

Light and Scanning Electron Microscopic Studies on Corneal Ontogeny in Buffalo

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Abstract : Histomorphological, histochemical and scanning electron microscopic observations were recorded in developing cornea of buffalo fetuses. The samples from fetal cornea were collected in appropriate fixative from slaughter house and Veterinary Clinics, GADVASU, Ludhiana. The microscopic slides were stained for detailed histomorphological and histochemical studies. The scanning electron microscopic studies were performed at Electron microscopy & Nanobiology Lab, PAU Ludhiana. In present study, it was observed that, in 36 days (d) fetus, the corneal epithelium was well marked single layered structure which was placed on stroma mesenchyme. Cornea appeared as the continuation of developing sclera. The thickness of cornea and its epithelium increased as well as the epithelium started becoming double layered in 47d fetus at corneo-scleral junction. The corneal thickness in this stage suddenly increased thus easily distinguished from developing sclera. The separation of corneal endothelium from stroma was evident as a single layered epithelium. The stroma possessed numerous fibroblasts in 49d stage eye. Descemet's membrane was appeared at 52d stage. The limbus area was separated by a depression from the developing cornea in 61d stage. In 65d stage, the Bowman's layer was more developed. Fibroblasts were arranged parallel to each other as well as parallel to the surface of developing cornea in superficial layers. These fibroblasts and fibers were arranged in wavy pattern in the center of stroma. Corneal epithelium started to be stratified as a double layered epithelium was present in this age of fetal eye. In group II (>120 Days), the corneal epithelium was stratified towards a well marked irido-corneal angle. The stromal fibroblasts followed a complete parallel arrangement in its entire thickness. In full term fetuses, a well developed cornea was observed. It was a fibrous layer which had five distinct layers. From outside to inwards were described as the outer most layer was the 7-8 layered corneal epithelial, subepithelial basement membrane (Bowman's membrane), substantia propria or stroma, posterior limiting membrane (Descemet's membrane) and the posterior epithelium (corneal endothelium). The corneal thickness and connective tissue elements were continued to be increased. It was $121.39 + 3.73\mu$ at 36d stage which increased to $518.47 + 4.98 \mu$ in group III fetuses. In fetal life, the basement membrane of corneal epithelium and endothelium depicted strong to intense periodic Acid Schiff's (PAS) reaction. At the irido-corneal angle, the endothelium of blood vessels was also positive for PAS activity. However, cornea was found mild positive for alcian blue reaction. The developing cornea showed strong reaction for basic proteins in outer epithelium and the inner endothelium layers. Under low magnification scanning electron microscope, cornea showed two types of cells viz. light cells and dark cells. The light cells were smaller in size and had less number of microvilli in their surface than in the dark cells. Despite these surface differences between light and dark cells, the corneal surface showed the same general pattern of microvilli studding all exposed surfaces out to the cell margin. which were long (with variable height), slight tortuous slender and possessed a micro villus shaft with a very prominent knob.

Keywords : buffalo, cornea, eye, fetus, ontogeny, scanning electron microscopy

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