

GROSS MORPHOLOGICAL STUDIES ON MAJOR SALIVARY GLANDS OF PRENATAL BUFFALO

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ABSTRACT

Gross morphological study was conducted on the major salivary glands of 42 buffalo foetuses ranging from 73 to 253 days. The mandibular gland was the largest salivary gland during the prenatal life. Dense compact lobulation of the parotid and mandibular glands was observed first at 155 days of foetal age. The mandibular gland was covered by the confluence of linguo-facial, occipital and maxillary veins laterally and developing thymus caudally throughout the prenatal period. Differentiation of dorsal and ventral parts of the sublingual gland was observed at 108 days of foetal age.

Major salivary glands of various domestic animals are paired structures, which includes parotid, mandibular and sublingual glands. Salivary glands fulfill important role in the oral biology by producing saliva for lubrication, as well as supplying electrolytes, mucus, antibacterial compounds and various enzymes to the oral cavity. Loss of salivary glands function can result in the wide spread deterioration of oral health (Hsu *et al.*, 2010). Study of normal development of salivary glands will be helpful for both anatomists and clinicians as they are having important role in several dreadful diseases like rabies, foot and mouth disease and other viral diseases.

Keywords: buffaloes, *Bubalus bubalis*, Gross

morphological, salivary glands, mandibular duct

MATERIALS AND METHODS

The prenatal specimens of unknown age, irrespective of the sex, nutritional status of the mother were collected from slaughter houses the CVRL (Curved Crown Rump Length) of specimens was measured to estimate the age of by Soliman's (1975) formula. Gross morphological changes were studied in feasible foetal age from of 73 days to 253 days regarding shape, size, location and relation of the parotid, mandibular and sublingual salivary glands.

RESULTS AND DISCUSSION

The parotid gland was situated along the caudal border of the masseter muscle extending from the region of the external auditory canal to the level above the angle of mandible. It was in the form of a pyramid with loosely arranged multiple lobules at 73 day foetal age. However the shape of the gland was found to be evident as triangular with a broad base and apex during 84 days to 253 days. Gradual change in the shape may be due to growth of the gland during the prenatal life. The base of the gland was superior with a notch placed

around the external auditory canal, while the apex was situated little above the angle of the mandible (Figure 1). Subsequently the gland reached the space between the base of the ear, vertical ramus of the mandible and sterno-mandibularis muscle in mid and late foetal stages (Figure 2).

The colour of the parotid gland varied from light yellow to light brown during the prenatal period, variation may be attributed to increased vasculature to the gland. The weight of the parotid gland ranged from 2.0 to 7.1 g during 84 to 253 days. The length and width of the parotid gland ranged between 0.8 to 2.1cm and 0.5 to 2.4 cm respectively from 84 to 253 days. Gradual increase in length, width and weight of the gland was due to increased proliferation of ducts, increased lobulation and connective tissue formation during the foetal stage. Compact lobulation and adult characteristic features of the gland were attained at 155 days (Figure 3).

The lateral surface was covered by parotid fascia, developing parotido - auricularis muscle and a muscle extending from the zygomatic arch to cervical fascia. The gland was reported to be attached superiorly to the zygomatic arch. The middle part of the gland was penetrated by the maxillary vein from lateral to medial surface throughout the prenatal life (Figure 1).

The medial surface was uneven and related to great cornu of hyoid, digastricus, occipito-hyoideus and sterno-mastoideus muscles, external carotid artery, external jugular vein and its tributaries, facial nerve and its branches. The anterior border was in contact with the parotid lymph node above and masseter muscle below throughout the prenatal period (Figure 1). The medial surface of the parotid gland showed impressions for the mandibular salivary gland, parotid lymph node and masseter muscle as reported in human embryos and

foetuses of 36 to 53 days (Guizetti and Radlanski, 1996). The duct of the parotid gland was opened into the mouth cavity at the level of upper 2nd erupting cheek tooth till 145 days, the same was evident at the level of upper erupting 3rd cheek tooth from 155 days to 253 days of foetal life.

The mandibular gland was the largest among the three major salivary glands in prenatal buffalo, while the parotid gland was reported to be the largest major salivary gland in human beings during prenatal life (Attie and Sciubba, 1981). It was long, narrow and curved throughout the prenatal period (Figure 1).

