ANATOMICAL ,HISTOLOGICAL AND HISTOCHEMICAL STUDY OF THE PROVENTRICULUS OF COMMON MOORHEN (*GALLINULA CHLOROPUS*)

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(Received 23 November 2015 , Accepted 28 December 2015)

Key words: Proventriculus, Common Moorhens, Anatomy.

ABSTRACT

The present work is designed to anatomical, histological and histochemical study of the proventriculus of common moorhen (*Gallinula chloropus*). Thirty adult common moorhen which obtained from a commercial market of (Al Basra city) were used in this study, and the work conducted at veterinary medicine collage –university of Basra. The anatomical study revealed that the proventriculus of common moorhen was tubular in shape with average mean of its length and width (20.00±.7906 mm),(10.48±.1.53194mm) respectively. The internal surface of the proventriculus was smooth and raising no papilla. The proventriculus connect with esophagus cranially and with muscular stomach caudally, It lies essentially in the vertical plane. The histological study showed that the proventriculus of common moorhen consist of four tunics (mucosa, submucosa, muscularis externa and serosa).The mucosal layer of characterized by branched longitudinal folds (villi) lined by simple columnar epithelium, the sub mucosal layers manifested by presence of compound tubular glands which was arranged in pyramidal or conical shape (adenomere), while muscularis externa consist of two layers longitudinal inner and outer layer was circular. The tunica serosa composed of loose connective tissue covered by mesothelum. The statistic analysis revealed that the average lengths of villi and adenomere were (74.50 ±14.72mm), (107.63±45.81mm) respectively, while the average width of villi, tunica sub mucosa, adenomere, muscularis externa and serosa were (8.75±2.36 mm), (143.12±30.37mm), (85.62±54.76mm), (22.12±6.29mm), (2.50±.00mm) respectively. The histochemical study of proventriculus showed that the carbohydrate have positive reaction with shiff reagent in the surface epithelium

sub mucosal glands, tunica muscularis and serosa. While the glycogen granules distributed in the epithelium, around the sub mucosal glands and in tunica muscularis.

INTRODUCTION

The stomach of birds anatomically composed of two chambers: a cranial chamber (proventriculus) which connect to the esophagus and caudal chamber (ventriculus) which connect with duodenum (1). The glandular stomach in chicken characterized by spindle shape which arises directly without any demarcation line from esophagus, while its separated from gizzard by intermediate zone (isthmus) (2). The internal surface of the proventriculus showed raised papillae, over its entire surface (3).These papilla secrete the digestive juices, which consist of a mixture of digestive enzymes, hydrochloric acid and mucine (4). The tunica mucosa of proventriculus represented by folds lined by simple columnar epithelium (5). Lamina propria of the proventriculus is typical and contains simple tubular glands and lymphatic tissue (6).The tunica sub mucosa having the great thickness which consist of sub mucosal glands (adenomeres), these glands were simple tubular to simple branched tubular glands (7). The muscularis externa of the proventriculus consists of inner longitudinal and outer circular layers of smooth muscles fibers, followed by tunica serosa which composed of connective tissue covered with mesothelum (8). The moorhens are water birds of a size like that of small duck, they live on the riversides, water shelves and among the river plants like reeds and characterized by a red or white color in their foreheads (9). The moorhens are present in the Arab homeland, where they present in morocco , Egypt, sham and extend east to Iraq and Arab gulf till the frontiers of Iran and middle of Asia and most the European countries (10).

MATERIALS AND METHODS

Thirty adult common moorhen (*G.chloropus*), which obtained from a commercial market in (Al Basra city) were used in this study. After total anesthesia by inhalation of chloroform, making longitudinal incision at the midventral surface and heart puncture to insure complete bleeding occur the gastrointestinal tract were removed from esophagus to the vent. Ten birds of common moorhen fixed in 4% formalin for general internal and external feature of proventeiculus and study the length and width of this organ by using vernia. For histological and histochemical

study the gastro intestinal tract are carefully dissection and the proventriculus removed and fixed in 10 % formalin (11), then dehydrated with series concentration of ethyl alcohol (70%, 90%, 100%, 100%) and embedded in paraffin wax, then sectioned by rotary microtome to 5-6 micrometers, the histological sections then stained with hematoxylin and eosin and special stains (Van Gesion, Masson trichrom, Best Carmin and PAS). (12).

