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TOPOGRAPHY OF THE MAJOR SALIVARY GLANDS IN RABBITS

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Abstract
Salivary glands are important in research articles, because of their different functions (Asari et al., 2000). They develop in different locations, having a very various architecture, secreting different types of saliva (Jaskoll et al., 2002). The major salivary glands are parotid, mandibular and sublingual glands. These glands have an important role in aliments' digestion through their secretions (saliva), which is serous, mucous or sero-mucous, containing different enzymes, water, mucopolysaccharides and lubrefiant glycoproteins (Al-Saffar and Simawy, 2014; Boşca et al., 2014). In this study, we used five healthy male rabbits from a private breeder in Cluj, sacrificed by the owner for own consumption. Subsequently, the anatomical regions of major salivary glands were shaved and cleaned with alcohol. Macroscopical exam revealed that the rabbits' parotid gland is the most voluminous gland, having the aspect of a scythe blade. The mandibular gland has a lobate appearance. We noticed that there is an asymmetry between the two mandibular glands, the right one being more developed than the left one. Sublingual gland is the smallest gland, being covered by surrounding connective tissue. Inferior buccal glands gathered and formed a major salivary gland, the labial gland, situated at the lips commissure.

Key words*: anatomy, mandibular, parotid, rabbit, saliva, sublingual.*

INTRODUCTION

The salivary glands are considered parts of the upper gastrointestinal tract, having exocrine secretion (Al-Abbad, 2011). Some of the salivary glands are voluminous, compact, being well individualized - the major salivary glands. This category includes: parotid, mandibular and sublingual glands (Popovici et al., 2003; Barone, 2009; Papuc et al., 2009; Miclăuş, 2012). In addition, there are minor salivary glands, poor developed, spread in the labial mucosa, hard palate, soft palate and lingual mucosa.
Saliva prepares food for digestion, which takes place in the following segments of digestive tract: pharynx, esophagus, reaching into the stomach where the digestion begins, proceeding into the small and large intestine (Popovici et al., 2003; Reece, 2005; Stan, 2014, 2013).

MATERIALS AND METHODS

The biological material was represented by five healthy male rabbits, with an average weight of 1750 g, from a private breeder in Cluj, sacrificed by the owner for own consumption. Subsequently, the anatomical regions of major salivary glands were shaved and cleaned with alcohol. The materials used were the dissection instruments (forceps, scalpel, scissors, magnifying glass, gloves, gauze) and a Nikon D3000 camera.

RESULTS AND DISCUSSIONS

The **parotid gland** is the most massive of the major salivary glands, having a white colour and visible lobulation, being represented by a dorsal and ventral extremity. The dorsal extremity surrounds the base of the ear and the ventral one reaches the mandibular angle. We noticed that the ventral extremity is less wider than the width of the dorsal extremity, which surrounds both orally and aborally the base of the ear.
Cranial edge of the parotid gland follows closely the recurved branch of the mandible and implicit the aboral border of the masseter muscle. Because of the glands' aspect, we can say that it not only shows two extremities - dorsal and ventral - but also two edges - cranial and caudal - both concave cranially.

The ventral extremity is sharp in the oral part, bringing together the two edges - cranial and caudal - giving the gland the appearance of a scythe blade.
The dorsal extremity covers the base of the ear, temporo-mandibular region, the cephalic extremity of the brachiocephalic muscle and cleidomastoidian muscle.
The subjects in dorso-ventral recumbence point out that the ventral extremity of the parotid gland reaches the mandibular gland.
The excretory duct of the parotid gland has the trajectory on the surface of the masseter muscle, crossing directly over this muscle and opening up above the last upper molar (Fig. 1).

Figure 1. Parotid gland

Mandibular gland is lobated, being smaller than the parotid gland, located ventro-medial to the angle of the mandible.
These glands are located on both sides of the aboral extremity of the tongue. We noticed an asymmetry regarding the dimensions of the gland, 100% of the subjects examined having the right mandibular gland larger than the left one.
The previous trajectory mentioned before was encountered in all subjects in this study, the parotid duct being parallel to the facial nerve branches, more exactly to the buccal nerves.
Also, to all individuals studied by us, the ventral extremity of the parotid gland is in contact with the mandibular gland.
Mandibular gland presents anatomical relation with the masseter muscle, pterygoid medial and milohioidian muscles (Fig. 2).

