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HISTOCHEMISTRY OF NICTITANS GLANDS OF THE ONE HUMPED CAMEL

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ABSTRACT

In this research, ten pairs of nictitans glands removed immediately after slaughter of 10 camels were examined to determine chemical content of the secretion by applying histochemical techniques (periodic acid shiff and alcian blue). Each gland was divided into small portion and fixed for histochemical examination in 10% buffered formalin solution. The histology of gland revealed secretory units of tubuloacinar and serous with scattered alveolar units. Mucosubstance histochemistry revealed acidic and neutral glycoproteins with different staining pattern.

Key words: Camel, histochemistry, nictitans gland

Adaptation of the camel to this inhospitable environment has come through certain behavioural, physiological and anatomical characteristics. Since it is well known that the lacrimal gland has a watery secretion, the morphological study of the lacrimal gland may contribute a great deal to a better understanding of the problem of water loss and conservation in the dromedary.

Lacrimal glands of mammals synthesise and secrete an aqueous solution in which different chemical substances are present, i.e. protein and mucosubstances. Lacrimal proteins include lactoferrin, lysozyme and growth factors that maintain the integrity of the eye and promote corneal re-epithelisation, while the function of the mucous is to lubricate the ocular surface (Fullard and Snyder, 1990). The glands of the eyelid include the glands of the third eyelid (nictitans gland or superficial gland of third eyelid), tarsal glands (glands of Meibom or Meibomian gland), gland of Moll and gland of Zeiss (Slatter, 1990). The gland of the third eyelid in cattle (Getty, 1975) and camel (Mohammadpour, 2009) divided into superficial and deep parts.

In histochemical tests, a different secretion has been found in the lacrimal glands of animals; mucoserous in sheep (Gargiulo *et al,* 2000), pig (Kuhnel and Scheele, 1979) and human (Allen *et al,* 1972); purely mucous in dog (Martin *et al,* 1988) and serous in cattle and bison (Pinard *et al,* 2003). In literature, there is no information about histochemistry of superior gland of third eyelid (nictitans gland) in camel. The objective of this study is to determine histology and carbohydrate histochemistry of gland in one humped camel.

Materials and Methods

Ten camels free of apparent ocular disease were examined to compare the normal morphological properties of nictitans glands in slaughter house, Mashhad, Iran. After dissecting, all of glands were characterised and measured (length and width) in left and right side and then were divided into small portion for histological studies. Fixation with 10% buffered formalin for 24-48 h were performed prior to processing. Each gland was sectioned in a sagittal plane and paraffin embedded. Sections (5µm) were stained with Hematoxylin and Eosin and Masson Trichrome and then examined by light microscopy for histological description. Histochemical studies were done by identification of glycoproteins and mucosubstances with Alcian blue and Periodic acid shiff staining.

Results and Discussion

The medial orbital gland of the camel is a nictitans gland (Superior gland of third eyelid), not a Harderian gland, as it secretes glycoprotein. It was a big gland, about 2 g in weight. Superior gland of third eyelid was oval in shape and irregular in outline. The position of the camel nictitating gland was similar to other domestic animals. It was located in the medial angle of the eye and surrounded with nictitating membrane. Nictitating membrane or third eyelid was dorsoventrally oriented conjunctival fold, which extends from the nasal canthus between lacrimal

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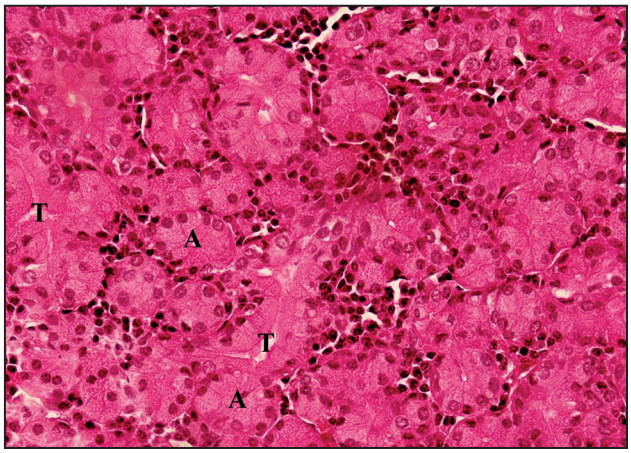

Fig 1. Tubuloacinar serous units were loosely arranged throughout the nictitating gland in camel. The acinar cells were pyramidal in shape. A- Acinar, T- Tubular (H & E X 160).

