MORPHOLOGICAL STUDY OF AIR SACS (*Sacci pneumatici*) IN WHITE CHEEKED BULBUL*(Pycnonotus leucotis)*

Shaymaa K. Jaifar, Alaa A. Sawad

Department of Anatomy and Histology, College of Veterinary Medicine, University of Basrah. Basrah,Iraq

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Key words: air sac, white cheeked bulbul, corrosion cast.

ABSTRACT

The study was designed to observed the anatomical features of the air sacs *(Sacci pneumatici)*in White Cheeked Bulbul *(Pycnonotus leucotis*) Ten healthy birds from white cheeked bulbul used, five birds extract the part of trachea and incision it after anaesthetized , then insert the cannula through trachea and injected the cold cure mixture for corrosion cast making. and macerated by 2% (KOH) for 4 days. and . Five birds used for imaging examination, barium sulphate suspension were injected via the trachea using plastic syringe, for radiographic procedure. The number of the air sacs in bulbul (nine) air sacs, cervical ,cranial and caudal thoracic and abdominal air sac , single air interclavicular.

The shaped and locations of these sacs described by using the cold cure corrosion cast and Radiological examinations.

INTRODUCTION

The avian respiratory organs differ from mammals that's some structures modified for flight, voice production and thermoregulation mechanism. The respiratory system plays an important role in thermoregulation (maintaining normal body temperature) (1,2).

The respiratory system of birds possesses relatively small lungs in comparative with mammals and nine air sacs . (3). The air sacs namely; unpaired clavicular sacs, paired cervical and paired cranial and caudal thoracic sacs and abdominal sacs (4,5).

The air sacs responsible for pulmonary ventilation ,their poorly vascularized walls and as such do not significant contribute to gas exchange in bird.(6,7,8,9,5,10,11,12).

In geese had nine air sacs, four paired air sacs(cervical, cranial thoracic, caudal thoracic,and abdominal thoracic)and one unpaired clavicular sac(13).

In chicken has eight air sacs: single cervical and clavicular ,and paired cranial thoracic ,caudal thoracic ,and abdominal thoracic (14)

The mallard ducks have five air sacs; unpaired cervical sac, unpaired clavicular sac, paired cranial thoracic and caudal thoracic sacs, and paired abdominal sac (15,16,11).

MATERIALS AND METHODS

Ten clinically healthy bulbul birds (*pycnonotus leucotis*), weighting where purchased from Al-Basrah city markets, for anatomical study, inhalation anesthesia was achieved by chloroform in closed glass chamber. In order to show and demonstration of air sacs, Two different materials were used in the present investigations;

five birds extract the part of trachea and incision it after anaesthetized , then insert the cannula through trachea and injected the cold cure mixture via disposable syringe,the feather, skin and muscle was removed and macerated by 2% (KOH) for 4 days, then washed by tab water ,coloring by oil paints and examined. (17).

five birds used for imaging examination, barium sulphate suspension were injected via the trachea using plastic syringe, the radiographic procedure execution by using 100mA with standard rotating anod 150kv X-ray tube.The focal film distance was 100 cm and exposure setting 170 milliampere/ sec and 78 kv.The birds positioned latero-laterally(LL), ventro-dorsally (VD).

RESULT

The number of the pneumatic sacci are a nine ;One single sac(interclavicular) and four paired air sacs(cervical, cranial and caudal thoracic and abdominal air sacs) (figure 1,2,3,4,5) . located in the body cavity among the viscera, and these related to the lung, these sacs found between muscles and pneumatic bones of limbs, pectoral ,pelvic girdle

Interclavicular Sacs: it's single sacs , enclosed by the shoulder girdle, lies beneath the trachea and ventral to the lung and cranial to the heart at the thoracic inlet.(figure 3,4,5) .

