

MORPHOMETRIC MEASUREMENTS OF THE SKULL OF THE CROSS BRED CATTLE OF TIRUNELVELI DISTRICT WITH REFERENCE TO ANATOMICAL LANDMARKS

S. Rajathi

Department of Veterinary Anatomy and Histology
Veterinary College and Research Institute, Tirunelveli – 627 001
Tamil Nadu Veterinary and Animal Sciences University

ABSTRACT

The aim of the study was to study the morphometrical measurements of the head region of adult Cross bred cattle without any apparent skeletal disorders and their clinical value for regional anaesthesia. 10 Cross Bred cattle were used and a total of 15 measurements were taken in the upper jaw and mandibles. The distance from the base of the horn to the caudal border of orbit, to mid level of dorsal arch of orbit and to rostral border of the orbit were 9.5 ± 0.22 cm, 11.5 ± 0.35 cm and 17.8 ± 0.56 cm respectively. The distance from the facial tuberosities to the infra-orbital canal and from the latter to the root of the alveolar tooth were 4.5 ± 0.06 cm and 4.0 ± 0.87 cm, respectively. The length and height of the mandible were 34.2 ± 0.72 cm and 21.0 ± 0.08 cm, respectively. The distance from the lateral alveolar root to the mental foramen and from the mental foramen to the caudal mandibular border were 4.5 ± 0.88 cm and 3.0 ± 0.32 cm, respectively. The distance from the mandibular foramen to the base of the mandible as well as from the caudal border of mandible to below of the mandibular foramen were 8.2 ± 0.11 cm and 4.5 ± 0.01 cm, respectively. The distance from the base of the mandible to the condyloid fossa and from the latter to the maximum height of the mandible were 16.2 ± 0.26 cm and 4.6 ± 0.25 cm, respectively. The distance from the caudal border of mandible to mandibular foramen and from the latter to the mandibular angle were 3.2 ± 0.97 cm and 6.6 ± 0.72 cm, respectively. These data were important landmarks with regard to the application to clinical procedure around the head of Cross bred cattle such as regional anaesthesia during dental extraction, dehorning and treating horn injury.

Key words: Morphometry, Skull, Cattle, Landmarks

INTRODUCTION

Morphometric measurements of skull will provide data on intraspecies and interspecies differences in animals. These measurements will

provide details on the variation with respect to breed, age, sex, nutritional and environmental factors. These surveys will form the base for the clinical and surgical practices (Karimi et al., 2011). The applied anatomy of the head region is very

Corresponding Author: Assistant Professor, Email: srajathi9936@yahoo.in

important because of the vital organs such a brain, tongue, eyes, ears, teeth, nose and lips. The head of cattle is needed for defence, deglutition and olfaction (Dyce et al., 2002). The directions of the cranial nerves and their passages from different foramina in the skull are of clinical importance in regional anaesthesia around the head. Morphology of the skull of the domestic animals like cow, buffaloes, horse, sheep and goat (Shahid and Muhammad, 2001, Karimi et al., 2011 and Getty, 1975) have already been dealt elaboratively. However the data available is very little about morphometric measurements of skull of Cross Bred cattle and its clinical importance in regional anaesthesia. Therefore a work was taken to provide information on clinically important parameters that may assist regional anaesthesia of the head.

MATERIALS AND METHODS

A total of ten Cross bred cattle aged between 5 – 10 years old were used. Upper jaw and mandible from all the animals were collected and processed using maceration techniques as reported by Simoens et al. (1994). The following morphometric measurements were taken in the upper jaw and mandible of native cattle using scale, thread and vernier callipers.

1. From the base of horn to caudal border of orbit
2. From the base of horn to the mid-level of the dorsal arch of orbit
3. From the base of the horn to the rostral border of orbit
4. From facial tuberosity to mid-level of infraorbital canal
5. From mid-level of infraorbital canal to root of alveolar tooth
6. Mandibular length: from the level of cranial extremity of alveolar root of corner incisor to the level of caudal border of the mandible.
7. From lateral alveolar root of corner incisor to the mental foramen
8. From mental foramen to caudal mandibular border
9. From mandibular foramen to the base of the mandible
10. From caudal border of mandible to below of the mandibular foramen
11. From condyloid fossa to maximum height of the mandible
12. From condyloid fossa to the base of the mandible
13. Maximum mandibular height: from the basal level of the mandible to the highest level of the coronoid process.
14. From caudal border of mandible to the level of mandibular foramen
15. From mandibular foramen to mandibular angle

The values were measured (Mean \pm SE) and data obtained were analysed statistically (Snedecor and Cochran, 1985) and presented in the table I.

RESULTS AND DISCUSSION

The distance from the base of the horn to caudal border of orbit, to mid-level of dorsal arch of orbit and to rostral border of orbit in the present study were 9.5 ± 0.22 cm, 11.5 ± 0.35 cm and 17.8 ± 0.56 cm, respectively (Table I). These values were higher than the values of Iranian native cows (Monfared, 2013). These data have clinical value in the nerve block purpose and also regional anaesthesia during dehorning and treating of the horn injuries. The nerve supply to the horn originates from the cornual branches of the lacrimal nerve and this must be blocked prior to dehorning (Ommer and Harshan, 1995). The lacrimal nerve is dorsal on the dorso-lateral aspect of the orbit and distributed in the root of the horn (Shahid and Muhammed, 2001). So the value of distance from the base of the horn to the caudal border of orbit was most beneficial in determining the appropriate site for injection of local anaesthetic agents.

