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CHANGE IN THE RATE OF GROWTH OF THE NOSE IN THE POSTNATAL PERIOD OF THE CAMEL-BACTRIAN

Annotation. In the article, on the basis of a morphometric study in the age aspect of the face of the head of the Bactrian camel, a mathematical analysis of some linear measurements of the nasal bone is carried out. The results of the study on the dynamics of the growth rate and development of the nasal bone of the Bactrian camel in the postnatal period correspond to changes in the linear measurements of anatomical structures and other bones of the facial part of the animal's skull, depending on the physiological loads of the respiratory system at different age periods. In the course of the research, it was found that during the transition to partial eating of pasture for young animals, growth on average by measurements increases by 14.29%. In camels, at the beginning of the sexually mature period of 2–3 years of life, the increase in the rate of the average of all measurements of the nasal bone decreases slightly - 8.58%. At the age of 4-5 years old and at 6-8 years old in adult camels, the growth rate of the measurements of the nasal bone passes evenly and develops by 14.07% and 12.96%, respectively. In the course of the research, the dynamics of the growth rate and development of the nasal bone of the Bactrian camel in the postnatal period was found to correspond to changes in the linear measurements of the anatomical structures and bones of the facial part of the animal's skull, depending on the physiological loads of the respiratory system at different age periods.

Keywords: morphometry; nasal bone; age anatomy; Bactrian camel; postnatal period.

Introduction

Modern veterinary morphology is currently associated with a scientific approach to studying the structure of anatomical structures and organs in a comparative and age aspect, in particular, the craniometry of the skeletal system in agricultural and domestic animals [1, 2, 3, 4, 5, 6].

At present, some morphological scientists in their scientific research show scientific interest in the craniometry of the Bactrian camel due to their poor study, taking into account the species and regional characteristics [7, 8, 9].

The physiological and anatomical features of camels are a specific indicator of the adaptability of these animals to desert and semi-desert conditions, and one of these features is the location and structure of the nostrils. The camel's nostrils are located on the dorsal surface of the upper lip in the form of narrow slits, which are covered with dense folds and thick hair. Due to this anatomical feature of the shape of the structure of the nostrils, it allows camels to retain excess water vapor in the nasal cavity during breathing in extreme heat and return it through the oral cavity as water, all this protects animals from dehydration without dulling their sense of smell. The camel's nasal bone belongs to the facial region of the skull and is the basis for the nostrils or the beginning of the respiratory system. Due to the peculiarity of the location and shape of the nostrils, the camel's nasal bone is half the size of other ruminants [10].

Mathematical processing of some linear indicators and their comparison between age groups make it possible to establish the features and patterns of the growth rate and development of the nasal bone in a given animal.

The purpose of our anatomical study was the morphometric substantiation of changes in the growth rate and development of the nasal bone of the Bactrian camel in terms of age.

Materials and research methods

The material for studying changes in the growth rate and development of the nasal bone of the Bactrian camel in the postnatal period was 28 preparations taken from six age groups. Anatomical and morphometric study was carried out according to certain methods. A morphometric study was carried out and linear measurements of the interosseous sutures of the nasal bone were measured using a caliper, a compass and a metal millimeter ruler. To determine the changes in the growth and development of the nasal bone of the Bactrian camel in the age aspect, we carried out the following morphometric measurements: the length of the internasal suture, the length of the inner bend of the naso-maxillary suture, the length of the outer bend of the naso-maxillary suture, the length of the outer bend of the frontal nasal suture, the length of the inner bend of the frontal nasal suture, width by the level of the middle of the nasal bone. Statistical processing of changes in the rate of growth and development of the nasal bone in the postnatal period in the Bactrian camel was determined by the coefficient (multiplicity) of the increase according to N.P. Chirvinsky, and the

relative speed according to S. Brody. Latin names of anatomical formations are given according to the international veterinary anatomical nomenclature [11, 12].

