Research Paper

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Ultrastructural Study of Oviduct in Amphistome *Cotylophoron cotylophorum* (Trematoda: Digenea) Parasites of Domestic Ruminants

Bio-medical

KEYWORDS : Cotylophoron cotylophorum, oviduct, Golgi Complex, and mitochondria

Gayatri Swarnakar Department of Zoology, Govt. P. G. Meera Girls College, Udaipur -313001(Raj.)

ABSTRACT

The ultrastructure of the oviduct of C. cotylophorum shows that it is internally lined by syncytial epidermis. The apical surface bear's many apical lamellae and the cilia. Epithelial cytoplasm contains abundant mitochondria, moderate GER and numerous Golgi complexes with their associated vesicles. This indicated that some kind of secretory material is synthesized in this region. Therefore, the present research work is great import from medico-veterinary standpoint.

INTRODUCTION

The amphistome form a group of great economically important yet poorly studied ruminant parasites worldwide. Light microscopic and histochemical research work has been done by many scientists on various tissues of amphistomes. Very scant information is available on the ultrastructure of female reproductive system of trematodes are available for *Schistosoma mansoni* (Spence and Silk, 1971 and Erasmus, 1973). *Pharyngostomoides procyonis* (Grant et al., 1977), *Cryptocotyle lingua* (Rees, 1979), *Aporocotyle simplex* (Thulin, 1982), *Schistosoma margrebowiel* (Awad and Probert, 1989) and *Paragonimus ohirai* (Orido, 1994). Whereas, little ultrastructural research work have been described in different species on amphistome (Sharma and Swarnakar, 1992; Sharma, et. al., 1994; Swarnakar and Sharma, 1997 and Swarnakar, 2010).

However, no research work has been carried out so far on the ultrastructural study of oviduct in amphistomes *Cotylophoron cotylophorum* (Trematoda: Digenea) parasites of domestic ruminants.

MATERIAL AND METHODES

Live amphistomes were collected from the rumen of the freshly slaughtered buffalo (*Bubals bubalis*) at local Zoo abattoir in Udaipur. Then they were transferred into physiological saline solution for their maintenance. Small fragments of mature amphistome (*Cotylophoron cotylophorum*) were fixed at 4°C for one hour in 4% glutaraldehyde in 0.1M phosphate buffer at pH 7.2. and Post fixed for one hour 1% osmium tetraoxide in 0.1M phosphate buffer. Then dehydrated through acetone ascending series, embedded in durcupan resin. The blocks were sectioned using glass or diamond knives on a LKBIII ultramicrotome. The ultrathin sections were mounted on uncoated 200 mesh copper grids. Stain with uranyl acetate and lead citrate. The grids were examined under Philips Electron Microscope.

RESULTS

The epithelium of the oviduct is syncytial in nature similar to that of the tegument. The apical portion of the epithelium is thrown into small sparsely distributed lamellae into the lumen of the oviduct. The thickness of the oviduct epithelium is not uniform. The thickness varies due to the presence of nucleus. The basal cell membrane of syncytial epithelium close to basal lamina is deeply invaginated into the cytoplasm and form complex ramifications (Fig. 1) cytoplasm of epithelium oviduct contain abundant Golgi complexes with the associated vesicles, sparse rough endoplasmic reticulum, numerous mitochondria and glycogen granules. Free ribosome's usually aggregate to form polyribosomes. At times multivesicular bodies, and dense granular secretory vesicles are seen scattered in the cytoplasm, Nucleus is large and oval in shape (Diag. No. 1). Each nucleus budges into the lumen marking the epithelial lining uneven.

Just outside the folded basal lamina is observed the musculature. Inner circular and outer longitudinal muscle bundles remain embedded in the interstitial material. The musculature clearly exhibits the bundles of myofibrils, glycogen granules and mitochondria. Lumen of mature oviduct is comparatively wider in diameter then immature oviduct. Mature oocytes and secretory granules are occasionally observed in the lumen of both proximal and distal regions of mature oviduct, whereas, sperms are seen only in its distal region. Parenchymatous and lymph vessels with large number of mitochondria, Golgi complex and secretory vesicles are discerned around the periphery of the oviduct wall (Fig. 1 and Diag. 1).

