Prenatal Development of Parotid Salivary Gland in Buffalo (*Bubalus bubalis*)

K.Raja¹, M.Santhis Lakshmi, G.Purushotham and K.B.P. Raghadavendr

Department of Veterinary Anatomy, College of Veterinary Science, Sri Venkateswara Veterinary University, Rajendranagar, Hyderabad-500030, Andhra Pradesh, India.

Abstract

The primordia of parotid salivary gland were observed at 41 days of embryonic life in buffalo. The parotid gland showed branched terminal epithelial budding at 45 days and groups of primary ducts and terminal buds at 84 days. The development of lumen was first recognizable in the terminal buds and primary cords of parotid gland at 84 days. Distinct lobulation of the gland was observed first at 123 days and all the terminal buds were differentiated into terminal tubules at 130 days.

Key words: Prenatal life, Parotid gland, Major salivary glands.

Major salivary glands has an important role in the oral biology by producing saliva to provide water for lubrication, as well as electrolytes, mucus, antibacterial compounds and various enzymes to the oral cavity. Loss of salivary glands function can result in the widespread deterioration of oral health (Hsu et al., 2010). Prenatal developmental studies on the Parotid gland at various ages are important to know the normal anatomical growth and development.

Materials and Methods

Total 49 buffalo embryos and foetuses ranging from 40 to 253 days (2.5 to 79.5 cm CVRL) were used in the present study. The age of foetuses was determined on the basis of their CVRL by using Soliman’s formula. Fresh tissue pieces were collected from the parotid gland from the fetuses of 84 days to 253 days and fixed in 10% Buffered Neutral Formalin and Bouin’s fluids and processed for paraffin sectioning of 5-8µm thickness. The embryos and foetuses from 40 to 66 days were subjected to serial paraffin sectioning (Singh and Sulochana, 1997). The paraffin sections were stained with the routine and special histological staining methods.

Results and Discussion

The primordium of parotid gland was noticed as a local thickening of the primitive oral cavity at 41 days of embryonic life (Fig.1) and migrated into the surrounding mesenchyme as a solid epithelial bud at 45 days. The migration of the gland concurs with the findings of Santhi Lakshmi (2006) in buffalo. Branched epithelial budding of the gland was observed at 45 days. Early cluster formation of epithelial cells (terminal buds) was evident in the gland at 54 days (Fig.2). Condensed embryonic mesenchyme with rich vasculature was evident around the terminal buds and intercalated ducts at 84 days.

Lumen was recognized first in the terminal buds at 84 days, which was reported to be observed during the 2nd month of the gestation by Eisenbruckner et al. (2003) in bovines. Most of the terminal buds were differentiated into terminal tubules at 130 days. Terminal tubules (primitive acini) were multilayered lined with 2-3 layers of epithelial cells till the foetal age of 141 days. The myoepithelial cells appeared as flattened bright basal cells initially around the developing acinar cells at 141 days. The myoepithelial cells appeared as flattened bright basal cells initially around the developing acinar cells at 141 days. Two types of cells were identified in most of the terminal tubules. The inner cells were prismatic while the outer cells were cuboidal or flattened. The terminal tubules attained the structure of the acini at 170 days and were lined by single layered epithelium. The cells forming the epithelium were pyramidal in shape and surrounded by myoepithelial cells. The cytoplasm of the cells...
evinced deep eosinophilia. The nuclei were spherical and situated towards the basal surface of the cells.

The acini were found to be increased in number as the age of the foetus was increased. There was a gradual reduction in the number of luminal cells in the acini and intercalated ducts during the development of the gland. Primitive lobule formation was first observed at 110 days (Fig.3) by the differentiation of embryonal mesenchyme into connective tissue. Distinct lobulation of the gland was observed first at 123 days. Capsule formation was evident around the gland at 130 days. A thick layer of smooth muscle fibers were observed first in the connective tissue septae at 141 days. Large quantities of adipose tissue, blood vessels and nerves were found in the capsule at 170 days. Dense compact lobulation with typical compound tubulo-alveolar architecture was observed at 175 days (Fig.4) by the differentiation of embryonal mesenchyme into connective tissue. Van Gieson's method was used to stain these structures.
lar nature of the gland was attained with steep increase in the number of lobules at 175 days (Fig. 4).

The luminized primary cords were first recognized at 84 days, which lead to the intercalated ducts lined with double layered cuboidal epithelium at 101 days. The epithelium lining was gradually changed to single layer at 130 days. The intralobular ducts were also appeared first at 101 days lined with double layered cuboidal epithelium. At 141 days interlobular ducts lined with pseudostratified columnar epithelium appeared first and surrounded by a thick layer of condensed mesenchyme. The connective tissue around the interlobular ducts was predominant in collagen fibres with blood vessels, nerves and smooth muscle fibres at 170 days. Number of myoepithelial cells increased during prenatal development of the gland.

Summary
The primordium of parotid gland was noticed first at 41 days of embryonic life and appears as a branched epithelial budding of at 45 days and Initial cluster formation of the epithelial cells was noticed first at 54 days. The lumen formation was recognized first in the terminal buds and primary cords at 84 days. The intercalated and intralobular ducts lined with double layered cuboidal epithelium were appeared at 101 days, while interlobular ducts were formed at 141 days.

References