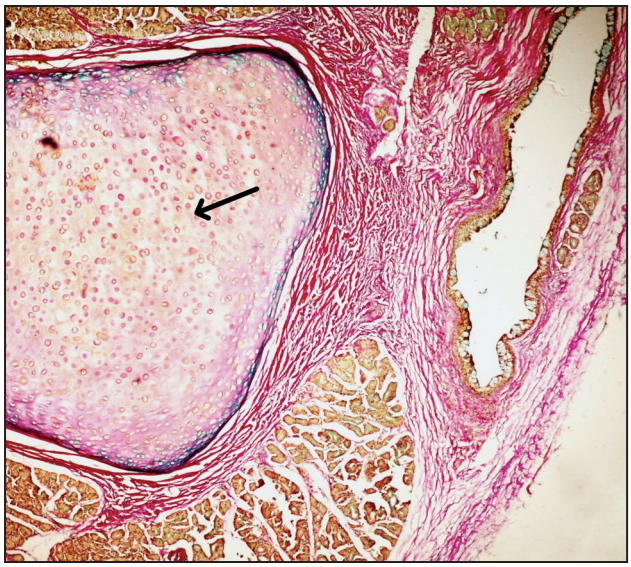

Fig 2. The camel superior gland of third eyelid that surrounded the hyaline cartilage (Arrow) (H & EX64).

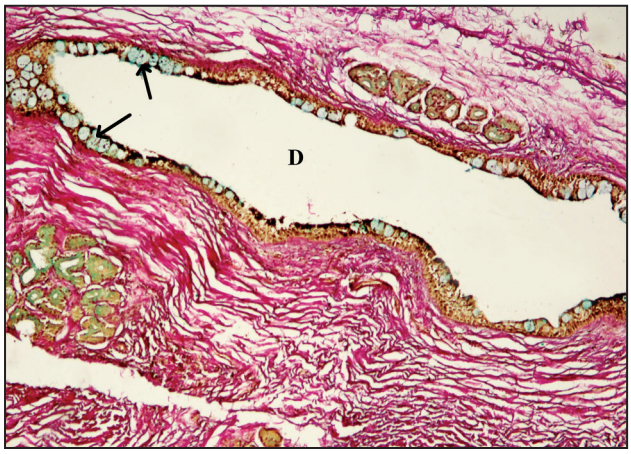

Fig 3. The epithelium of interlobular duct (D) is stratified with goblet cell (Arrow). Alcian blue with Van Gieson staining (X 160).

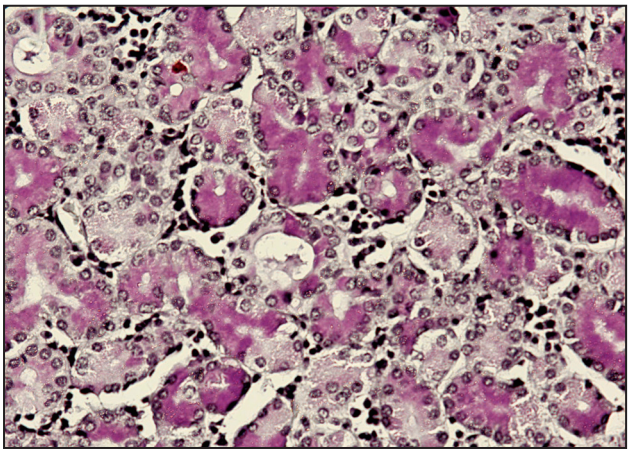

Fig 4. The camel nictitating gland with PAS stain showing staining variability between acini and cells within an acini (X 160).