RESULTS AND DISCUSSION

The anatomical study revealed that the stomach of common moorhen was divided in to two parts, glandular compartment or (proventriculus) and muscular compartment (ventriculus), these two compartment separated from each other by inter mediate zone (isthmus) (Fig.1). The results was agreement with (13) in domestic birds, and (14) in sea gulls, and disagree with (15) who reported that the stomach of birds consists of three compartments; proventricular, ventricular and pyloric part. The proventriculus of common moorhen was tubular in shape, with average length and width (20.00±.7906mm),(10.48±.1.53194mm) respectively. The glandular stomach was connect cranially by esophagus with no demarcation except in diameter between these two organs ,this finding was similar with (2) and disagree with (16) in duck who revealed that the demarcation by different in the color (the esophagus was whitish while the proventriculus was light brown). The internal surface of proventriculus common moorhen was smooth and having no papilla this result was agreed with (16) in duck and disagree with (17,18) (Fig.1).The proventriculus connect with esophagus cranially and with muscular stomach caudally, It lies essentially in the vertical plane, the left surfaces of the glandular stomach is close to the left lobe of liver, while the right side of provenrticulus attached to spleen, the cranial part of the of the dorsal surface of proventriculus separated from the ventral surface of the lung by cranial thoracic air sac. The caudal part of the dorsal surface was separated from the ovary by left abdominal air sac. these results agree with (16) in duck and Pigeon. The histological result of the proventriculus of common moorhen showed that the its consist of four main tunic (tunica mucosa ,tunica sub mucosa ,tunica muscularis and tunica serosa), this results in agreement with (19).

Tunica mucosa

The tunica mucosa of proventriculus composed of folds which varied in its heights that' match with (20) in quail. These folds was branched this results in agreement with

(21) in burrowing owl. The tunica mucosa consist of three layers (epithelium, lamina propria and muscularis mucosa) (Fig. 2), the similar finding recorded by (22) in chicken. The average length and widths of villi was (74.50 ±14.72mm),(8.75± 2.36mm) respectively, while the mean of the thickness of the tunica mucosa was (83.50± 14.27mm).

Epithelium

The tunica mucosa was lined by simple columnar epithelium with goblet cells in agreement with (23).

Lamina propria

The lamina propria extend to the center of the mucosal folds as a core of connective tissue, contain blood and lymphatic vessels and numerous superficial glands, these glands was simple tubular founded in the base of the villi (Fig.2) in agreement with (24).

Muscularis mucosa

The muscularis mucosa, consist of single layer of smooth muscle fibers between lamina propria and sub mucosa (Fig.2) in agreement with (23).

Tunica sub mucosa:

The sub mucosa had greatest thickness of proventriculus wall (143.12±30.37mm). Sub mucosa consist of tubule alveolar glands, which called the deep gastric glands, the same results was found by (25) in partridge. These glands arranged as pyramidal shape named adenomere, which separated from each other by thin areolar connective tissue in agreements with (16) in duck and Pigeon. It is lined by cuboidal to low columnar cells, these adenomeres was elongated with mean of width and length (85.62± 54.76mm), (107.63±45.81mm) respectively .

Tunica muscularis

The tunica muscularis had two layers of smooth muscles, inner was thick and arranged in longitudinal manner while the outer was thin and arranged in circular manner, this results was agreed with (16) in duck and pigeon, and disagree with (8) who revealed that the tunica muscularis of fowl composed of three layers of smooth muscle, inner and outer layers was arranged longitudinally while middle was circular. The average mean of tunica muscularis thickness is (22.12±6.29mm).

