



Different cell types in the epididymis of Chamurthi horse

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Abstract

The present study was conducted on the tissue samples collected from the epididymis of 10 apparently healthy Chamurthi horses. Using morphological staining techniques, various cell types in the epididymis of Chamurthi horse were identified. The epididymis contained 6 cell types viz. Principal cells, basal cells, narrow cells, apical cells, clear cells and migratory lymphocytes. The morphology of these cells was studied.

Key words: Epididymis, cell, Chamurthi, Horse.

The main function of the epididymis is to provide a luminal environment that transforms spermatozoa into fully mature cells. In addition to sperm "maturation," the epididymis also plays an important role in sperm transport, protection, and storage (Hinton and Palladino, 1995). This luminal environment is formed by the secretory and absorptive processes of different types of cells present in epididymal epithelium. These include net water, Na^+ , Cl^- , and HCO_3^- reabsorption, K^+ secretion, and luminal acidification (Turner, 2002). Very little work has been done on the morphological study of epididymis of Chamurthi horse. Therefore, the present investigation was undertaken to study the various cell types and their characteristics in the epididymis of Chamurthi horse. This will serve as the basis for further studies on the epididymis of this species.

Materials and Methods

The epididymides from 10 apparently healthy Chamurthi horses were collected while performing castration at clinical complex (Veterinary College Palampur), veterinary hospitals of the state and from clinical camps organized at tribal areas of H.P. Tissue samples collected were fixed in neutral buffered formalin and processed with alcohol-benzene schedule for paraffin technique. Then paraffin sections 5-7 μm thick were obtained by microtome (Spencer

type) and stained with haematoxylin – eosin and Masson's Trichrome method (Luna, 1968).

Results and Discussion

In the epididymis of Chamurthi horse six types of cells were observed – principal cells, basal cells, narrow cells, apical cells, migrating lymphocytes and clear cells. Romanelle *et al.* (1985) had described main cells, basal cells, apical cells and cells with residues in the caput epithelium of donkey epididymis. Dellmann and Eurell (1998) described two cell types in the epididymal epithelium of all domestic mammals – columnar principal cells and small, polygonal basal cells. In the epididymis of donkeys (Bansal *et al.* 2003), buffaloes (Singh and Roy, 1995) and bovine (Goyal, 1985) five types of cells were observed – columnar, basal and apical cells along with intra-epithelial macrophages and lymphocytes.

Principal cells

These cells constitute the main portion of the epithelium. They were tall columnar cells with stereocilia and apical protrusions at their luminal border. Their cytoplasm was vesicular (Fig. 1). The principal cells because of their particular characteristics (tall columnar size, stereocilia and apical protrusions at luminal border) were reported to play an important role in creating and maintaining the unique regional characteristics of the luminal fluid

(Robaire and Hermo, 1988). They synthesize essentially all proteins secreted into the epididymal lumen and also play role in endocytosis (Hermo *et al.* 1994).

Basal cells

These cells were located on the basement membrane and were interposed between the principal cells. These cells were arranged in a row at the base of the epithelium (Fig. 1&2). Their nucleus was round to oval. These cells are thought to be undifferentiated precursors of principal cells. The function of the basal cells was unclear (Robaire and Hermo, 1988). Some studies suggested that the major role of the basal cells is in regulating the electrolyte and water transport by the principal cells through local formation of prostaglandins (Leung *et al.* 2004). Other studies suggested a supportive role for the basal cells. The basal cells had also been proposed to possess a protective role against reactive oxygen species thus protecting the maturing spermatozoa (Andonian and Hermo, 2003).

Narrow cells

These cells extended throughout the whole length of the epithelium and had a narrow width. The nuclei were present almost in the centre where the cell width was maximum (Fig. 1). These narrow cells are involved in secretion of protons to regulate the luminal pH, a process critical for sperm maturation and viability (Breton *et al.* 1996).

Apical cells

The apical cells were located towards the luminal borders of the epithelium. Their nuclei were round to oval. These cells had a narrow base with wide apical part. Their luminal border lacked stereocilia (Fig. 2). Apical cells play a role in endocytosis. Like narrow cells they appear to be responsible for H⁺ secretion and bicarbonate resorption (Breton *et al.* 1999)

Migrating lymphocytes

These cells had compact round darkly stained nuclei without any apparent cytoplasm. These cells were present at different levels in the epithelium (Fig. 2).

Clear cells

They were generally spherical in shape and had unstained clear cytoplasm around them (Fig. 1). Nicander (1957) reported the absence of clear cells (light cells) in stallion, ram and bull, however, Sudhakar *et al.* (1990) observed some clear cells in the epididymis of Spiti ponies. The light cells may be involved in glyceryl phosphoryl choline (GPC) secretion or in the formation of ions and proteins (Flickinger *et al.* 1978). These cells have phagocytic function and are responsible for the uptake of a number of different proteins excreted by the epididymal epithelium, as well as the contents of the cytoplasmic droplet released by sperm traversing the duct (Hermo *et al.* 1988).



Fig.1

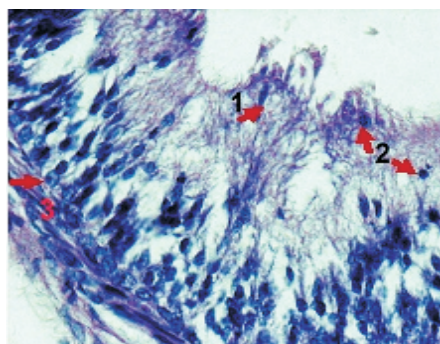


Fig.2

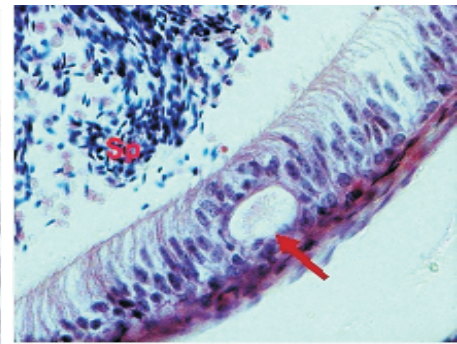


Fig.3

Fig. 1. Lining epithelium of epididymis showing principal cells (1), basal cells (2), narrow cells (3) and clear cells (4) resting on the basement membrane (BM). Cilia are also visible. H&E x 400.

Fig. 2. Lining epithelium of the epididymis showing

apical cells (1), migrating lymphocytes (2) and basal cells (3). H & E x 200.

Fig.3 Intraepithelial cyst (arrow) present in the lining epithelium of epididymis. Spermatozoa (Sp) are visible in the lumen. H & E x 400.

The intra-epithelial cysts (Fig. 3) were found in the epididymis of Chamurthi horse which was earlier reported by Trautmann and Fiebtger (1952) in ox and Pal and Bhardwaj (1986) in buffalo but Sudhakar *et al.* (1990) reported the absence of such cysts in Spiti

ponies. They have been implicated in absorption in the proximal epididymis but in the distal epididymis, where they are numerous, the light cells, whose function has long been a controversy, may have an absorptive function (Flickinger *et al.* 1978).

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