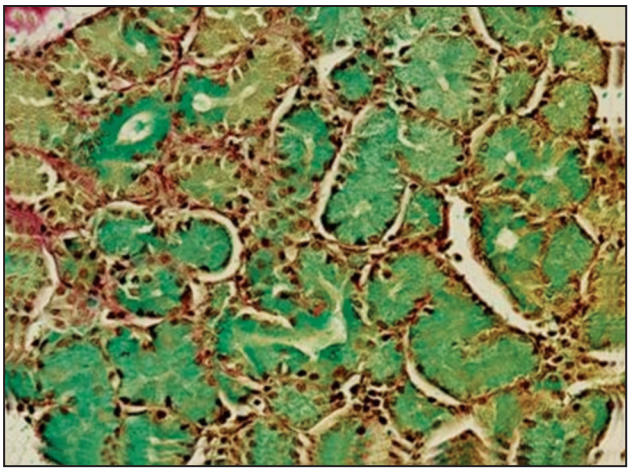

Fig 5. The camel nictitating gland with Alcian blue stain. Numerous acinar cells were stained (X 160).

caruncle and the eyeball. The gland and third eyelid were stiffened by a rod of hyaline cartilage, which is U-shaped with the ends attached to the conjunctival connective tissue and the shafts and bend surrounded by glandular tissue and held in place by tethers of dense connective tissue (Fig 2).

Histology of cartilage is different in animals. It is elastic cartilage in the horse, pig and cat and of hyaline cartilage in the dog and in ruminants. Numerous lymphatic nodules are found within the third eyelid of animal, which are enlarged in chronically infected eyes and may cause further irritation (Barasa, 2003; Konig and Liebich, 2004). The mean length of nictitating gland determined was 28.7 mm and 27.2 mm in left and right side, respectively. The mean of it was 17.4 mm and 16.1 mm in left and right side width, respectively (Mohammadpour, 2009). Histological examination

of superior gland of third eyelid revealed that secretory units were tubuloacinar and serous (Fig 1). Dispersed alveolar units were also seen. The nictitans gland was lobulated with dense connective tissue between lobules. Many large myelinated nerves run in this connective tissue, as well as the usual blood vessels, etc. There was a highly convoluted and complex duct system. Large ducts are lined with numerous goblet cells, presumably secreting mucous to be released onto the conjunctiva of the nictitating membrane (Fig 3). The conjunctival surface of the nictitating membrane was folded and lined by a stratified columnar epithelium with melanocytes and goblet cells. The acini were composed of tall pyramidal or columnar cell. The alveolar units were seen intermingled between the nests of acini and were composed of cuboidal epithelium. The gland was surrounded in hyaline cartilage. In sheep, lacrimal glands were compound tubuloacinar glands. Secretory endpieces were lined by cells filled with morphologically heteregenous granules (Gargiulo *et al,* 2000). In cattle and bison, histology of lacrimal glands was different. The histology of the dorsal lacrimal and superior gland of third eyelid revealed tubuloalveolar cells with basophilic vaculated cytoplasm in bison and eosinophilic granular cytoplasm in cattle (Pinard *et al,* 2003).

Mucosubstance histochemisty revealed acidic and neutral glycoproteins with different staining pattern. Most of acinar cells (about 70%) were strongly Alcian blue positive. PAS moderately stained a few of the glandular cell. In PAS staining, the reaction was varying in apical and basal portion. In apical was strong PAS positive. Some secretory acini contain PAS-positive secretory granules, some do not (Figs 4, 5).

Histochemical results showed that goblet cells scattered among the epithelial lining cell in interlobular duct, had moderately PAS and Alcian blue positively. The glycoproteins stained with alcian blue were mainly acidic glycoprotein and those stained with PAS reagents were neutral glycoproteins. Therefore, nictitating gland of one humped camel has neutral and acidic glycoproteins but the rate of acidity was more than neutral glycoproteins .

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