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Anatomy of the hyoid bone in camel (*Camelus dromedarius*)

R K JAIN[1], PAWAN KUMAR[2] and A N GUPTA[3]

CCS Haryana Agricultural University, Hisar, Haryana 125 004 India

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ABSTRACT

The hyoid bone of camel consisted of a body (basihyoideum) and 4 pairs of cornua, viz. thyroid cornu (thyrohyoideum), small cornu (ceratohyoideum), middle cornu (epihyoideum) and great cornu (stylohyoideum). The basihyoideum had no lingual process, however, a small tubercle was observed in place of lingual process. The stylohyoideum was the largest and the longest while the epihyoideum and thyrohyoideum were almost of the same length. The ceratohyoideum was the smallest.

Key words: Anatomy, Bone, Camel, Hyoid bone

The hyoid bone is an osseo-cartilagenous structure placed between rami of the mandible. The anatomical features of this bone in most of the domesticated animals are fully studied (Sisson and Grossman 1953, McLeod 1958, Miller *et al.*1964, Raghvan 1964, Getty 1975 and Nickle *et al.* 1986). However, the available literature lacks the data on camel except very brief general and fragmentary description is given by Lesse (1927) and Smuts and Bezuidenhout (1987). The hyoid bone plays an important role in supporting the pharynx, larynx and root of the tongue, so the present investigation was carried out to obtain the detailed description on the morphological features of the hyoid bone of camel and its differences from other domesticated animals.

MATERIALS AND METHODS

The hyoid bones were obtained from 6 heads of adult camels of either sex. The material was treated with dilute (50%) hydrochloric acid for 48 hr and then it was kept under running tap water till the flush was removed off. The periosteum was removed by gently scrubbing the bone with the help of a scalpul and a sharp knife. The bones were dried up at room temperature(approximately 30°C) for 24 hr and then they were subjected to the careful morphological examination.

RESULTS AND DISCUSSION

The hyoid bone (os-hyoideum) was the part of skeleton of face and was situated between rami of the mandible. It comprised several rod- shaped elements which articulated with each other. Rostrally, the hyoid bone was embedded in the root of the tongue, caudally, it was connected with the larynx, while dorsally, it articulated with the temporal bone. The part of the bone lying in the area between tongue and larynx were regarded as the hyoid, while those parts, which were directed upwards towards the skull constituted the suspensory apparatus. The hyoid consisted of 3 parts, viz. corpus ossis hyoidei or basihyoideum, thyrohyoideum and ceratohyoideum. The suspensory apparatus was attached to the ceratohyoideum and included epihyoideum and stylohyoideum (Nickle *et al*. 1986). The hyoid bone of camel consisted of a body (basihyoideum) and 4 pairs of cornua, viz. thyroid cornu (thyrohyoideum), small cornu (ceratohyoideum), middle cornu (epihyoideum) and great cornu (stylohyoideum).

Basihyoideum (body)

The body (Fig. 1) was small, short, diamond shaped and embedded in the root of the tongue. It was flattened dorsoventrally and slightly constricted in the middle. It measured 2.0 cm from before backward and 2.2 cm from side to side. Its rostral border bore 2 small and slightly convex facets, each of which faced rostrally for articulation with the ceratohyoideum. The caudal border carried 2 large concave facets which were very close to each other and each one faced caudolaterally for articulation with the wide rostral end of the thyrohyoideum. The basihyoideum of camel had no lingual process, however, a small tubercle had been observed in place of the lingual process during the present investigation. Smuts and Bezuidenhout (1987) reported that the basihyoideum of camel had no lingual process but they failed to observe any tubercle on this bone. In horse the basihyoid was a short transverse bar and presented the lingual process

Present address:[1]Associate Professor, [2]Assistant Professor, [3]Professor and Head, Department of Anatomy and Histology.