Cervical sacs:

it's bilaterally located at the neck on each side of vertebral column .The sac consists of two diverticula; the intermuscular diverticula,, protruded as a spear like shaped located between the cervical vertebrae and the muscle of the shoulder girdle where it fused with clavicular air sac to form cervicoclavicular sac and the vertebral diverticula, while the tubular part which lied on lateral of the vertebral column.(figure 1,2,3,4,5).

Cranial thoracic sac:

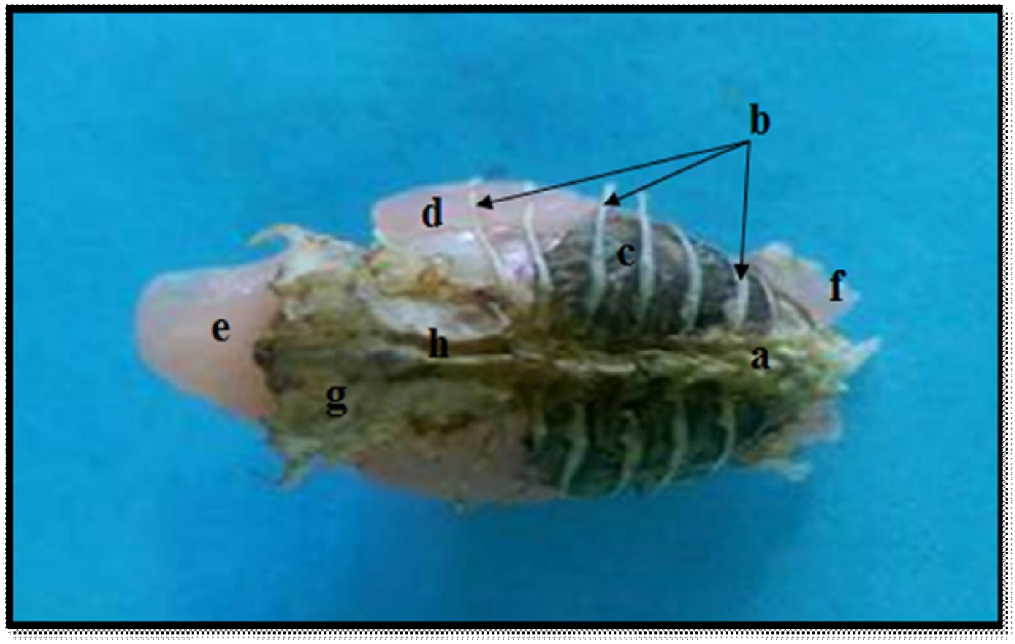
This sac is paired, lies ventro-lateral to the lung, medial to sternal ribs, and lateral to the heart, liver and caudal part of the esophagus ,it's smaller than the caudal thoracic sac, and it's had no diverticulum.(figure 2,3)

Caudal thoracic sac:

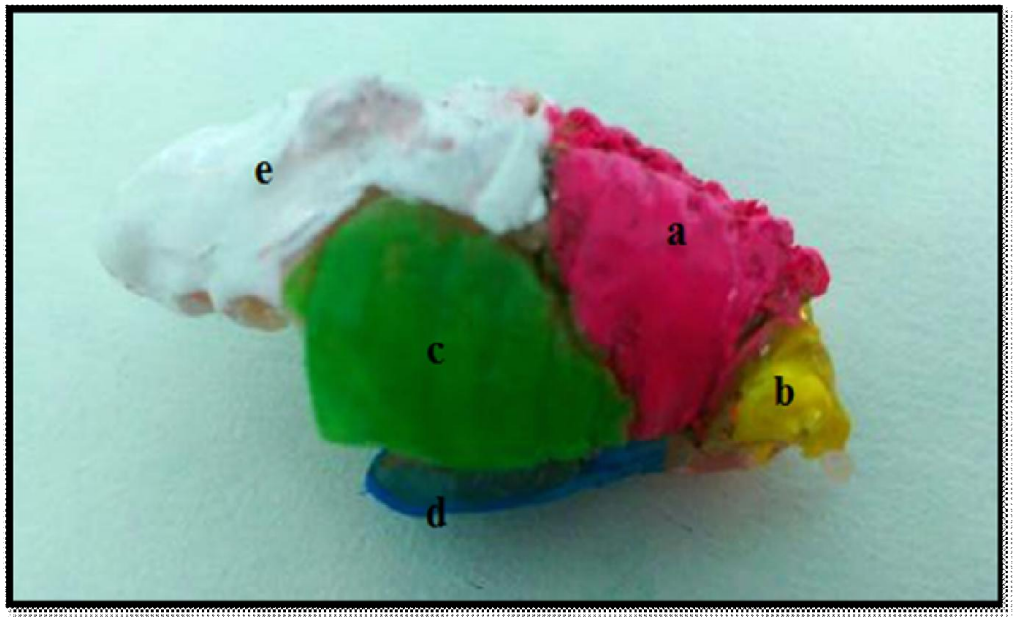
consists of paired sacs located caudovental to the lung, caudal to the cranial thoracic sac it's almost larger than the cranial. The caudal thoracic sac was encircled dorsally by the abdominal sac and ventrally by the cranial thoracic sac .it had no diverticulum (figure 1,2,3,5)

Abdominal sac:

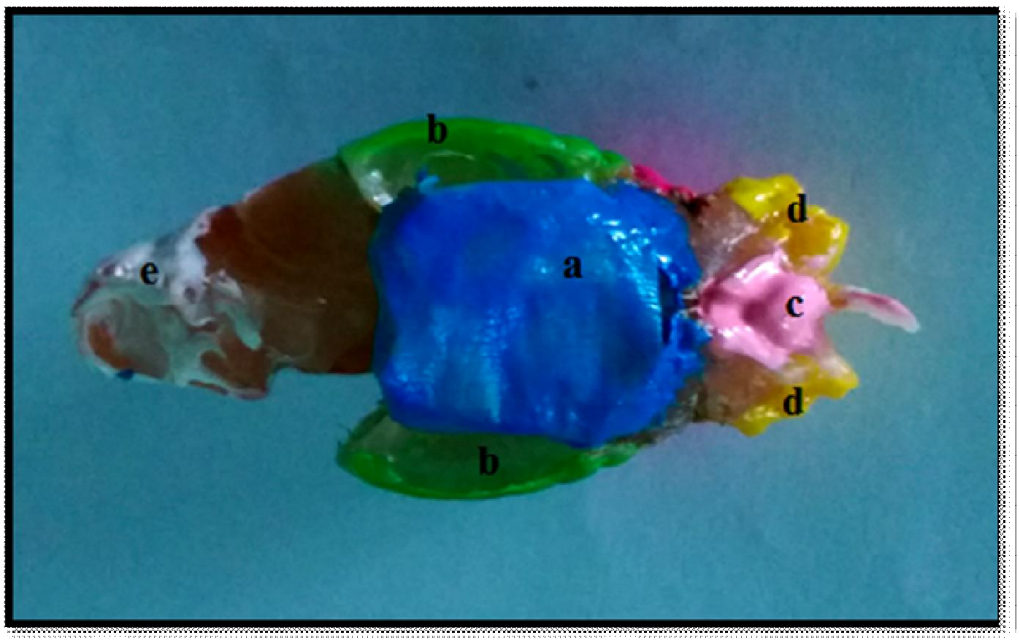
it's the largest sac ,occupied on the abdominal cavity , it's symmetrically and located as two part in the abdomen. The lateral surface was smooth while the medial surface have an irregular structure due to the presence of the viscera. The cranial part aerated the last three ribs and synsacrum whereas the caudal part was smaller and narrowed than the cranial part. (figure, 1, 2, 3,4, 5).



