

HISTOLOGICAL STUDY ON BURSA OF FABRICIUS OF QUAIL BIRDS (COTURNIX COTURNIX JAPONICA)

By

Hassan S.A. Al-Tememy, Jinan S. Hussien and Bushra S. Rasool

Department of animal resources / Agricultural collage / University of Baghdad

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Abstract: *The present work was undertaken to show the histological structure features of bursa of Fabricius in quail (C.C. japonica). Ten adult birds of quail, nine weeks old, were used in this study. Experimental birds were anesthetized by using chloroform inhalation in closed chambers and then the necropsy technique were applied to remove the bursa and study its histological characteristics.*

Generally the histological structure of bursa of Fabricius in quail was similar in other birds. Its sac-like dorsal diverticulum of the proctodeal wall of the cloaca.

The histological examination were showed that the wall of the bursa in quail consist of tunica mucosa, tunica muscularis and tunica serosa. The study was determined that the tunica mucosa forms the plicae (folds) at different length and thickness which prolongate towards lumen. The numbers of plicae in bursa of quail were 14 . The surface of plicae was surrounded by pseudostratified epithelium except at the apex of each fold, which is covered by an epithelial tuft of simple columnar cells. Epithelium cells had usually an ovoid nucleus.

The results of present Observation regarding that there were the lamina propria of each plicae was completely filled with follicles separated by connective tissue. The forms and sizes of follicles were different from one to another. Each follicles had a darker cortex with densely packed small lymphocytes , a lighter staining and less dense medulla containing cells of various sizes. The mean thickness of cortex and medulla of the lymphoid follicles in plicae were 85.03 μ m and 193.02 μ m respectively.

The histological study of the quail bursa of fabricius showed that the layer of undifferentiated epithelial cells occupies the periphery of the medulla, which is separated from the cortex by a capillary layer. Tunica muscularis surrounding the mucosa, had been formed by an outer layer of longitudinal fibers and an inner layer of circular fibers. Blood vessels of subserosa under the tunica serosa were also seen in connective tissue of tunica mucosa and tunica muscularis and the results observe numerous blood vessels at the cortex of follicles, but the study could not observe any in the medulla.

Key Word: *Histological, Bursa Of Fabricius, Quail*

INTRODUCTION

Bursa of fabricius was first described by Hieronymus Fabricius who was scientist in 1621(Olah and Glick,1992) . The bursal anlage appears between 3-5days of embryonic development (Alten

and Meuwissen,1972;Glick and Olah,1993) some references actually call it a "cloacal tonsil,"(geety,1975).

The bursa of Fabricius is an immunological organ that plays a primordial

role in the poultry immunity (Toivanen et al., 1987). The different aggressions of the environment (stress, bad hygiene, vaccination, pathologies...) undergone by birds, influential on the histo-anatomical and physiological development of the bursa of fabricius. It can, therefore, lead to an immunodepression at certain birds (Oie, 2001; Denberger et. al., 2000).

The cloacal bursa is an oval sacculated organ dorsal to the cloaca and communicating with it by a small opening. It is a central lymphoid organ that seeds B lymphocytes to the germinal centers of peripheral lymphoid deposits and the spleen, and is the primary site for the synthesis of immunoglobulin in the young bird before involution commences from 3-4 months (Jolly, 1915; Ball and freemon,1971 ; Ratcliffe,1985; Sturkie,1986).

Histologically the mucosal wall of the bursa is thrown into folds covered by a pseudostratified columnar epithelium continuous with that of the cloaca. The folds are subdivided by connective tissue trabeculae into lobules. Each lobule consists of a densely populated outer cortex of lymphocytes and an inner sparsely populated medulla separated by a layer of undifferentiated epithelial cells. Lymphoid tissue and the overlying mucous membrane are in close apposition and lymphocytes migrate through the epithelium (Ciriaco et al.,1985; Chan, 1994; Elizabeth and Fredric, 2001).

MATERIALS AND METHODS

Ten adult birds of quails, nine weeks old, were used in this study. Experimental birds were anesthetized by using chloroform inhalation in closed chambers and then the necropsy were applied to removed the bursa of fabricius. The samples were immediately fixed by formalin (10%) for 24 hours. After dehydration with ethyl alcohol in increasing concentration (70-100%) and passed in two content of xylol the

samples were embedded in paraffin , sectioned by the rotary microtome at 5µm. After slides samples were passed through the decreasing concentration (100-70%) of ethylic alcohol and in xylol. The histological slides were stained by Hematoxylin and Eosin stain (Luna, 1968).

An ocular micrometer were used to measured the mean thickness of cortex and medulla of the lymphoid follicles (plicae) in bursa of fabricius of the experimental birds (Crossmon,1937;Bancroft and Cook,1984).