Research results

Nasal bone - osnasale is represented in the Bactrian camel, a paired bone that participates in the formation of the roof of the nasal cavity. On the nasal bone, the outer and inner surfaces are distinguished. The outer surface is faciesexterna, in the Bactrian camel it forms the upper part of the nasal dorsum, has the form of a plate, the edges are semicircular. The length of the nasal bone of the Bactrian camel, due to the peculiarity of the shape and the location of the nostrils on the dorsal part of the nose, is half that of other ruminants. In the anterior third of the nasal bone, the camel has two processes — the medial and the lateral. The medial process - the processusmedialis of the nasal bone in the Bactrian camel is barely noticeable and is presented in the form of a small growth. The lateral process is the processus lateralis, longer and wider at the base, like in carnivores, and ends at the junction of the incisor and maxillary bones (at the incisor-maxillary suture); in dogs, this process goes like the lower part of the nasal cut suture.

The posterior part (caudally) of the nasal bone of the Bactrian camel is bordered by the frontal bone by the frontal-nasal suture - suturafrontonasalis. The nasal part of the nasal bone is strongly expanded than in other animals, it has the appearance of a wing and forms two bends - an internal and an external one. The lateral edge of the wing of the nasal bone is involved in the formation of the inner part of the lacrimal opening, which in the camel has a different size and shape. The narrow part of the nasal bone externally borders on the maxillary bone by means of the naso-jaw suture –suturanasomaxillaris, which, after the lacrimal opening, sharply turns at 70º perpendicular to the internasal suture. Then, after 1.5-1.8 cm, it turns outward again and goes parallel to the internasal suture to the inciso-maxillary suture. Medially, the nasal bones are bordered by a well-defined internasal suture - suturainternasalis, the latter being a continuation of the frontal suture.

The inner surface of -faciesinterna, the nasal bone of the Bactrian camel, forms a short ceiling (upper wall) of the nasal cavity. On the inner surface of the lateral part of the nasal bone, the camel has an ethmoid ridge - cristaethmoidalis, which serves to attach the dorsal turbinate. On the inner surface, the left and right nasal bones also border medially with each other with a well-defined internasal suture. The growth rate and development of the nasal bones in the Bactrian camel on the left and right sides are identical in terms of age.

The internasal suture in the Bactrian camel is visually very well pronounced, it is a continuation of the interfrontal suture, which runs between the nasal bones of the same name. In camels, the limit of the length of the internasal suture at the age of one month is 4.8 ... 5.2 cm, with the coefficient of variation Cv = 2.0.

Table – 1 - Morphometric parameters of linear measurements of the nasal bone in the postnatal period (cm)

The age of the animals	n	Lim	$\bar{x} \pm S\bar{x}$	σ	Cv
	The length of the inter-nasal seam				
1 month	4	4,8-5,2	5,02±0,06	0,10	2,0
6 months	4	5,7-6,2	5,92±0,07	0,13	2,2
1 year	5	6,3-7,1	6,64±0,08	0,16	2,4
2-3 years	5	6,5-7,3	6,92±0,08	0,16	2,3
4-5 years old	5	8,0-8,9	8,40±0,09	0,18	2,1
6-8 years old	5	9,0-10,0	9,52±0,25	0,50	2,6
	The length of the outer bend of the naso-maxillary suture				
1 month	4	4,8-5,3	5,07±0,06	0,10	2,0
6 months	4	5,7-6,5	6,05±0,12	0,20	3,3
1 year	5	6,6-7,4	7,00±0,08	0,16	2,3
2-3 years	5	7,0-7,7	7,44±0,07	0,14	1,9
4-5 years old	5	8,4-9,1	8,70±0,07	0,14	1,6
6-8 years old	5	9,2-10,3	9,72±0,01	0,02	0,2
	The length of the internal bend of the naso-maxillary suture				
1 month	4	0,8-1,0	0,90±0,03	0,05	5,56
6 months	4	1,0-1,5	1,23±0,08	0,13	10,5
1 year	5	1,2-1,6	1,42±0,04	0,08	5,6
2-3 years	5	1,2-1,7	1,54±0,02	0,10	6,5
4-5 years old	5	1,6-1,8	1,70±0,02	0,04	2,4
6-8 years old	5	1,8-2,3	2,08±0,05	0,10	4,8
	The length of the internal bend of the frontal suture				
1 month	4	1,7-2,2	1,92±0,06	0,10	5,2
6 months	4	1,8-2,3	2,03±0,06	0,10	4,9
1 year	5	2,2-2,8	2,52±0,06	0,12	4,8
2-3 years	5	2,4-3,0	2,70±0,08	0,15	5,6

