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Gross anatomical studies on the sternum of crow (*Corvus splendens*)

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Abstract

Gross anatomical features of the sternum in crow (*Corvus splendens*) was studied using specimens collected from birds brought for post-mortem at the Department of Pathology in the College of Veterinary and Animal Sciences, Mannuthy. The sternum was extensive and extremely thin with a total length of 4.63 ± 0.11 cm and width 2.65 ± 0.11 cm. The large ventrally directed keel or carina was triangular in shape, wide cranially (1.29 ± 0.08 cm) and narrow and tapering caudally for attachment of flight muscles. The manubrial spine was of moderate size, projecting from the rostral most border of sternum and bifid cranially. The cranial border of the body of the sternum showed well developed, elongated transversely directed facets for articulation with the distal extremity of coracoid bones. Lateral borders of the body presented five costal facets on either side for articulation with the sternal ribs. The body of sternum was roughly rectangular in shape and showed a pair of short cranio-lateral and long caudolateral processes. The caudal border was straight and presented on either side a 'U' shaped notch between the caudolateral process and lateral border of body. The dorsal surface was concave from sides to midline and there were several pneumatic foramina arranged linearly on the midline for communication with airsacs. The anatomical peculiarities of sternum in the crow may be correlated with its flight adaptations and scavenging behaviour of the species.

Keywords: Crow, sternum, gross anatomy

1. Introduction

Crows can be found all over the world in a variety of habitats. There exists an obligate association between habitat of crows and human inhabitation and it is interesting to notice that no crow population are known to live independently of human population (Ryall, 2002) [1]. Crows are omnivores and they tend to feed on anything that comes their way. They are quite adaptable, scavenging feeding on a wide range of foodstuffs including rodents such as mice, rats, squirrels and fruits (Nyari *et al.*, 2006) [2]. Sternum in birds is a large unsegmented bone, which with its processes forms a considerable part of ventral body wall. It gives attachment to large flight muscle (Dyce *et al.*, 2010) [3]. Depending on flight or other habitat adaptation patterns, there is a considerable variation among different species of birds in the morphology, size and shape of sternum (Nickel *et al.*, 1986) [4]. Literature on gross anatomy of sternum in domestic fowl, pigeon, duck and goose are available in various text books of anatomy (Dyce *et al.*, 2010, Nickel *et al.*, 1986) [3, 4]. But, very minimal information is available on the sternum of crow and hence the present study was designed to provide basic data on the gross anatomy of sternum in this bird.

2. Materials and methods

The sternum of birds under study were collected from the specimens brought for post-mortem at the department of Pathology, College of Veterinary and Animal Sciences, Mannuthy. The specimens were boiled in water until the muscle tissue separated from the bone and cleaned with 10-15 % NaHCO_3 (Duzler *et al.*, 2006) [5]. The morphological and morphometric parameters of sternum were recorded.

3. Results and Discussion

The sternum was extensive and extremely thin in the crow. The body of sternum was roughly rectangular in shape, wide cranially and narrow caudally. The length of sternum was maximum at the middle part (4.63 ± 0.11 cm) and width was maximum at the cranial part (2.65 ± 0.11 cm). The sternum was 15 cm long and 3 cm wide in domestic fowl, in duck it was 11 cm long and 4 cm wide and in black drongo measured 3.2 cm long and 2.5 cm wide (Sumena and Lucy, 2015) [6]. The width of sternum in flying group of birds ranged between 2.4 cm to 6.5 cm (Duzler *et al.*, 2006) [5] which is in agreement with the results of present study in crow (Fig. 1 & 2).

The dorsal surface was concave from sides to midline and there were several pneumatic foramina arranged linearly on the midline for communication with airsacs. Similar observations were made in black drongo (Sumena and Lucy, 2015) [6], whereas in domestic fowl pneumatic foramina were seen only in the region of the mesosternum and in ducks there was only a single foramen located at the cranial border of the midline of the basal plate which tunnelled deep into the carina of the sternum.

The ventral surface was convex and carried the keel (carina) in the midline.

The large ventrally directed keel or carina was triangular in shape, wide cranially (1.29 ± 0.08 cm) and narrow and tapering caudally for attachment of flight muscles. The cranial border was concave and the apex of the carina was in level with the manubrium as in the black drongo (Sumena and Lucy, 2015) [6]. The ventral border of keel was convex and towards the caudal end it bifurcated in to two ridges and each of which joined the caudolateral angles of body of sternum, giving a triangular outline when viewed from caudal side. In domestic fowl, the carinal apex was located 4 cm behind while in duck it was about 0.5 to 0.7 cm in front of the manubrium (Sumena and Lucy, 2015) [6].

Lateral borders of the body at its cranial end presented five costal facets on either side for articulation with the sternal ribs. The lateral border at its middle part carried four facets on each side in drongo and fowl, whereas in duck there were six facets (Sumena and Lucy, 2015) [6].

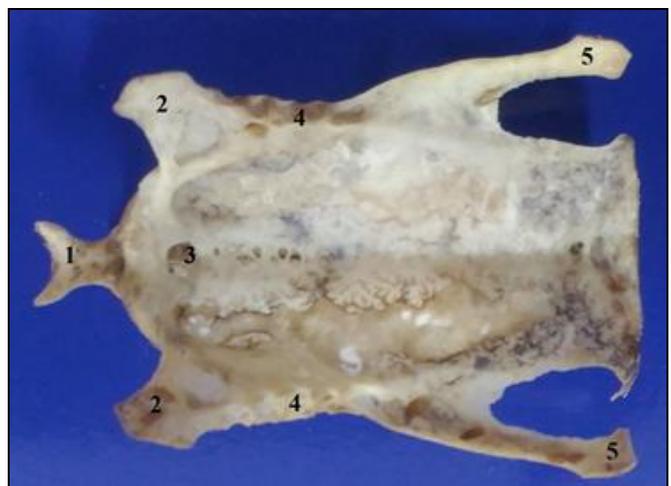
The manubrial spine was of moderate size, projecting from the rostral most border of sternum and bifid cranially. The cranial border of the body of the sternum showed well developed, elongated transversely directed facets for articulation with the distal extremity of coracoid bones. The craniolateral processes were short and broad and the caudolateral processes were long (1.31 ± 0.06 cm). The caudal border was straight and presented on either side a 'U' shaped notch between the caudolateral process and lateral border of body (Fig. 1 & 2).

The anatomical peculiarities of sternum in the crow were more simulating with that of black drongo, which may be correlated with the common flight patterns followed by the two species of birds. It can be concluded that the gross anatomical features of sternum in crow is well suited for the flight adaptations and scavenging behaviour of the species.



1. Sternal keel (Carina) 2. Apex of keel 3. Manubrial spine 4. Craniolateral process 5. Coracoidal sulcus 6. Articular facets for ribs 7. Caudolateral process

Fig 1: Sternum of crow - lateral view



1. Manubrial spine 2. Craniolateral process 3. Pneumatic foramina 4. Articular facets for ribs, 5. Caudolateral process

Fig 2: Sternum of crow - dorsal view

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