RESULTS AND DISCUSSION

Bursa of fabricius in quail was a sac-like dorsal diverticulum of the proctodeal wall of the cloaca. And that agreed with(hodages,1974 ;nickel etal.,1977 ;nakamura et.al.,1986 ;tanyolac,1993) they suggest the bursa of fabricius, which is peculiar to birds, is the dorsal diverticulum of the proctodeum. While (click et al., 1956; davenport and allen,1995) suggest that the bursa is considered to be the equivalent of the aggregated ileal nodules in mammals which is the place where b-lymphocytes must reside to made the immune system completely competent.

Histological results disclosed that the wall of the bursa in quail consist of tunica mucosa, tunica muscularis and tunica serosa. It was determined that tunica mucosa forms the plicae (folds) at different length and thickness which prolongate towards lumen. The numbers of plicae in bursa of fabricius in quail were 14 (fig1) and that agree with (hassa, 1961; hadges, 1974; tanyolac, 1993). Tunica mucosa forms plicae towards the bursal lumen while the numbers of these plicae have been demonstrated about 12-14 in the most birds like helmeted guine fowl (onyeanusi et al.,1993). (hadges,1974 ;king and mclelland,1984) shown that the number of plicae on mucosa has been stated about 12 in domestic fowl, while the plicae was about

11-13 in the chicken (betti et al.,1991) and geese (gulmez and aslan, 1999).

The results impression suggests that the surface of plicae was surrounded by pseudostratified epithelium except at the apex of each follicle, which is covered by an epithelial tuft of simple columnar cells. Epithelium cells had usually an ovoid nucleus (fig 2). Many investigators have different ideas about the surface epithelium covering the inner surface of bursa of fabricius some investigators like (hassa, 1961; gillmore et.al.,1974; tanyolac,1993; kamo et.al.,1993) has demonstrated that the surface of plicae is covered with pseudostratified epithelium, the other (nickel et.al.,1977 ;king and mclelland,1984) have noticed that it is covered with simple columnar epithelium. There are different ideas about structure of the lymph follicles. (raviola,1967 ;freedman, 1984) has mentioned about the presence of two types follicles with button like or projection like formation.

The present study show that the lamina propria of each plicae was completely filled with follicles separated by connective tissue trabeculae (fig 3-a). Some follicles were in a direct contact with epithelium while others were completely surrounded by a connective tissue (thorbecke et al.,1957)

the results of present observation regarding that the follicles have forms and sizes different from one to another. Each follicles has a darker cortex with densely packed small lymphocytes and a lighter

staining, less dense medulla containing cells of various sizes (fig 3-a). The study showed that the measured of mean thickness of medulla were 193.02µm while the cortex were 85.03µm. The nodule has a darker staining cortex with densely packed small lymphocytes and the medulla contains cells of various sizes including lymphocytes and reticulum cells ,the plasma cells located in peripheral much less than in internal area (bradley and grahame ,1960). By histometrical measurements of geese, it was determined that the mean thickness of cortex and medulla of the lymphoid follicles in plicae were 89.06µm and 196.8µm respectively (gulmez and aslan, 1999).

the histological study for the quail bursa of fabricius showed that the a layer of undifferentiated epithelial cells occupies the periphery of the medulla, which is separated from the cortex by a capillary layer. Tunica muscularis surrounding the mucosa, had been formed by an outer layer of longitudinal fibers and an inner layer of circular fibers. Blood vessels of sub serosa under the tunica serosa were also seen in connective tissue of tunica mucosa and tunica muscularis. The result observe numerous blood vessels at the cortex of follicles, but it could not observe any in the medulla (fig 3-a,b). There were macrophages among the lymphocytes and the connective tissue under surface epithelium rarely had eosinophilic granulocytes (hodges, 1974; özcan, 1984; glick and olah, 1987; yilmaz et al., 1996).

Fig 1 :

1. Bursa of fabricius lumen
2. Pseudostratified epithelium
3. lobule
4. Tunica mucosa
5. Tunica muscularis
6. Tunica serosa



(H&E) ×40

Fig 2 :

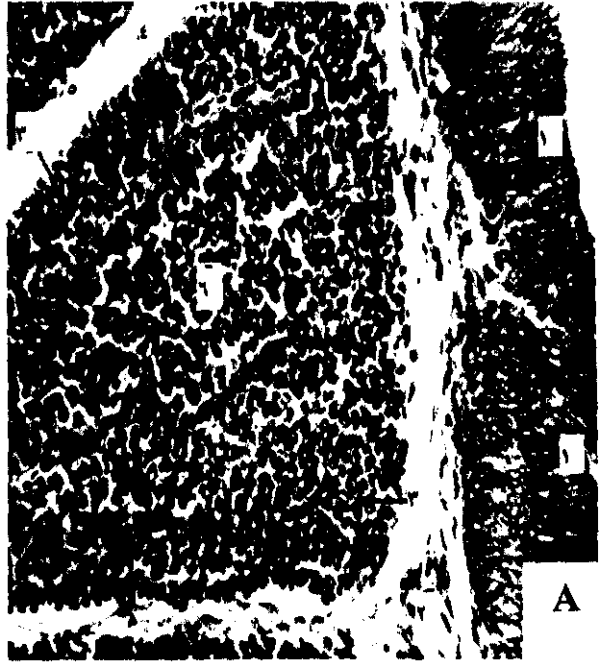
1. Bursa of fabricius lumen
2. Pseudostratified epithelium
3. coonective tissue trabeculae
4. Medulla of lobule
5. Cortex of lobule
6. Epithelial tuft