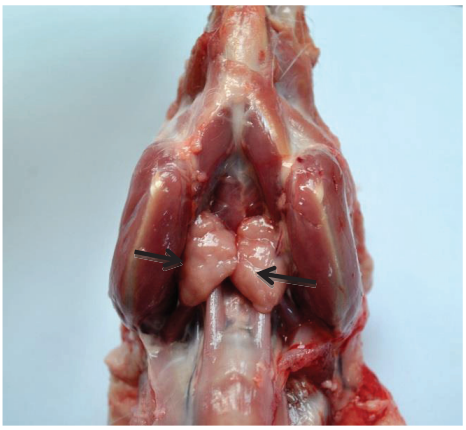

Figure 2. Mandibular glands

Sublingual gland is the smallest gland of the glands discussed above, being embedded in the surrounding connective tissue. After removing this tissue, we noticed that this gland has two extremities: one oral and another, aboral. This two extremities have an elongated shape which extend from the base of the tongue (aboral extremity) and 1.5 cm oral of the tongue (oral extremity). Sublingual gland ducts are detached from the superior edge of the gland, having dorsal trajectory (Fig. 3).

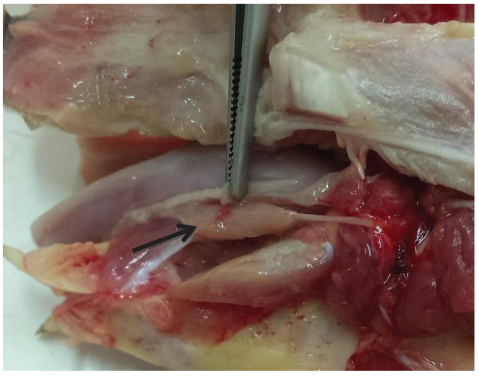

Figure 3. Sublingual gland

We mention that in all subjects examined, the inferior buccal glands gathered and formed a major salivary gland, found at the lips commissure, extending one cm aboral and following the dorsal edge of the horizontal branch of the mandible. This gland has multilobat appearance (Fig. 4).

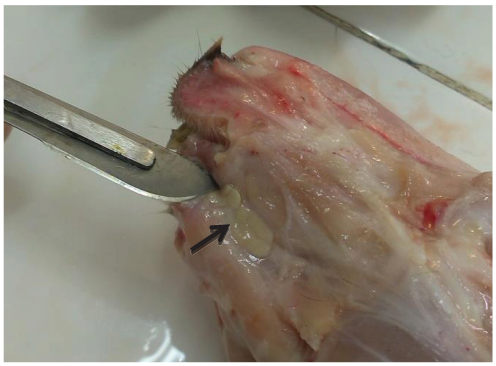

Figure 4. Buccal glands

As we also noticed, Zhang et al., 2005 and Zhou et al., 2010 show that in rabbit and mouse, ventral extremity of the parotid gland is in contact with the mandibular gland. We agree and confirm what Kimura et al., 1998 say, that mandibular gland is the second largest major salivary glands.

The main salivary glands are the parotid, mandibular and sublingual. The parotid gland in rabbit is the most developed, compared with the other major salivary glands - mandibular and sublingual. The gland extends from the base of the outer ear to the angle of the jaw.

The duct crosses rostral the lateral surface of the masseter muscle, very close to the facial nerve branches, entering in the oral cavity, next to the last molar. The colour of the gland is white, and the lobulation is visible (Al-Saffar and Simawy, 2014).

Mandibular gland in rabbits is smaller in comparison with the parotid, but bigger than the sublingual. It has pyramidal shape and a reddish-brown colour. The outer surface is smooth, with no signs of obvious lobulation. Both glands are located medial to the mandibular angle. They are located on the midline of the caudal part of the tongue (Kimura et al., 1998; Al-Saffar and Simawy, 2014).

Sublingual gland is smaller compared with the parotid and the mandibular glands. It is located rostral to the mandibular gland, ventro-caudal to the base of the tongue. It has an elongated shape and a reddish-brown colour. The outer surface is smooth, without lobulation (Al-Saffar and Simawy, 2014).

The ventral location at the base of the ear is comparable to the location of parotid gland in other species, such as rats (Kimura et al., 1998), rodents (Jonjic, 2001), koala (Mizuno et al., 2009), dogs (Weidner et al., 2012) and man (Amano et al., 2012).

Like in rabbit, also in human, sublingual gland is the smallest of the three pairs of major salivary glands, being also located deep under the mucous membrane of the oral cavity (Rana et al., 2012).

CONCLUSIONS

In rabbits, the ventral extremity of the parotid gland reaches the mandibular angle, ending sharp in the oral side, having the two edges concave cranially, the gland having the appearance of a scythe blade; parotid gland is in contact with mandibular gland.

In rabbits there is an asymmetry of the mandibular and the parotid glands regarding their size, those on the right side being slightly bigger compared to those on the left.

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