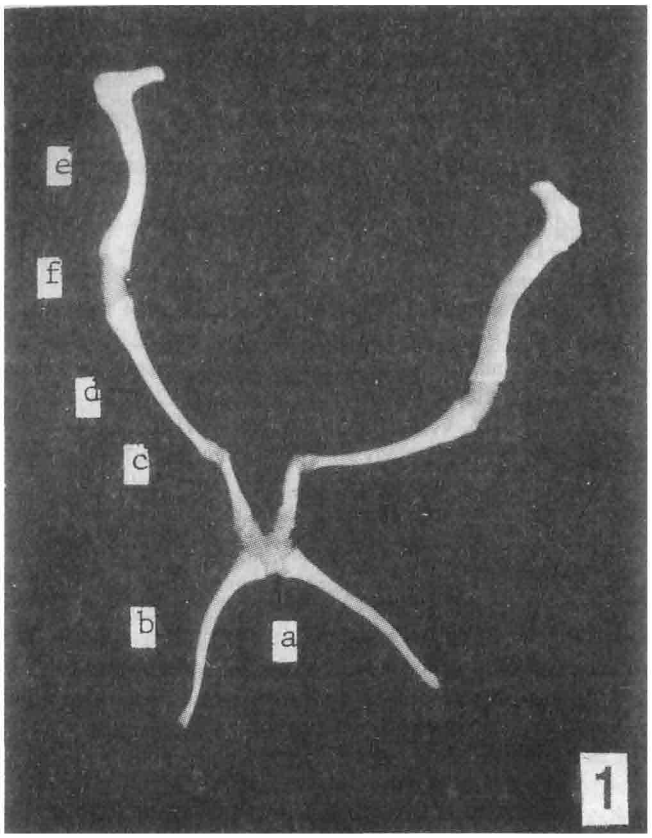

Fig. 1. The various segments of the hyoid bone in camel (*Camelus dromedarius*). a. Basihyoideum; b, thyrohyoideum; ceratohyoideum; d, epihyoideum; e, stylohyoideum; f, cartilage between the epihyoideum and stylohyoideum.

(Getty 1975 and Nickle *et al.* 1986). The anterior border of basihyoideum in camel gave attachment to the mylohyoideus, geniohyoideus and hyoglossus muscles while thyrohyoideus, sternohyoideus and omohyoideus muscles were inserted on its caudal surface.

Thyrohyoideum (thyroid cornu)

It was paired and strongly curved, the convexity being on the lateral aspect and marked at the middle to form an arch. Each cornu measured on an average 9.0 cm in length. It extended caudal and slightly dorsal from the concave facet present on the caudal border of the basihyoideum, where it was firmly attached to it by means of a cartilage. Smuts and Bezuidenhout (1987) reported in camel and Getty (1975) in horse that the basihyoideum was completely fused with the thyrohyoideum caudally. Getty (1975) reported in horse that the thyrohyoideum extended caudad and dorsad from the lateral parts of basihyoideum. In dog as in camel the thyrohyoideums were firmely attached to the basihyoideum by means of cartilage (Getty 1975). The cranial extremity of each thyrohyoideum was enlarged and appeared triangular in shape. It was situated very close to its fellow of the opposite side. The caudal extremity of each thyrohyoideum presented a small cartilage which was attached with the rostral cornu of the thyroid cartilage of the larynx. These extremities were widely separated from each other. The muscle stylohyoideus was inserted on the free end of the thyrohyoideum while the muscles ceratohyoideus and thyrohyoideus were inserted on its rostral border.

Ceratohyoideum (small cornu)

The ceratohyoideum was paired and each one was like a short rod which was slightly flattened dorsoventrally and was directed cranially and slightly dorsally from the rostral border of the body. Its caudoventral extremity was enlarged and attached to the latter by means of a cartilage. Its length was measured to be 4.0-4.5cm which was longer than as reported by El-Shaieb and Majeed (1979) and its rostrodorsal extremity articulated with the epihyoideum. The ventral end had a small concave facet which articulated with basihyoideum while the dorsal end articulated with the stylohyoideum or with the epihyoideum when present. Nickle *et al.* (1986) reported in domestic animals that the ceratohyoideum formed a movable joint with the basihyoideum, while in horse the ventral extremity of small cornu articulated with the basihyoideum by a diarthrodial joint.

Epihyoideum (middle cornu)

The epihyoideums in camel were almost as large as the thyrohyoideum but were much less curved than the latter. Each epihyoideum measured on an average 9.5 cm and it was directed caudodorsally. Smuts and Bezuidenhout (1987) described that the epihyoideum was twice as long as the ceratohyoideum in this species. The extremities were enlarged and directed caudodorsally where they articulated by pieces of cartilages with the stylohyoideums. The rostral extremities were comparatively smaller and articulated by small pieces of cartilages with the ceratohyoideums. This end was approximately 0.5 cm wide while the proximal extremity which articulated with stylohyoideus was 1.5 cm wide. The epihyoideums were narrow and flattened laterally in the middle. Getty (1975) in horse described that the epihyoideums were small wedge-shaped pieces or nodular interposed between the ceratohyoideums and stylohyoideums. They were usually transitory and unite with the stylohyoideums in the adult.

Stylohyoideum (great cornu)

The stylohyoideums were the largest segment of the hyoid bone. These were directed dorsally and slightly cranially. Each one was flattened laterally and borders were thin. The stylohyoideums measured 11.00-12.00 cm in length. The cranial border was convex while the caudal border was concave. Each stylohyoideum was slightly curved medially so that the lateral surface appeared slightly concave and the medial surface slighly convex. The proximal extremity presented 2 angles, the rostral or articular angle and the caudal or muscular angle. These 2 angles were placed at a distance of about 4.0 cm. The articular angle was slightly thicker and

articulated with the styloid process of the petrous part of the temporal bone by means of a cartilage (tympanohyoideum). While the caudal angle (angulus stylohyoideus) was round and thinner than the rostral one and was roughened for muscular attachment and slightly laterally curved. The distal extremity was small and articulated with the epihyoideum by means of a cartilage. The findings were in agreement with El-Sheib and Majeed (1979) and Smuts and Bezuidenhout (1987) in camel. The lateral surface of the each stylohyoideum in camel presented a groove on its upper half. It resembled more or less to that of horse but lesser in length.

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