Continuation of table 1

4-5 years old	5	2,8-3,4	3,08±0,06	0,12	3,9
6-8 years old	5	2,8-3,6	3,38±0,08	0,16	4,7
	The length of the outer bend of the frontal-nasal suture				
1 month	4	0,8-1,3	1,08±0,08	0,13	12,0
6 months	4	1,1-1,5	1,30±0,03	0,10	7,7
1 year	5	1,2-1,6	1,48±0,06	0,12	8,1
2-3 years	5	1,5-2,1	1,72±0,06	0,12	6,9
4-5 years old	5	1,8-2,4	2,08±0,06	0,12	5,7
6-8 years old	5	2,1-2,6	2,36±0,03	0,16	6,2
	Width at the level of the middle of the nasal bone				
1 month	4	1,0-1,5	1,28±0,03	0,13	10,2
6 months	4	1,5-1,8	1,68±0,05	0,08	4,8
1 year	5	1,4-2,4	1,96±0,06	0,12	6,1
2-3 years	5	1,8-2,6	2,28±0,08	0,16	7,0
4-5 years old	5	2,2-2,8	2,46±0,06	0,12	4,9
6-8 years old	5	2,5-3,1	2,78±0,06	0,12	4,3

By the age of six months in camels, this seam increases by 0.90 cm, which on average for the group was 5.92 ± 0.07 cm, with a growth rate of 1.17 according to N.P. Chirvinsky.

An increase in the measurement of the inter-nasal seam is observed, also at the age of one year, by 0.72 cm, with the development of the growth rate along S. Brody, respectively - 11.46%, since during this period the camels switch to pasture. Up to 2-3 years, the length of the inter-nasal seam decreases slightly by 0.28 cm, with the development of the growth rate, respectively, up to 4.12%. In the future, up to 4-5 years, the length of the inter-nasal seam develops evenly by 0.48 cm, with the development of the growth rate along S. Brody, respectively - 19.32%.

At an older age of 6-8 years of life of camels, the maximum seam length is 9.52 ± 0.25 cm, with an increase in speed along S. Brody - 12.50%.

The outer bend of the naso-maxillary suture in the Bactrian camel anatomically runs parallel to the internasal suture between the nasal bone and the maxillary bone; the length of the suture varies with the width of the nasal bone of the animal. In one-month-old animals, the length of the outer bend of the naso-maxillary suture is, on average, 5.07 ± 0.06 cm for the group, with the coefficient of variation Cv = 2.0. In six-month-old camels, a significant increase in the suture length by 1.03 cm is observed, at a growth rate of 17.62% according to S. Brody. In annual animals, with an incomplete transition to pasture and the simultaneous development of other facial bones, the cranio-maxillary suture increases on average in the group by 7.00 ± 0.08 cm, with a growth rate of 14.07%.

Table – 2 - Dynamics of growth and development of the nasal bone of the Bactrian camel in the postnatal period, (n=28)

The age of the animals	The length of the inter-nasal seam		The length of the outer curvature of the nose of the jaw suture	
	1	2	1	2
6 months	1,17	16,45	1,19	17,62
1 year	1,12	11,46	1,16	14,07
2-3 years	1,21	4,12	1,06	6,09
4-5 years old	1,21	19,32	1,16	15,61
6-8 years old	1,13	12,50	1,11	11,07
	The length of the internal bend of the naso-maxillary suture		The length of the internal bend of the frontal-nasal suture	
6 months	1,19	17,69	1,36	31,13
1 year	1,15	14,28	1,24	17,62
2-3 years	1,08	8,11	1,07	6,89
4-5 years old	1,10	9,87	1,14	13,14
6-8 years old	1,22	20,10	1,09	9,28
	The length of the outer bend of the frontal-nasal suture		Width at the level of the middle of the nasal bone	
6 months	1,20	18,48	1,31	27,02
1 year	1,13	12,94	1,16	15,38
2-3 years	1,16	15,00	1,16	11,32
4-5 years old	1,20	18,94	1,07	7,59
6-8 years old	1,13	12,61	1,13	12,21

Note: 1 - growth rates according to N.P. Chirvinsky, ed .;
2 - relative growth rate according to S. Brody,%.

