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التطور النسيجي للحويصله الصفراويه في الجاموس المصرى أثناء مراحل النمو المختلفة

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تتكون الحويصله الصفراويه من القنع والجسم والعنق الذى يمتد كمسال مرارى، تتكون الصفيحه الطلائيه من خلايا طويله ذات طبقات مزيفه تتحول الى خلايا طويله بسيطه يوجد بينهما خلايا ليمفاويه خصوصا في مراحل قبل الولادة وتتجمع هذه الخلايا الليمفاويه في الصفيحه الدعاميه المستويه في مراحل بعد الولادة .

وقد وجد بين الخلايا الطويله العموديه خلايا كأسيه في جميع أجزاء الحويصله الصفراويه . وقد وجد أن الطيات المخاطيه لاتوجد في المراحل الأولى من النمو قبل الولادة ولكنها مع تقدم مراحل النمو وزيادة العمر تزداد هذه الطيات في العدد . ولم يلاحظ وجود الصفيحه العضليه المخاطيه في مراحل النمو المختلفه .

وقد وجد في الصفيحه الدعاميه المستويه غدد متفرعه أنبوبيه سنجيه وتظهر في البداية في صور نبته طلائيه من النسيج الطلائي الى الصفيحه الدعامية عند طول ٥٠ سم .

أما بالنسبه للطبقه العضليه الخارجيه فوجد أنها تتكون من خلايا عضلية ملسيه ولها ترتيب دائرى في مراحل نمو قبل الولادة أما الترتيب الطولي والمائل لها فيصبح ظاهرا وجليا في مراحل بعد الولاده .

ووجد أن هذه الطبقه العضليه رقيقه في منطقة العنق عن باقي أجزاء الحويصله الصفراويه في مراحل نمو ما قبل الولادة ويصبح العكس صحيحا في مراحل نمو مابعد الولادة .

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HISTOGENESIS OF THE GALL BLADDER OF THE EGYPTION WATER BUFFALO (Bos bubalus L.) IN DIFFERENT DEVELOPMENTAL STAGES

(With 4 Figs.)

By
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SUMMARY

The gall bladder had a pear shape during the prenatal and postnatal stages. It consisted of a fundus, body and neck conected with the cystic duct.

At the early foetal ages the lamina epithelialis was formed of pseudostratified columnar epithelium which changed into a simple columnar in foeti of 4cm CVRL. Between the tall columnar cells there were narrow cells with elongated, rodshaped, darkly stained nuclei and darkly acidophilic cytoplasm. Intraepithelial lymphocytic infiltrations were observed at the prenatal and postnatal stages. The goblet cells were firstly observed in the neck region of the bladder in foeti of 12-16cm CVRL, then appeard at its body region in foeti of 20cm CVRL and at its fundus in foeti of 40cm CVRL.

Glandular primordia were firstly seen in foeti of 50cm CVRL and were differentiated into tubulo-alveolar branched glands at foetal stage of 65cm CVRL.

The muscular layer at the neck region of the gall bladder was thinner in the prenatal stages and thicker in the postnatal stages than that of the body and the fundus regions.

INTRODUCTION

The structure of the gall bladder of different animals was discussed by many authors (VIRCHOW 1857 and OPPEL 1900 in dog, cat, pig, sheep and guinea pig, JURISCH 1909 in dog, cat, goat, lamb, pig, calf and ox, HAYWARD 1966 in rabbit, SINGER and SINGH 1971 in buffalo, NICKEL et al 1973 in domestic animals, NAWAR and KAMEL 1975 in dog and MONAZH and ABDALLAH (1978) in goat.

The gall bladder in the water buffalo in Egypt received little attention by the morphologists. The aim of this work is the study of the gall bladder in different developmental stages.

MATERIAL and METHODS

The gall bladder of 34 foeti (ranged between 0.7 to 85cm CVRL), two newly born buffaloes (45 days of age) and four adult buffaloes (3-8 years of age) were collected from Cairo, Edfina and Demanhour abbatoirs.

