200x).

Structurally, the parotid is a compound tubule-acinar serous gland. It is wrapped in a conjunctive capsule from which septa form and penetrate the interior of the gland, dividing it into lobes and lobules. Among the lobules of the glands there are large amounts of adipose tissue. A series of conjunctive fasciae surround and sustain the acini and the canals. The glandular acini are small, serous and are made up of pyramid shaped acinar cells, with their base placed on the basal lamina which surrounds the acinus and with their tip oriented inwards, where a lumen takes shape (Fig.5).

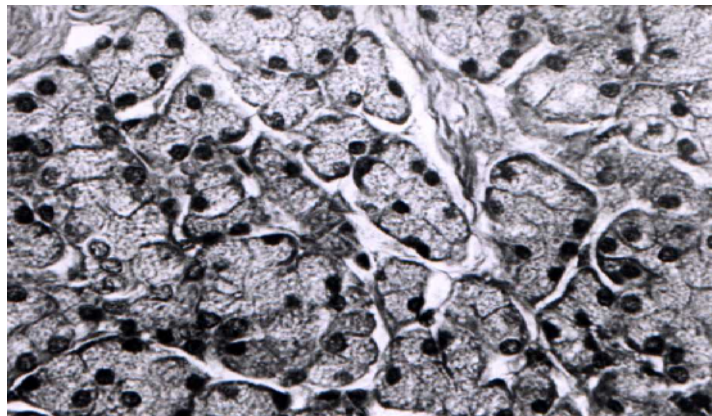


Fig.5. Serous acini of the parotid in the rabbit
(Trichrome Masson - var. Goldner stain, 500x).

The serous acinus has a narrow lumen bordered by 2 to 6 cells. The nucleus of the acinar cells is round and placed in their basal third. The cytoplasm of the cells presents a special aspect: a pronounced basophily near the nuclear area, where there are a larger number of organites involved in synthesis, and a more discrete basophily in the apical region, which is filled with secretion droplets. Between the basal lamina and the acinar cells there is a number of myoepithelial cells playing a role in the discharge of the secretion product from the acinus. The transparency of the cytoplasm is similar to that of the mixed acini, but not identical. The acini are slightly larger than serous acini in other mammals, but not as big as mucous acini.

These constant aspects underline the fact that the acini of the parotid gland in the rabbit have an intermediary structure between the serous and the mucous acini. As the structure is always linked to the function, this aspect leads us to believe that the composition of the secretion product of this gland has certain peculiarities. We think that the particular morpho-functional aspects of the acini of the parotid gland are in some measure linked to the alimentary habits of these species.

The excretory canals are intralobular and interlobular. Intralobular ducts continue the lumen of the acinus, their first part being named intercalar segment or Boll's passage (Fig.6).

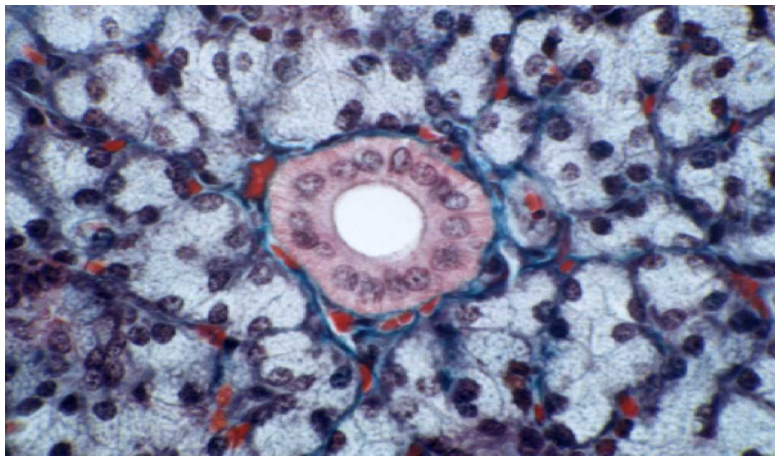


Fig.6. Intralobular excretory canal (striated, Phlüger)
(Trichrome Masson - var. Goldner stain, 200x).