At the age of 2-3 years, the seam increases slightly by 0.44 cm, with the growth rate according to S. Brody - 6.09%, and at the age of 4-5 years, the growth rate was 15.61%, respectively. the suture in animals is observed at the age of 6-8 years on average by 1.02 cm, with a growth rate of 11.07%, respectively.

The internal bend of the naso-maxillary suture in the Bactrian camel is, as it were, the internal bend of the wing of the nasal bone and is located visually perpendicular to the external bend above the said suture, in monthly camels the suture length averages 1.03 ± 0.03 cm in the group, with a coefficient of variation Cv = 9 , 7. In 6, 12-month-old camels and young animals at the age of 2-3 years, there is a slight increase in the length of the suture by 0.20 cm, 0.19 cm and 0.24 cm, with the growth rate according to S. Brody - 17.69% , 14.28% and 8.11% respectively. At 4-5 years old and 6-8 years old, the length of the internal bend of the naso-maxillary suture also increases evenly by 0.36 m and 0.44 cm, with the development of the growth rate according to S. Brody - 9.87%, and 20.10 % respectively.

The internal bend of the fronnasal suture in the Bactrian camel is the nasal (posterior) border of the nasal bone and is located perpendicularly exactly 45º to the interfrontal suture at the point of transition of the latter into the internasal suture. The length of the internal bend of the frontal-nasal suture in camels at the age of one month is 1.92 ± 0.06 cm, with the coefficient of variation Cv = 5.2. By the age of six months and one year, the seam increases by 0.11 cm and 0.49 cm, with the growth rate according to S. Brody by 31.13% and 17.62%, respectively. At 2-3 years old, 4-5 years old and 6-8 years old, the measurement of the internal bend of the fronnasal suture increases evenly by 0.18 cm, 0.38 cm and 0.30 cm, respectively, the growth rate according to N.P. Chirvinsky was during these periods of the life of the animal - 1.07, 1.14 and 1.09.

The outer bend of the frontal-nasal suture in the Bactrian camel is located parallel to the internasal suture and the outer bend of the naso-maxillary suture, and also participates in the formation of the inner edge of the lacrimal opening. The length of the outer bend of the frontal nasal suture in camels of one month old averaged 1.08 ± 0.08 cm in the group, with the coefficient of variation Cv = 12.0.

By the age of six months in camels, the outer bend of the frontal suture increases by 0.22 cm, the growth rate according to N.P. Chirvinsky was 1.20. In the future, the length of the suture in comparison with other sutures of the nasal bone develops evenly up to 1 year by 0.18 cm, up to 2-3 years by 0.24 cm, up to 4-5 years by 0.32 cm, at a growth rate of C. Brodie by 12.94%, 15.00% and 18.94%, respectively. In 6-8 years of life of camels, the maximum suture length is 2.36 ± 0.03 cm, with a growth rate along S. Brody of 12.61% ...

With a change in all measurements of the length of the nasal bone, the width also significantly changes. The width at the level of the middle of the nasal bone in camels at the age of one month is 1.28 ± 0.03 cm, with a limit of 1.0 ... 1.5 cm. In 6 and 12 month old camels, there is a uniform increase in width at the level of the middle of the nasal bone by 0.40 cm and 0.28 cm, which amounted to growth according to N.P. Chirvinsky - 1.31, 1.16. At 2-3 years old, 4-5 years old and 6-8 years old, the length of the lacrimal orbital suture also increases uniformly by 0.32 cm, 0.18 m and 0.32 cm, respectively, with the growth rate of S. Brody by 11 , 32%, 7.59% and 12.21% respectively.

Conclusion

Based on a morphometric study and a mathematical analysis of changes in the growth rate of the nasal bone in the age aspect of the Bactrian camel, he showed that during the sucking period of life in camels there is an intense growth of the rate of the nasal bone on average for all linear measurements was 21.39% according to S. Brody. After a year of life, during the transition to partial grazing of pasture, the growth of young animals increases on average by measurements by 14.29%. In camels, at the beginning of the sexually mature period, in 2-3 years of life, the increase in the rate on average of all measurements of the nasal bone slightly decreases -8.58%. At the age of 4-5 years old and at 6-8 years old in adult camels, the growth rate of the measurements of the nasal bone passes evenly and develops by 14.07% and 12.96%, respectively. Thus, the results of the study on the dynamics of the growth rate and development of the nasal bone of the Bactrian camel in the postnatal period correspond to changes in the linear measurements of the anatomical structures and bones of the facial part of the animal's skull, depending on the physiological loads of the respiratory system at different age periods.