Figure(1):Corrosion cast of dorsal view of air saca; (a)Vertebral column, (b)Ribs, (c)Lung, (d)Caudal thoracic air sac, (e) Abdominal sac, (f)Cervical air sac, (g)Pelvis (h) Synsacrum



Figure(2): Corrosion cast of lateral view of air sacs; (a) Lung, (b) Cervical air sac, (c) Caudal thoracic sac, (d) Cranial thoracic sac, (e) Abdominal sac.



Figure(3):Corrosion cast (ventral view) of the white eared bulbul of air sac;(a) Cranial thoracic air sac, (b)Caudal thoracic air sac, (c)Clavicular air sac, (d)Cervical air sac, (e)Abdominal air sac.

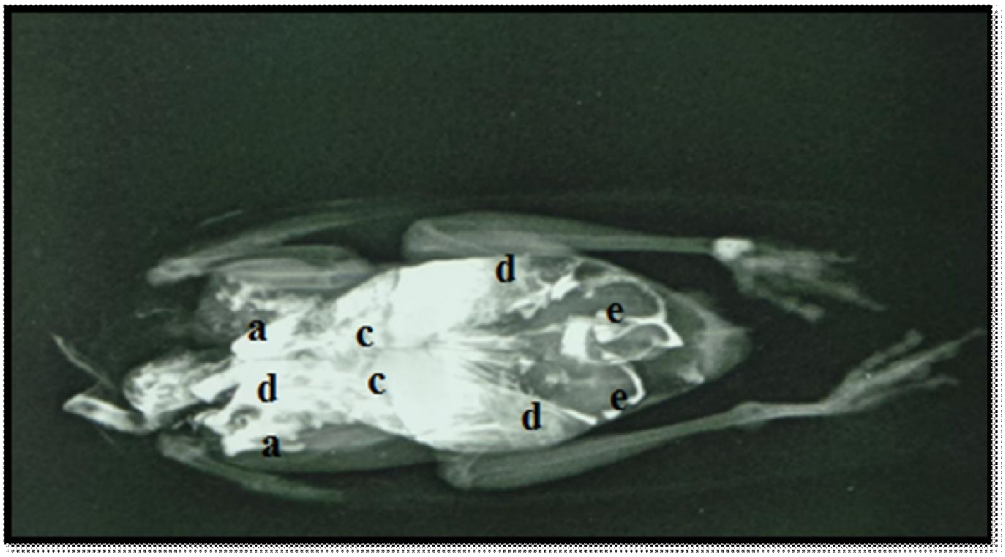
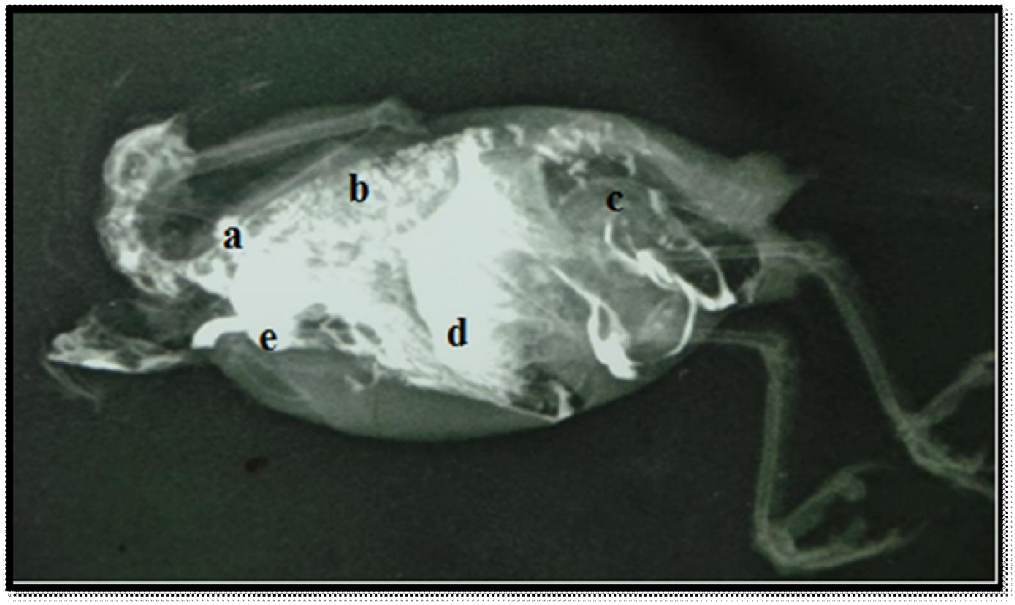