Tunica serosa

This tunica consists of connective tissue rich in blood vessels, nerve plexus,and adipose tissue covered by mesothelium (Fig.2), the same results was found by (8).The average thickness of this tunica (2.50± .00mm).

The histochemical study revealed that the poly saccharid had positive reaction to shiff reagent (when the section stain with P.A.S stain) in the surface epithelium, sub mucosal glands, muscularis externa and serosa that's agree with (15) in fowl, while the section which stain with best carmine showed that the distribution of glycogen granules in the epithelium and surrounding the glands and tunica muscularis also in tunica serosa (Fig.3) these results in agreement with (26).

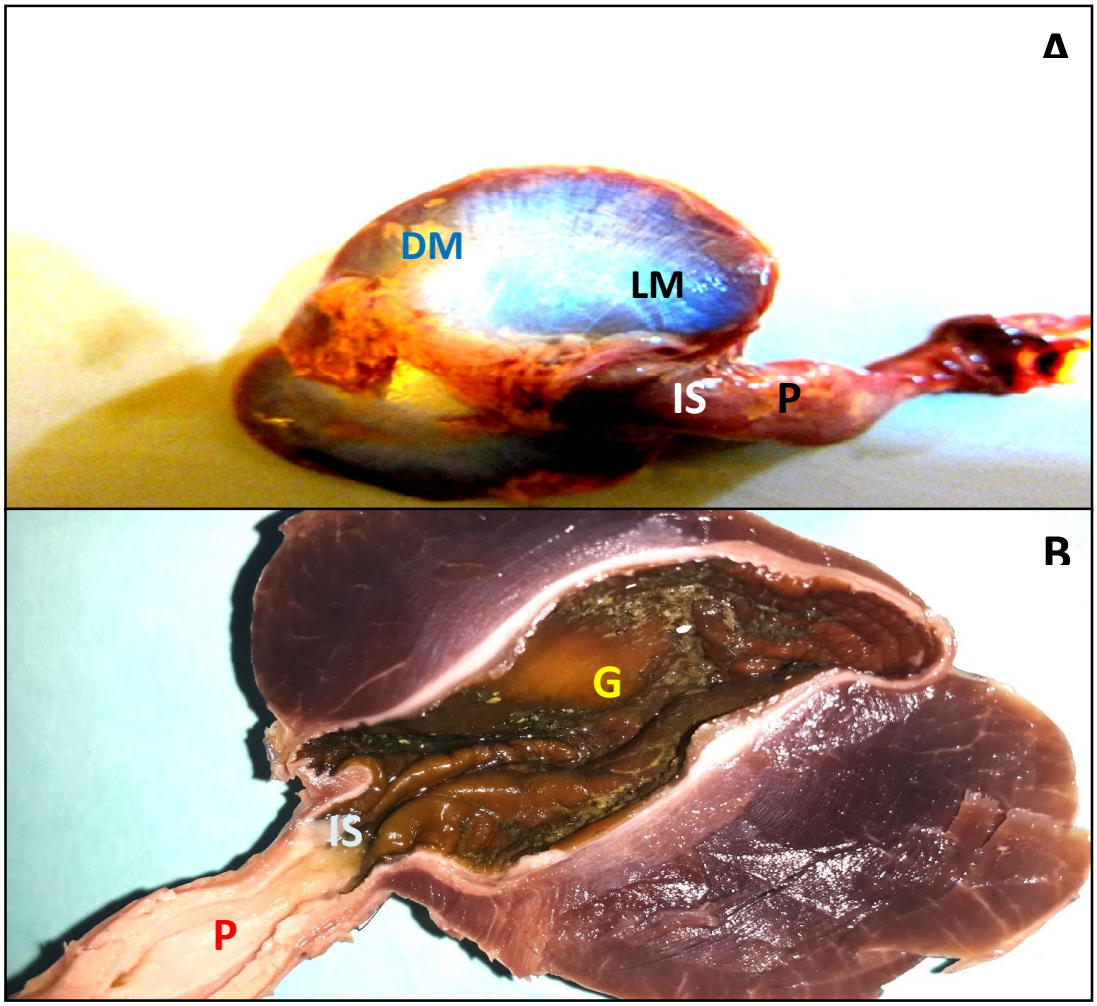

Figure (1)The anatomical structures of the stomach of common moorhens showing
A- Dorsal surface of the stomach of common moorhen: proventriculus (P), isthmus (IS), light muscle (LM), dark muscles (DM).
B- Internal surface of stomach : proventriculus (P), isthmus (IS), gizzard (G).