Samples taken from the fundus, body and neck regions of the gall bladder were immediately fixed in 10% formalin, dehydrated, cleared and embedded in paraffin wax. Sections of 5-7 Um were then cut and stained with the following methods:

HARRIS hematoxylin and eosin stain, Van-Gieson stain, weigert's elastic tissue stain, reticulin stain, periodic acid schiff (PAS) technique, Alcian blue stain and Alcian blue-PAS combination (BANCROFT 1976).

RESULTS

At the early stage of development (0.7 - 1.2cm CVRL foetuses) the primordium of the gall bladder was superficially embedded in the substance of the liver (Fig. 1). It's epithelium was psudostratified columnar surrounded by a layer of mesenchymal cells.

At the foeti of 3.2cm CVRL the epithelium was simple or sometimes pseudostratified columnar. The apices of the cells beared bullae.

At the foetal stage of 8cm CVRL few small longitudinal mucosal folds were appeared at the body of the bladder. These folds were increased in number at it's neck. The lamina epithelialis was made up of simple columnar cells having lightly acidophilic cytoplasm. The mesenchymal cells surrounding the lamina epithelialis were differentiated into fibroblasts forming the lamina propria mucosae. Reticular fibers were observed and many blood capillaries were located especially in the folds of the lamina proria.

A thin layer of smooth muscle cells surrounded the lamina propria formed the tunica muscularis. The lamina subserosa at the free part of the developing bladder and the adventitia at it's attached part consisted of loosely arranged connective tissue. At the free part, the subserosa was covered by one layer of flattened cells (lamina epithelialis serosa).

At the foeti of 12 - 16cm CVRL the lamina epithelialis showed narrow cells compressed by their neighboring cells. They had darkly stained red-like nuclei and a darkly acidophilic cytoplasm more than the neighboring cells. At this stage no goblet cells could be observed the body and the fundus of the gall bladder, but rarely found at the neck region. Few lymphocytes were detected between the epithelium There were small saccular, sometimes branched invagination from the epithelium, extending into the lamina propria, which can be called Rokitansky-Aschoff sinuses.

The tunica muscularis formed from a spiral layer differs in its thickness. The muscular cells were found in small bundles separated by connective tissue. The tunica serosa and adventitia showed network of reticular fibers, collagenic and few fine elastic fibers.

At the foetal stage of 20cm CVRL the goblet cells were observed among the epithelium of the body of the bladder then appeared at its fundus in foeti of 40cm CVRL (Fig. 2). The apical part of the columnar cells had pale stained vacules which usually bulge as bullae into the lumen. In addition to these vacuoles, the cytoplasm had many fine basophilic granules. At the 50cm CVRL stage, the supranuclear region of the cells was filled with PAS positive materials and some cells showed a thin zone of Alcian blue material under their free border. In some cases the epithelium sand invaginations into the underlying connective, giving rise to glandular primordia. These primordia were differentiated into tubulo-alveolar branched glands in foeti of 65cm CVRL. They were less in number at the fundus than at the neck and body regions of the bladder. The glandular cells gave positive reaction to the Alcian blue stain.

At the foetal stage of 80 - 85cm CVRL, the narrow compressed cells were few in number the lamina propria was formed of loose connective tissue with diffuse lymphocytic infiltration and the direction of the muscle cells in the tunica muscularis was mainly circular between them were some longitudinal ones (Fig. 3).

At the postnatal stage of 30 - 60 days-old buffalo calf, protruded bullae were observed from the cell apices. The lamina propria contained lymph nodules at some parts and highly branched tubulo-alveolar glands (Fig. 4). The tunica muscularis was markedly increased in thickness and became clearly organized into inner longiludinal layer and outer much thicker, circular ones. The lamina subserosa and the adventitia were formed of dense irregular connective tissue.

At the age of 3 - 10 years-old buffaloes the apical bullae were also present. The tunica muscularis was thicker at the neck region than at the other parts of the gall bladder and the mucosa had small and large mucosal folds as in the previous stage.