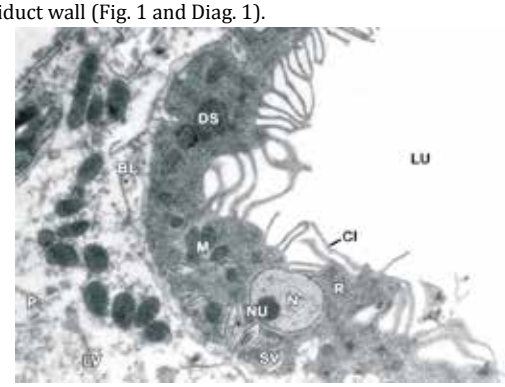
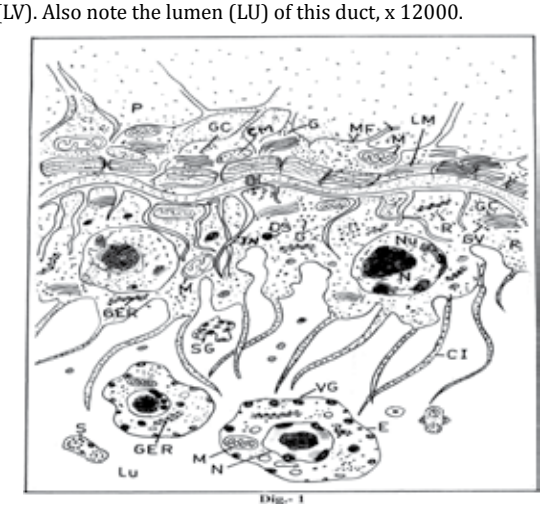


Fig.1. Ultrastructure photomicrograph of oviduct of mature worm. Syncytial epithelium of it, containing nucleus (N) with nucleolus (NU), mitochondria (M), ribosomes (R), secretory vesicles (SV) and cilia (CI) syncytial epithelium surrounded by basal lamella (BL), parenchymal cell (P) and lymphatic Vessels (LV). Also note the lumen (LU) of this duct, x 12000.



Diag.1. Transmission electron microscope (TEM) section through oviduct. Basal lamina (BL), Cilia (CI), dense secretory vesicle (DS), Golgi complex (GC) and its vesicles (GV) glycogen (G), granular endoplasmic reticulum (GER), plasma membrane invatination (IN), mitochondria (M), nucleus (N), with nucelous (NU), parenchymal cell (P), free rebosomes (R), secretory granules (SG), myofirile bucndle (MF), circular muscles (CM), longitudinal muscles (LM), egg (E) sperms (S), Lumen (LU) and vitelline globules (VG).

DISCUSSION

The oviduct is very important, since it is engaged in transportation and fertilization of the mature oocytes in amphistome *Cotylophoron cotylophorum*.

The ultrastructure of the oviduct of *C. cotylophorum* shows that it is internally lined by syncytial epidermis. Externally it is covered by a thin musculature. The thickness of the syncytium is uneven due to the presence of large nuclei in it. The base of the syncytium present a prominent basal lamina and exhibit extensive folding which appear to run towards apical surface almost in parallel lines. The apical surface bear's many apical lamellae and the cilia. Epithelial cytoplasm contains abundant mitochondria, moderate GER and numerous Golgi complexes with their associated vesicles. This indicated that some kind of secretory material is synthesized in this region.

The structure of the oviduct of the present amphistome does not correspond to that studied in other trematodes. In *Schistosoma mansoni* (Erasmus, 1973), *Pharyngostomoides procyonis* (Grant et al., 1977 and Rees, 1979) and *Paragonimus ohirai* (Orido, 1994) the oviduct lining is cellular. The apical surface of these cells bear cilia; on the contrary the apical surface of *C. cotylophorum* is syncytial and devoid of cilia. However, Rees (1979) and Thulin (1982) have reported the presence of both prominent lamellae and cilia in the lining of the oviduct of *Cryptocotyle lingua* and *Aporocotyl simplex* respectively. Spence and Silk (1971) has reported oviduct to be syncytial in nature but ciliated. Thus their observations differ from that of Erasmus (1973) and Awad and probert (1989) in case of the oviduct of *S. mansoni.*

The cilia in oviduct appear to be responsible for the movement of ova and vitelline globules into their lumen. Besides, the cilia also take part in the removal of unwanted material during egg shell formation in the ootype. In *Schistosoma mansoni* multiplicity of functions of female reproductive tract has been reported.

The characteristics of the lining of oviduct of female reproductive tract of the present amphistome also suggest that they may have diverse functions. The cilia present in the muscular wall of the oviduct help in the movement of genital product along the duct. The sperms reached in oviduct after insemination may perhaps also obtain their nutrition from the wall of the oviduct. The head of the sperms thus may be seen buried in the lining of oviduct. Besides the cilia and lamellae wall of the oviduct possesses abundant Golgi complex, lysosomes and phagolysosomes. This indicates that the oviduct is involved in the intracellular digestion process.

Schistosoma mansoni whose female reproductive tract has been studied extensively also support. The view that oviduct is engaged in the synthesis, transport and discharge of secretory material as well as intracellular digestion (Spence and Silk, 1971 and Erasmus, 1973). Contents of the phagosomes suggest that they are involved in the digestion of degenerating ova and unspent sperms. The significance of this process is recycling of the material.

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