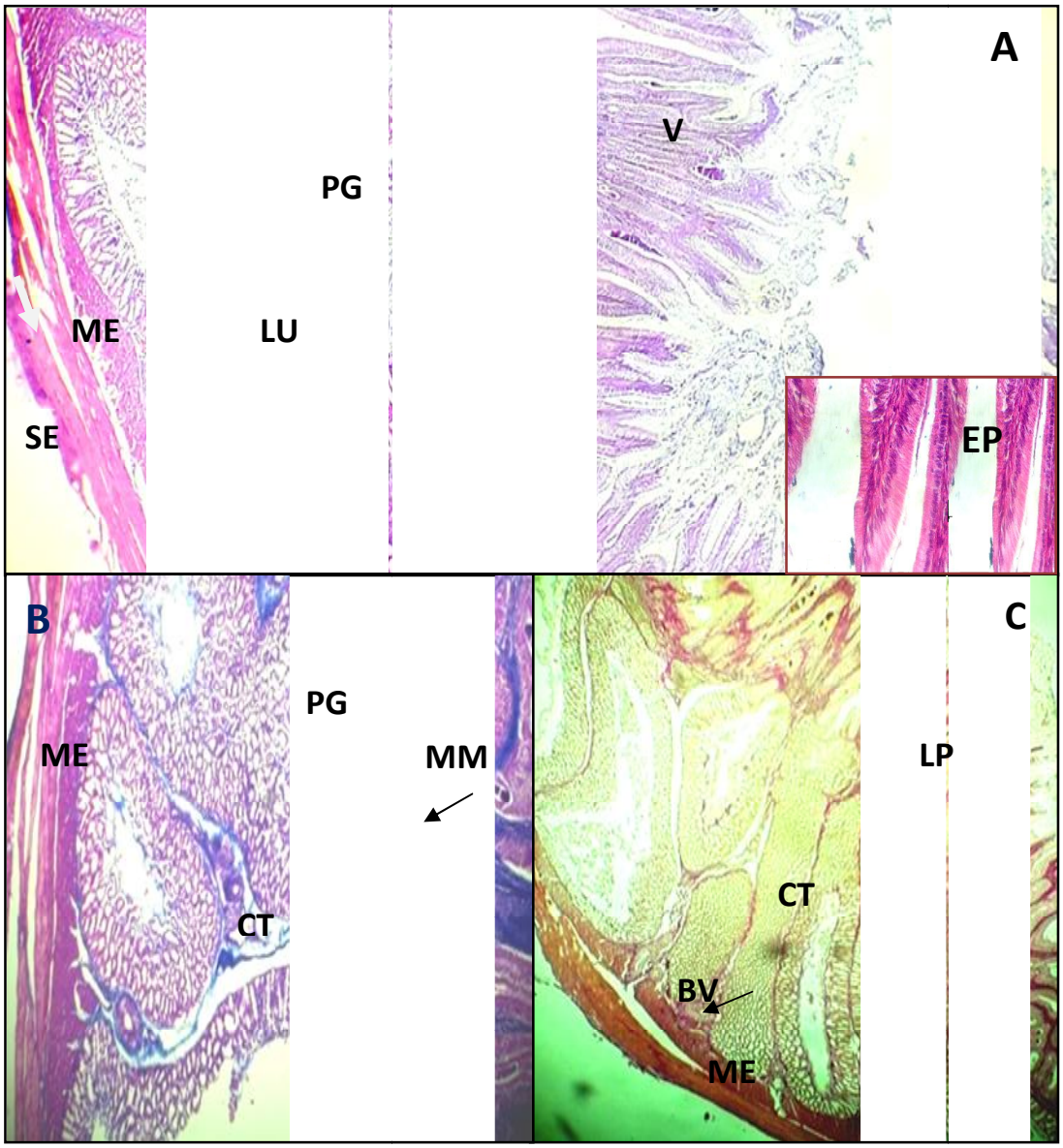

Figure (2): Cross section of proventriculus of common moorhens showing

A- Epithelum (EP), villi (V), proventriculus glands(PG), lumen (LU), muscularis externa (ME), serosa (SE). (H&E stain4x).

B- Muscularis mucosa (MM), proventriculus gland (PG), connective tissue(CT), muscularis externa (ME) (Masson trichrom stain4X).

C- The distribution of collagen fibers in: lamina proprea (LP), connective tissue(CT), blood vessel (BV), muscularis externa (ME), serosa (SE) (Van Gieson stain 4X).