The wall of this region is made up of the apical membrane of the acinar cells and, after that, of flattened single-rowed epithelial cells which become more and more cubic as they lead away from the acini. All of these cells are placed on a basal lamina. Boll's passages are followed by intralobular excretory canals, which are also called striated or Phlüger canals. Striated canals are bordered by a single row of prism cells with a centrally placed nucleus. The name of striated cells is due to the presence of basal striae in the cells of the canal visible on the optical and electronic microscope, striae due to the vertical alignment of the mitochondria. Intralobular canals are followed by large interlobular canals which are placed in the interlobular septa. They are initially lined with a simple prismatic epithelium and, as their caliber grows, this epithelium becomes pseudostratified and finally stratified prismatic. Interlobular canals merge and produce the parotidian duct - the collector or Stenon canal.

CONCLUSIONS

- The topography of the parotid gland in rabbits is mostly similar to that of the other domestic mammal species, subscribing to what we call common norm;
- From the architectonic point of view, in rabbits, the parotid gland is not divided in noticeable segments - head, body and tail, but appears as a unitary organ;
- The acini of the parotid gland of this species subscribe to the serous acini type, but they are slightly larger than the serous acini of other species;
- Structurally, the acini present certain peculiarities intermediary to the serous and the mucous acini, in the sense that the nuclei of the cells are round like in the serous acini of other species, but the cytoplasm is much more transparent, similar to a certain degree to that of mucous cells;
- The excretory canals of the gland subscribe to the common norm, both from the point of view of their number and from the point of view of their distribution and structure;
- We consider that these particular structural aspects are linked to the distinct composition of the saliva in this species, closely related to the nature of aliments that it consumes.

REFERENCES

1. Atanasiu, N., and S. Peredelnic, (1970). Cre terea animalelor de blan . Ed. Ceres, Bucure ti.
2. Barone, R. (1994). Anatomie compareé des mammiferes domestiques, vol. I, II, Imprimerie des Beaux Arts J. Tixier and Fils S.A., Lyon.
3. Coman, T., N. Cornil (1999). Embriologie veterinar , Editura Funda iei "România de mâine", Bucure ti.
4. Co ofan, V., Valentina Hritcu, R. Palicica, G. Predoi, A. Damian, Carmen Gan , V. Enciu (2007). Anatomia animalelor domestice. vol.II Ed. Orizonturi Universitare, Timi oara.
5. Damian, A. (2001). Anatomia comparat - Sistemul cardiovascular. Ed. Academic Pres, Cluj-Napoca.
6. Gudea, Al. (1999). Studiul anatomic al glandelor salivare la iepure i unele aspecte legate de colorarea histologic a acestora, Lucrare de diserta ie, FMV Cluj-Napoca.
7. Fickel, L., F. Göritz, B.A. Joest, Th. Hildebrandt, R. Hofmann, G. Breves (1998). Analysis of parotid and mixed saliva in roe deer, J. Comp. Physiology B 168, 257-264.
8. Micl u , V., C. Pa ca, and C. Lisovschi (1999). Histologie i tehnic microscopic , Ed. Risoprint, Cluj-Napoca.
9. Micl u , V., C. Lisovschi-Chele anu, 2000, Histologie animal , Ed. Risoprint, Cluj-Napoca.
10. Micl u , V. (2001). Histologie special . Ed. Risoprint, Cluj-Napoca.
11. Parhon, C. I., A. Babe , and I. Petrea (1957). Endocrinologia Glandelor Salivare, Ed. Academiei R.P.R.
12. Popovici, I., A. Damian, N. Popovici, and Ioana Chirilean (2003). Tratat de anatomie comparat – Splanhnologie. Ed. AcademicPres, Cluj-Napoca.
13. Predoi, G. (1999). Anatomia comparat i topografic a animalelor domestice. Ed. Casa C r ii de tiin , Cluj-Napoca.
14. Tudor, Despina, and Gh. Constantinescu (2002). Nomina Anatomica Veterinaria, Editura Vergiliu, Bucure ti.
15. *** Nomina Anatomica Veterinaria, (2003), together with Nomina Histologica (Revised second edition) and Nomina Embryologica Veterinaria. Zurich and Ithaca, New York.