DISCUSSION

At the early stage of development (0.7 - 1.2cm CVRL foeti the primordium of the gall bladder was superficially embeded in the substance of the liver. This is in a line with the result of AREY (1974) in 1cm pig embryos. The epithelium started its development as a simple columnar to pseudostratified columnar at 1.2cm CVRL foetal stage. This is nearly similar to the observation of HAYWARD (1966) on the foetuses of rabbits.

ABOU EL-NAGA (1965) in man, EL-HAGRI (1967), SISSON and GROSSMAN (1969) in domestic animals, SINGER and SINGH (1971) in buffalo, NAWAR and KAMEL (1975) in dog and MONAZAH and ABDALLAH (1978) in goat, reported that the gall bladder has three coats, mucous, muscular and serous coats. This is also confirmed in the present studs. In contrast HAM (1969) mentioned that in man the wall of the gall bladder consists of four coats (mucous, muscular, connective tissue and serous coats). In the present study the mucosal folds started to appear at CVRL 8cm foetal stage and were increased with advancing age in number and thickness. In accord with these results are EL-HAGRI (1967) in domestic animals, BROOKS (1974) in man and KAMEL and NAWAR (1975) in mouse, bufo and dog.

BLOOM and FAWCETT (1971), HAM (1969) in man, SINGER and SINGH (1971) in buffalo, NICKEL et al. (1973) and GETTY (1975) in ox and MONAZAH and ABDALLAH (1978) in goat reported that the mucosa is lined by a simple layer of tall columnar cells. This is in accord with the present study.

Narrow, compressed cells were seen between the columnar epithelium. These cells were reported in man by EGITTIS and HAYES (1961) and in goat by MONAZAH and ABDALLAH (1978). These authors believed that they are lymphocytes squeezed between the lining epitheliat cells. Among the present data many lymphocytes were observed intraepithelially and take their usual spherical shape. So the narrow, rod shape cells in our opinion are ordinary epithelial cells reaching the end of their life-span. This is supported by their very darkly basopOhilic nuclei, which mean that these are less active cells. In the same line with our opinion are HAYWARD (1966) in rabbit and SINGH et al. (1973) in buffalo.

At the foetal stage of 3.2cm CVRL and the following developmental stages, the apices of the lining epitheium showed bulged bullae into the lumen. This observation was reported also by HAYWARD (1966) in rabbit. Among the present materials few goblet cells were firstly observed in the neck region of the bladder at the foetal stages 12 - 16cm CVRL, than appeared at the

body region in foeti of 20cm CVRL and at the fundus in the stage of 40cm CVRL. JURISCH (1909) in dog, cat, goat, lamb, pig, and ox, NICKEL et al. (1973) in domestic animals and STINSON and CALHOUN (1976) in large ruminant have confirmed the presence of the goblet cells. On the contrary VIRCHOW (1957) and OPPEL (1900) in man, dog, cat, pig, sheep, guinea pig and SINGH et al. (1973) in buffalo did not observe goblet cells in the gall bladder.

MONAZAH and ABDALLAH (1978) in goat reported that the lamina propria is a vascular connective tissue. They added that the tissue is more dense under the lamina epithelialis than in the deeper layer. This latter result is in contrast with the present work in which the lamina propria becomes dense away from the lamina epithelialis. The lymph nodules demonstrated in the postnatal life at the 45 day old calf could not be observed by MONAZAH and ABDALLAH (1978) in goat. The tubulo-alveolar branched glands were found at the neck, body and the fundus regions. MONAZAH and ABDALLAH (1978) reported that these glands are not found in all regions of the gall bladder in goat. They added that these are serous and mucous glands. This is in accordance with the present results. SINGER and SINGH (1971) confirmed the presence of these glands in buffalo, but they are of the mucous type.

Rokitansky-Aschoff sinuses had been observed in the various foetal stages. These sinuses were more in the postnatal life. ROTHMAN (1966) in man mentioned that they did not appear in the foetal stage and rarely seen in the enfants.