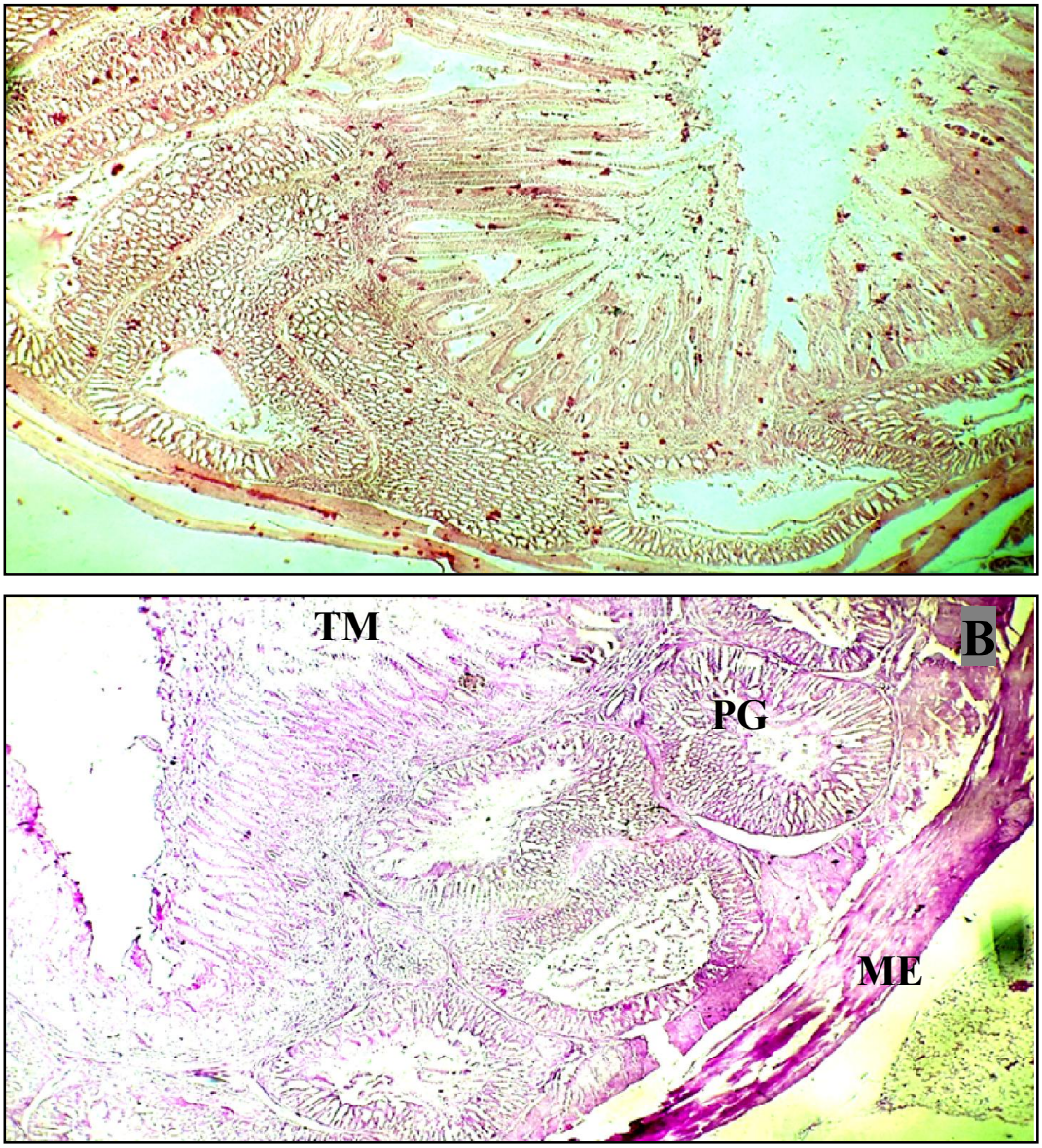

Figure (3). Cross section of proventriculus of common moorhens showing

A- The distribution of glycogen granules in : tunica mucosa (TM), proventriculus glands (PG), mscularis externa (ME) (Best carmine stain 4x).

B- The distribution of poly saccharid in tunica mucosa (TM) ,proventriculus glands (PG), connective tissue (CT) , muscularis externa (ME) .(PAS stain 4x).

دراسةتشريحية،نسجية، وكيمياء نسجية للمعدة الغدية لدجاج الماء

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الخلاصة

صمم هذا العمل للدراسة التشريحية والنسيجية والكيمياء نسيجية للمعدة الغدية في دجاج الماء.استخدمت ثلاثون طير من دجاج الماء التي ابتاعت من سوق المحلي في محافظة البصرة وتم العمل في مختبرات الطب البيطري جامعة ألبصرة.أظهرت الدراسة التشريحية إن المعدة ألغديه لدجاج الماء تكون أنبوبية الشكل بمعدل طول وعرض (20.00±.7906mm),(10.48±.1.53194mm)على التوالي. يكون السطح الداخلي للمعدة الغديه أملس ولا يحتوي على بروزات. تتصل المعدة الحقيقية مع المريء أماميا ومع المعدة العضلية خلفيا. بينت الدراسة