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ТҮЙЕ-БАКТРИЯНЫҢ ПОСНОТАЛЬДЫ КЕЙІНГІ КЕЗЕҢДЕГІ МҰРЫННЫҢ ӨСУ ҚАРҚЫНЫНЫҢ ӨЗГЕРІСІ

Аңдатпа. Мақалада қос өркешті түйесінің бас бетінің жас ерекшелігіне морфометриялық зерттеу негізінде мұрын сүйегінің кейбір сызықтық өлшемдеріне математикалық талдау жасалған. Қос өркешті түйесінің поснатальды кезеңдегі әртүрлі жас кезеңдеріндегі байланысты тыныс алу жүйесінің физиологиялық жүктемелері мұрын сүйегінің өсу қарқыны мен даму динамикасын зерттеу нәтижелері жануардың бас сүйегінің бет-жақ бөлігінің анатомиялық құрылымдары мен басқа сүйектерінің сызықтық өлшемдерінің өзгеруіне сәйкес келеді. Зерттеу нәтижесінде жас малдарды жартылай азықтандыруға көшу кезінде өсу қарқыны орта есеппен 14,29%-ға өсетіні анықталды. Түйелерде 2-3 жыл өмірінің жыныстық жетілген кезеңінің басында мұрын сүйегінің барлық өлшемдерінің орташа жылдамдығының жоғарылауы сәл төмендейді -8,58%. Ересек түйелерде 4-5 жаста және 6-8 жаста мұрын сүйек өлшемдерінің өсу қарқыны біркелкі болып, сәйкесінше 14,07% және 12,96% дамиды. Зерттеу барысында қос өркешті түйесінің постнотальды кезеңдегі мұрын сүйегінің өсу қарқыны мен даму динамикасы жануардың бет бөлігінің анатомиялық құрылымдары мен сүйектерінің сызықтық өлшемдерінің өзгеруіне сәйкес келетіні анықталды. әр түрлі жас кезеңдеріндегі тыныс алу жүйесінің физиологиялық жүктемелеріне байланысты бас сүйегі.

Кілт сөздер: морфометрия; мұрын сүйегі; жас анатомиясы; қос өркешті түйе; постнотальды кезең.

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ИЗМЕНЕНИЕ СКОРОСТИ РОСТА НОСОВОЙ КОСТИ В ПОСТНАТАЛЬНОМ ПЕРИОДЕ ВЕРБЛЮДА-БАКТРИАНА

Аннотация. В статье на основании морфометрического изучения в возрастном аспекте лицевой части головы верблюда-бактриана проведен математический анализ некоторых линейных промеров носовой кости. Результаты исследования по динамике скорости роста и развития носовой кости верблюда-бактриана в постнатальном периоде соответствуют изменениям линейных промеров анатомических образований и других костей лицевой части черепа животного в зависимости от физиологических нагрузок дыхательной системы в разные возрастные периоды. В ходе исследований было установлено, что в период перехода на частичное поедание подножного корма у молодняка увеличивается рост в среднем по промерам на 14,29%. У верблюдов в начале половозрелого периода в 2-3 года жизни немного снижается рост скорости в среднем всех промеров носовой кости - 8,58%. В возрасте 4-5 лет и в 6-8 лет у взрослых верблюдов скорость роста промеров носовой кости проходит равномерно и развивается соответственно на 14,07% и 12,96%. В ходе исследований было установлено динамика скорости роста и развития носовой кости верблюда-бактриана в постнатальном периоде соответствуют изменениям линейных промеров анатомических образований и костей лицевой части черепа животного в зависимости от физиологических нагрузок дыхательной системы в разные возрастные периоды.

Ключевые слова: морфометрия; носовая кость; возрастная анатомия; верблюд-бактриан; постнатальный период.