The mandibular gland was light yellow in colour during the prenatal period. It was long, narrow and curved and extended from the region of tympanic bulla to the level above the angle of the mandible behind the parotid salivary gland in early age groups (Figure 1). However the position of the gland gradually changed to that of adult at 123 days, but it was located caudo-medial to the parotid salivary gland as reported in day old kid by Rauf *et al.* (2004) which continued throughout the mid and late foetal age groups. The average length, width and weight of the mandibular gland ranged from 1.23 to 2.84 cm, 0.45 cm to 1.6 cm and 2.1 to 8.00 g respectively during the prenatal period from 84 to 253 days.

The mandibular gland was covered laterally by fascia and the confluence of the external jugular vein with maxillary, linguo-facial and occipital veins (Figure 1), which agree partly with the findings of Rauf *et al.* (2004) in one day old kid. The gland was related to the larynx, division of the common carotid artery, external carotid artery, 9th, 10th and 11th cranial nerves, stylo-hyoideus muscle and great cornu of hyoid medially and developing thymus caudally. The anterior extremity was narrow and placed at the

level of the angle of the mandible above the sterno-mandibularis muscle and the posterior extremity at the level of fossa atlantis as reported in domestic animals (Budras and Habel *et al.*, 2003). However the anterior extremity was carried to the level of root of the tongue in mid and late age groups.

The mandibular gland showed loosely arranged lobules at 73 days. Dense compact lobulation of the gland was observed between 155 to 253 days of prenatal life (Figure 3). Mandibular lymph node was placed above the anterior extremity of the gland, a little cranial to or at the angle of the mandible. At 253 days the mandibular gland attained the characteristic shape, colour and position to that of adult.

The mandibular duct was well developed at 84 days but not amenable for dissection. It was found to be leaving the gland at lower third of the inferior border between 84 to 123 days and middle of the concave border between 145 to 253 days. The duct running on the floor of the mouth cavity in

close association with the sublingual duct opened closely along the side of monostomatic sublingual duct at the caruncula sublingualis.

The sublingual gland was the smallest among the major salivary glands (Figure 3). It was composed of two parts, the dorsal (polystomatic) and ventral (monostomatic) parts. The dorsal and ventral parts of the gland were distinguishable at 108 days of foetal age. The dorsal part of the gland was arranged in a chain of lobules from the palato-glossal arch to the incisive part of the mandible, while the ventral part was lying beneath the mucosa of the floor of the mouth above the mylohyoid muscle between the mandible laterally and the muscles of tongue medially. The dorsal and ventral parts of the gland were distinguished at 108 days. The colour of the dorsal part varied from light yellow to light brown during prenatal development, while the ventral part appeared as light yellow between 189 to 253 days of prenatal life.

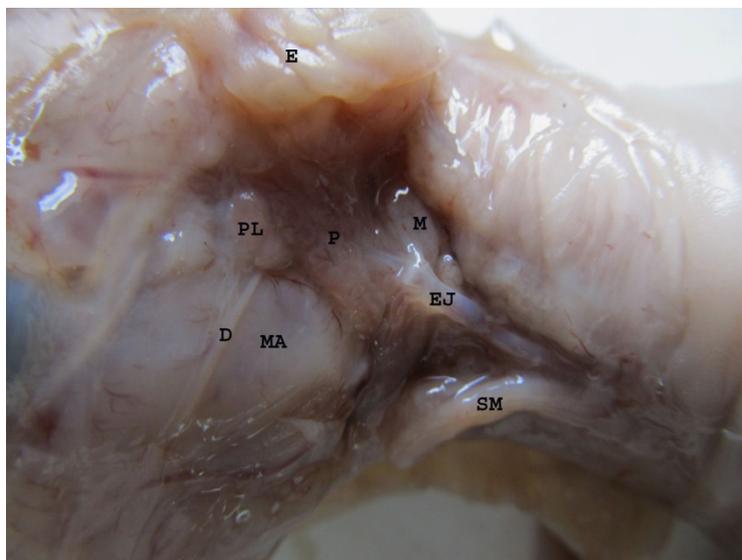


Figure 1. Photograph of 84 day buffalo foetal head showing parotid (P) and mandibular (M) salivary glands and their relation to adjacent structures. PL- Parotid lymph node, EJ- External jugular vein, SM- Sterno-mandibularis, D-Dorsal buccal nerve, MA-Masseter muscle, E-External ear, T- Thymus.