النسجية إن المعدة الغدية تكونت من أربعة طبقات (المخاطية، تحت المخاطية، العضلية الخارجية،والمصلية) تميزت الطبقة المخاطية للمعدة الحقيقية بوجود طيات طولية متفرعة (الزغابات) تبطن بظهارة عمودية بسيطة أما الطبقة تحت المخاطية فتميزت بوجود غدد نبيبية مركبة تعرف بالغدد تحت المخاطية تترتب بشكل مخروطي أو هرمي. تتألف الطبقة العضلية من طبقتين من العضلات الملساء داخلية طولية وخارجية دائرية. تليها الطبقة المصلية المؤلفة من نسيج ضام رخو. أظهرت نتائج التحليل الإحصائي ان معدل طول الزغابات والغدد تحت المخاطية (107.63±45.81mm), (74.50 ±14.72mm) على التوالي بينما بلغ معدل عرض كل من الزغابات، الطبقة تحت المخاطيه ،والغدد تحت المخاطية،والطبقة العضلية والطبقة المصلية(8.75± 2.36mm)،(143.12±30.37mm)، (85.62±54.76mm)، (22.12±6.29mm)، (2.50±.00mm) على التوالي. أظهرت الدراسة الكيمياء نسجية إن الكاربوهيدرات تتفاعل ايجابيا مع عامل شيف في الطبقة الطلائية والطبقة تحت المخاطية والطبقة العضلية والمصلية بينما حبيبات الكلايكوجين تتوزع في الطبقة الطلائية وحول الغدد والطبقة العضلية .

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