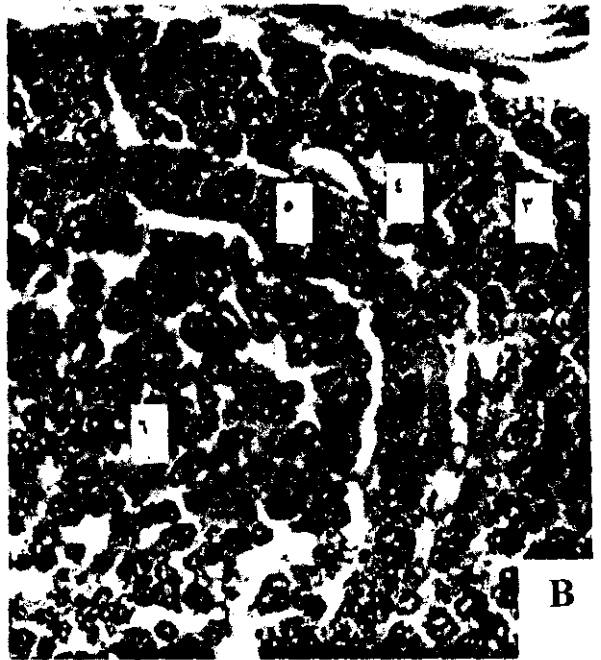
(H&E) ×100

Fig 3 A,B:

- 1.Pseudostratified columnar epithelium
- 2.Lamina propria
- 3.Cortex of lobule
- 4.Capillary filled with blood
- 5.Undifferentiated epithelial cells
6. Medulla of lobule



(H&E) ×100



(H&E) ×400

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الملخص العربي

دراسة نسيجية لجراب فابريشيا في طيور السمان

(*Coturnix coturnix japonica*)

حسن سعد عبد الحسين التميمي ، جنان صاحب حسين ، بشرى سعدي رسول

قسم الثروة الحيوانية - كلية الزراعة - جامعة بغداد

يستهدف البحث الحالي دراسة التركيب النسيجي لجراب فابريشيا في طيور السمان الياباني . استخدم في هذه الدراسة عشرة طيور بالغة بعمر تسعة اسابيع حيث خذرت الطيور بواسطة استنشاق الكلوروفورم الموضوع في حجرة مغلقة . بعد اجراء التقلية التشريحية تم عزل جراب فابريشيا من كل الطيور وذلك لاجل اجراء اختبار الفحص النسيجي .

التركيب النسيجي لجراب فابريشيا بصورة عامة متشابه في اغلب الطيور فهو اشبه بكيس يوجد على هيئة رتج ظهري في الجزء الخلفي لأدمة جدار المخرج .

الفحص النسيجي لجراب فابريشيا اظهر بان جدار الجراب في طيور السمان يتكون من الغلالة المخاطية ، الغلالة العضلية والغلالة المصلية . تكون الغلالة المخاطية ثنيات (طبقات) ذات طول وسماك مختلف وهي ممتدة باتجاه تجويف الجراب . عدد الثنيات في جراب فابريشيا لطيور السمان هو ١٤ ثنية . سطح الثنيات محاط بظهارة مطبقة كاذبة عدا قمة الثنيات حيث تحاط بظهارة عمودية بسيطة مكونة ما يسمى بالفتيلة الظهارية . غالبا ما تكون انوية الخلايا الظهارية بيضوية الشكل .

نتائج الدراسة الحالية تظهر بان الصفحة القاعدية لكل ثنية تكون مشغولة بشكل كامل بثنيات مفصولة عن بعضها بواسطة نسيج ضام . كل ثنية تتكون من محفظة معتل سمكها ٨٥.٠٣ ميكرون ولب معدل سمكه ١٩٣.٠٢ ميكرون .

الدراسة النسيجية لجراب فابريشيا في طيور السمان اوضحت بان هناك طبقة من الخلايا الظهارية غير متميزة تحتل السطح الجداري للثنية وهي مفصولة عن المحفظة بواسطة طبقة شعرية .

الغلالة العضلية المحيطة بالغلالة المخاطية تتكون من طبقة خارجية من الالياف الطولية وطبقة داخلية من الالياف الدائرية .

النتائج بينت بان التغذية الدموية للطبقة تحت المصلية تتغلغل داخل الغلالة العضلية والنسيج الضام للغلالة المخاطية كما وان الدراسة اثبتت وجود تغذية دموية داخل محفظة الثنيات وعدم وجودها في اللب .