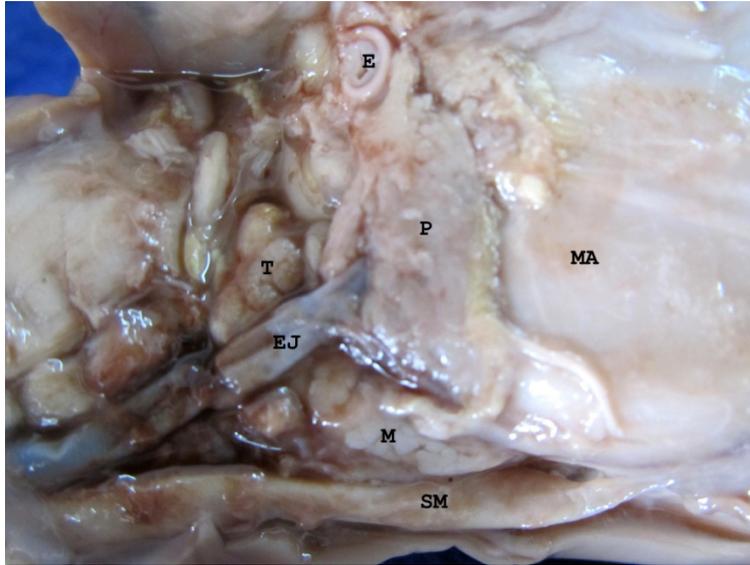


Figure 2. Photograph of 145 day buffalo foetus showing compact lobulation of parotid gland (P) and loosely arranged lobules of mandibular (M) salivary glands. E- External auditory canal, EJ- Ext jugular vein, T -Thymus,SM- Sterno mandibularis muscle, MA- Masseter muscle

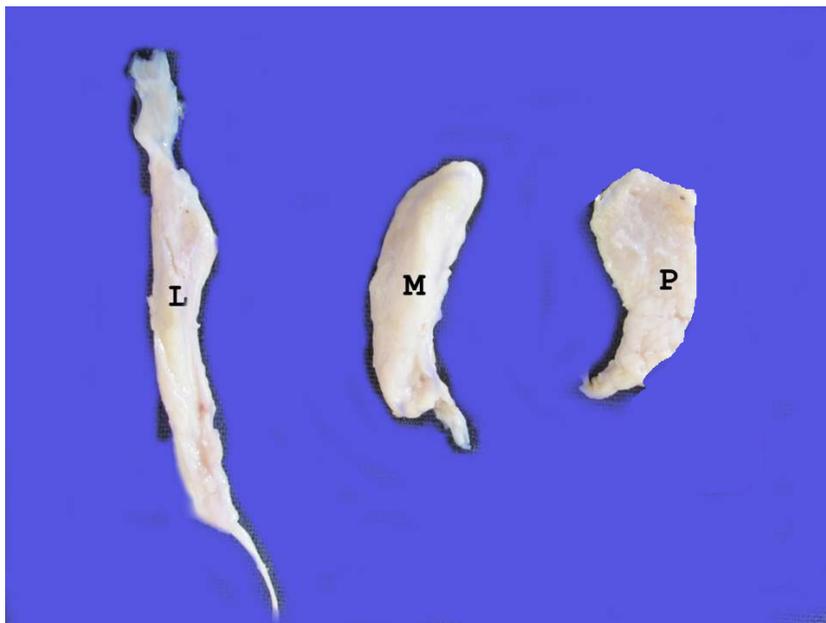


Figure 3. Photograph showing dense compact lobulation in foetal parotid (P), mandibular (M), and sublingual (L) salivary glands at 155 days in buffalo.

The ventral part of the gland was elongated and situated beneath the mucosa of the floor of the mouth above the mylohyoideus muscle between the mandible laterally and the muscles of tongue medially. The ventral part of the sublingual gland was drained by only one duct, which opened along the side of mandibular duct at caruncula sublingualis as reported by Latshaw (1987) in domestic animals. But the ducts of the dorsal part of sublingual gland were not visible to the naked eye during the prenatal period.

The weight, length and width of the ventral part of sublingual gland ranged from 1.45 g to 2.65 g, from 1.7 to 4.2 cm and 0.25 to 1.1 cm from 84 days to 253 days of embryonic life. Increase in the size and weight of the gland was due to increased proliferation of ducts, increased lobulation and connective tissue formation.

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