The distance from the infraorbital canal to the root of the alveolar tooth was 4.0 cm in the present study while in the Iranian native cattle it was 2.5 cm (Monfared, 2013) and in adult cows and buffaloes from Pakistan were 2.54 cm and 3.81 cm, respectively (Shahid and Muhammed, 2001). The facial tuberosity is prominent as a guide for tracking the infra-orbital nerve and necessary for the desensitization of the skin of the upper lip, nostril and face on that side; therefore the current findings are of clinical importance. The injection site of local anaesthetic agents may be easily spotted out by calculating the distance of 4 cm from root of alveolar tooth in the direction of facial tuberosity. By this process the local anaesthetic agents may be exactly injected in the infraorbital canal.

The distance between the lateral alveolar roots to mental foramen was 4.5 cm which was a vital guide for the detection of the location of the mental nerve for this regional nerve block in the Cross Bred cattle. The above distance in the Iranian native cows was 5.7 cm (Monfared, 2013). This measurement help to locate the mental nerve in cross bred cattle.

The mandibular length and height in the present study (Table I) were higher than the data reported for cattle and buffaloes of Pakistan (Shahid and Muhammed, 2001) and for Iranian native cows (Monfared, 2013).

The caudal border of the mandible to below of the mandibular foramen was 4.5 ± 0.11 cm in the present study. The distances from the caudal border of the mandible to the level of mandibular foramen and from the latter to the border of mandibular angle were 3.2 ± 0.97 cm and 6.6 ± 0.72 cm, respectively. These data were necessary for achieving the regional anaesthesia of the mandibular nerve and also have clinical importance for desensitization of all the teeth in lower jaw (Hall et al., 2000).

The current results will find consideration as reference values for Cross Bred cattle and will thus contribute to morphometric investigations.

REFERENCES

- Dyce, K. M., Sack, W. O. and Wensing, C. J. G. (2002) Text book of Veterinary Anatomy. 3rd ed. Philadelphia, WB Saunders.
- Getty, R. (1975). Sisson and Grossman's The Anatomy of the Domestic Animals. 5th ed. Philadelphia, WB Saunders.
- Hall, L. W., Clarke, K. W. and Trim, C. M. (2000). Wright's Veterinary Anesthesia and Analgesia. 10th ed. London, ELBS and Bailliere Tindall.
- Karimi, I., Onar, V., Pazvant, G., Hadipur, M. and Mazaheri, Y. (2011). The cranial morphometric and morphologic characteristics of Mehraban sheep in western Iran. *Global Veterinaria*. 6(2): 111-117.
- Monfared, A. L. (2013). Gross anatomical measurements of the head region of the Iranian native cattle (*Bos Taurus*) and their clinical value for regional anesthesia. *Global Veterinaria*. 10(2): 219-222.
- Ommer, P. A. and Harshan, K. R. (1995). Applied Anatomy of domestic animals, 1st ed. Jaypee brother's medical publisher, India.
- Shahid, R. U. and Muhammad, F. (2001). Comparative gross anatomical study of the axial skeletons of buffaloes and cows. *Pakistan Veterinary Journal*. 21(1): 55-56.
- Simoens, R., Poles, R. and Lauwers, H. (1994). Morphometric analysis of foramen magnum in pekingese dogs. *American Journal of Veterinary Research*. 55: 33-39.
- Snedecor, G.W. and Cochran, W.G. (1985). *Statistical Methods*, 7th edn., Oxford and IBM Publishing Co., New Delhi.

Table I

Morphometric measurements of the mandible and upper jaw and mandible of Cross Bred cows (Mean \pm SE).

S. No.	Parameters	cm
1	Distance from the base of horn to caudal border of orbit	9.5 \pm 0.22
2	Distance from the base of horn to mid level of dorsal arch of the orbit	11.5 \pm 0.35
3	Distance from the base of horn to rostral border of orbit	17.8 \pm 0.56
4	Distance from facial tuberosity to infra-orbital canal	4.5 \pm 0.06
5	Distance from infra-orbital canal to root of alveolar tooth	4.0 \pm 0.87
6	Mandibular length	34.2 \pm 0.72
7	Distance from lateral alveolar root to mental foramen	4.5 \pm 0.88
8	Distance from mental foramen to caudal mandibular border	3.0 \pm 0.32
9	Distance from mandibular foramen to base of mandible	8.2 \pm 0.11
10	Distance from caudal border of mandible to below of the mandibular foramen	4.5 \pm 0.01
11	Distance from condyloid fossa to height of the mandible	4.6 \pm 0.25
12	Distance from condyloid fossa to the base of the mandible	16.2 \pm 0.26
13	Maximum mandibular height	21.0 \pm 0.08
14	Distance from caudal border of mandible to the level of mandibular foramen	3.2 \pm 0.97
15	Distance from mandibular foramen to mandibular angle	6.6 \pm 0.72