Figure (4): Radiological ventro-dorsal view of air sacs;(a)cervical air sac,(d) Interclavicular air sac,(c) Cranial air sac,(d) Caudal air sac,(e)Abdominal air sac



Figure(5): Radiological lateral view of air sacs;(a)Cervical air sac,(b) Lung, (e)interclavicular air sac,(d) Caudal air sac, (c)Abdominal air sac.

DISCUSSION

The present study revealed that the (nine) air sacs in white eared bulbul One single sac(interclavicular) and four paired air sacs(cervical, cranial and caudal thoracic and abdominal air sacs).match with(13,15) that noted nine air sacs in geese, long-legged buzzard, and disagreement with(5,14, 12,11,18) who reported that the number of the air sacs in chicken ,Japanese quail,

mallard duck, golden pekin duck and are eight sacs. This differs with(19) reported that the number of the air sacs in turkey are seven, (7)noted that air sac in goose are eleven.

1- Interclavicular Sacs: it's single sacs , enclosed by the shoulder girdle, lies beneath the trachea and ventral to the lung and cranial to the heart at the thoracic inlet. similar with(13)in geese.

2-Cervical air sac: its bilaterally located at the neck on each side of vertebral column. The air sac was fused with clavicular air sac to form cervicoclavicular sac that agreement with (13) in geese.

3- Cranial thoracic air sac ;This sac is paired, lies ventro-lateral to the lung, medial to sternal ribs, and lateral to the heart, liver and caudal part of the esophagus ,it's smaller than the caudal thoracic sac, and it's had no diverticulum ,match with(13) in geese. unsimilar with (20) showed that the cranial thoracic sac is larger one in long-legged buzzard

4-Caudal thoracic air sac consisted of paired ,flat, asymmetrical air sac found caudal-ventral to lung, it larger than cranial thoracic air sac . This not match with (16) who explained that the cranial thoracic sac is larger than the caudal in Denizili cock. and unsimilar with (21) who noted that the caudal thoracic absent in white Pekin duck.,while (11)was present in the mallard duck,it had no diverticulum this result match with(14)

5-The abdominal sac were the largest and occupy at the caudodorsal part of abdominal cavity ,where contact with intestine, gizzard, kidney, adrenal gland The sac wall fused dorsally with the kidneys to the floor of mesentery and became free to step down into the abdominal cavity (22).

دراسة شكليائيه للأكياس الهوائية في البلبل الأبيض الخدين

شيماء كاظم جعفر ،علاء عبد الخالق سواد

فرع التشريح والانسجه،كلية الطب البيطري، جامعة ألبصره ،البصرة ،العراق.

الخلاصة

صممت الدراسة للتعرف على الصفات التشريحية للأكياس الهوائية في طائر البلبل الأبيض الخدين ، استخدمت عشرة طيور خاليه سريريا من الامراض،قسمت الى مجموعتين، تم عمل شق في القصبه الهوائيه في خمسه من الطيور بعد تخديرها وحقن مزيج البوليمر اعمل القالب التاكلي،عضنت في محلول هيدروكسيد البوتاسيوم تركيز 2% ولمدة أربعة أيام .

استخدمت خمسة من الطيور للمجموعه الثانيه للتصوير الشعاعي بعد حقنها بمعلق سلفات الباريوم عن طريق القصبه الهوائيه بواسطة محقنه بلاستيكيه نبيذه.

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