DELLMANN (1971) in domestic animals and BROOK (1974) in man reported that the tunica muscularis is absent but they observed lamina muscularis mucosae. This is in contrast with the present data in which tunica muscularis exist and the lamina muscularis mucosae is absent. Between the muscle bundles there were elastic, reticular and collagenic connective tissue fibers with fibroblasts. ROTHMAN (1966) reported that in man, the muscular layer contains more elastic and collagenic bundles than muscle cells. This agrees with the present study, so far the primary stages of the primary stages of the foetal development were concerned.

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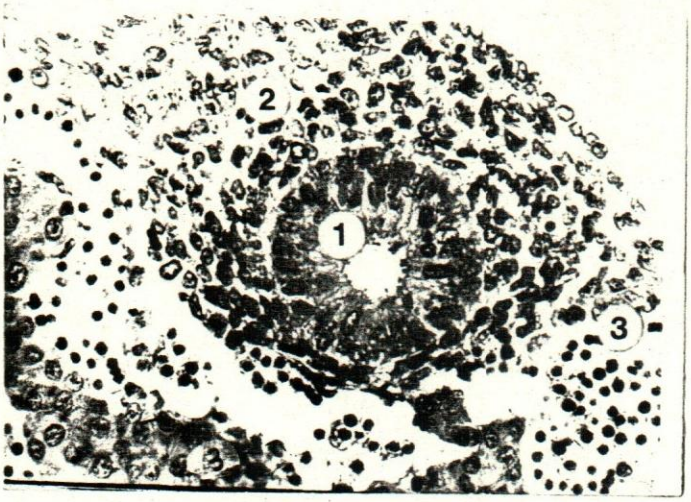

Fig. (1)

Fig. (2)

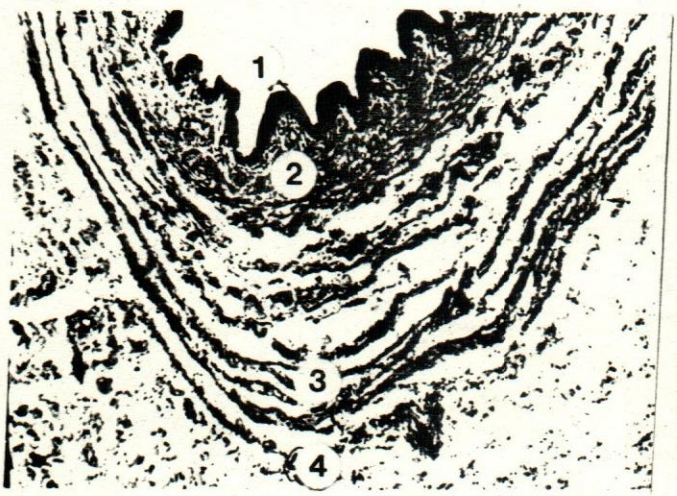

Fig. (3)

Fig. (4)

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DESCRIPTION OF THE FIGURES

Fig. (1): Cross section through the gall bladder of 1.2cm CVRL buffalo foetus.
H & E. Obj. 40, Ocular 5: IK
1) Lamina epithelialis.
2) Mesenchymal layer.
3) Hepatic cells.

Fig. (2): Cross section in the body of the gall bladder of buffalo foetus (CVRL 40cm).
H & E. stain Obj. 25 Ocular 5: IK
1) Lamina epithelialis showing goblet cells.
2) Lamina propria.

Fig. (3): Cross section through the neck of the gall bladder of 85cm CVRL buffalo foetus. Alcian blue-PAS stain.
Obj. 25 Ocular 5: IK
1) Lamina epithelialis.
2) Lamina propria.
3) Tunica muscularis.
4) Tunica serosa.

Fig. (4): Cross section through the body of the gall bladder of buffalo calf (45 day old) Van Gieson stain.
Obj. 16 Ocular 5: IK
1) Branched tubulo-alveolar gland.
2) Lamina propria.