

ORIGINAL ARTICLE

Morphological Study on the descent of Testes in *Camelus dromedaries* Embryos

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ABSTRACT

In this study, the descent of testes in the fetal camels is reviewed. And the role of swelling reaction of the gubernaculum testes is discussed. A study was conducted on 60 embryos of Camelus dromedaries. The genital ridge was observed at 8 week of gestation, on the ventromedial aspect of mesonephrose. At week 10, the genital ridge developed into cylindrical structure, the testes located in the middle of mesonephrose. The abdominal migration was completed up to 25week. The testes were situated in the inguinal canal from 45 to 46week. From 50week onward, scrotal migration had been observed, however the testes did not reach the base of scrotum up to term. During the descent of testes, a peritoneal fold detached from the caudal end of the gonad and extended up to the abdominal floor on 23week, known as gubernaculum. In the initial stage of pregnancy it was thin, whitish, jelly like. On 50week, it was enveloped by vaginal process. During the stage of growth and development of the extra-abdominal gubernaculum, there is no attachment of the distal end of the infra vaginal gubernaculum to the adjacent mesenchyme of the inguinal region or of the scrotal region. It is proposed that the swelling of the gubernaculum dilates the vaginal ring and enlarges the inguinal canal.

Key WORDS: testes, *Camelus dromedaries*, morphogenesis, Development

Received 12/04/2015 Accepted 29/06/2015

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How to cite this article:

M.Morovati S, E. Salehi. Morphological Study on the descent of Testes in *Camelus dromedaries* Embryos. Adv. Biores. Vol 6 [4] July 2015: 108-112. DOI: 10.15515/abr.0976-4585.6.4.108112

INTRODUCTION

The camel is an important livestock species uniquely adapted to hot and arid environment [19 and 16]. The primary uses of camel were for transport the people in desert and semidesert areas. Now a days a new rule was created for the camel, as milk, meat, wool and other production [9, 21 and 6]. Scientific study of the camel organs seems to be very important. One of these organs is testes. The descent of the testes from genital ridge to an extracorporeal location is a mandatory developmental process to ensure the mature testes promote normal spermatogenesis [10]. The gubernaculum testes seems to be the most important structure involved in testicular migration. The rule of this organ is due to its ability to dilate and shorten. Testicular descents happened in two stages. First, inactive movement of testes, caudoventrally, to the inguinal canal due to elongation and growth of the body and fixation of testicular distances from urogenital sinuses. Another one is descent of testes in to scrotum. As soon as the testes situated near the inguinal canal most changes must be happen to reduce the measure differences between testes and canal that resistance against movement. Those changes have been done by gubernaculum swelling, adjacent the inguinal canal [13]. The aim of this study is investigated to testicular topography in abdominal cavity, migration, and descending process to scrotum in gestation period in *Camellus dromedaries* embryos.

MATERIAL AND METHOD

This study was performed on 60 embryos and fetuses ranged from day 40, post conception (P.C) through day 400 P.C which collected from the gravid uteri of apparently healthy camel. Camel uterus were gathered from slaughter house in Yazd province, Meybod town. Then all the specimens transported to the anatomical laboratory in Ardakan University.

After dissecting the uterus, the age of fetuses were meager by CRL formula (using crown-to-rump length), (age of fetus) = $\frac{crl + 23.9}{336}$ according to Mcgeody [8]. All the fetus were dissected by giving

ventral abdominal incision to observe the development of testes. The topographic location, shape of testes and migration process to the scrotum was recorded.

RESULTS

At week 8 of gestation the genital ridge appeared as an aggregation of cell on the ventromedial aspect of mesonephros extending to the last sacral vertebrae, in fact at this time of early differentiation in the genital ridged there is a condensation of mesenchyme connecting the caudal pole of the developing testes to the developing epididymis and continuing caudally, related to the dorsolateral body wall, to the inguinal region of the caudal abdominal region. The regression of cranial part of mesonephros on week 9 pushed the gonads close to metanephros, at this time the genital ridge became swollen (Fig.1). it was confined to the developing lumbar vertebrae. On week 10 of gestation the genital ridge developed into a cylindrical structure, the testes situated in the middle of the ventromedial aspect of the mesonephros. These were related with the coils of intestine. On week 11 the testes shifted to the cranial pole of mesonephros related ventro-laterally to the metanephros. On day 85 the testes placed in the middle of the ventrolateral aspect of respective metanephros. The testes further descended down on 90 day (Fig.2) and on day 100 reached near the caudal pole of metanephros. Beginning at week 16 stage, the testes is displaced toward the deep inguinal opening. By week 18, (Fig.3) the testes is at the deep inguinal ring. And the abdominal migration was completed up to 25 week. The condensation of gubernaculum mesenchyma is incorporated in inguinal region and delineates as the anlage of the gubernaculum testes and the area it occupies delineates as the inguinal canal. The major swelling of gubernaculum occurs between week 24 and 25. At this time, the evagination of the peritoneal lining in to the major portion of the anlage of the gubernaculum mesenchyme grows caudoventrally in to this mesenchyme and subdivided it, defining parts of the extra abdominal gubernaculum (Fig.4). The evagination of peritoneum is the vaginal process. The rim of the vaginal process at its beginning is the vaginal rings. As the evagination of the peritoneum elongates, it envelopes on its dorsocaudal aspects in some of the enlarge of gubernacular mesenchyme becoming concaved in aspects. The later at week 38, becomes a bit, more cellular and as an elongated core of mesenchyme, is nearly enveloped by the sagging dorsocaudal wall of the vaginal process which forms the visceral mesothelium, this sheet of mesenchyme bounded by mesothelium, is the plica gubernacularis. The parts of the extra abdominal gubernaculum are these: the distal part of the gubernaculum proper, nearly enveloped by the vaginal process, the vaginal gubernaculum, a Steve of mesenchyme external to and surrounding the vaginal process, a narrow sheet of gubernacular mesenchyme connecting the gubernaculum proper along its more proximal dorsocaudal margin to the vaginal gubernaculum and the infravaginal gubernaculum which is beyond the rim of the sac of the growing vaginal process which connects the gubernaculum proper and the Steve of vaginal gubernaculum. By week 50 the gubernaculum proper has regressed markedly and the testes has passed through the inguinal ring. In fetuses about 51 week each testes descended more towards the inguinal ring. the testes were elongated in shape and were slightly away from the caudal pole of the respective metanephros. On 52 week of gestation, the testes were just at the rim of the internal inguinal ring and the caudal part of epididymis entered the inguinal canal along with the peritoneal covering, the tunica vaginal. on 53 week of gestation, the gubernaculum has differentiated to a fibrous band forming proximally a short segment which connect the caudal pole of the testes to the tail of epididymis, the proper ligament of testes, and distal to that attachment, a long segment extending from the tail of the epididymis to the fundus of parietal layer of the vaginal tunic, subsequently a connection develops with the spermatic fascia, the entire structure is called the ligament of the tail of epididymis. during the stage of growth and development of the extra-abdominal gubernaculum, there is no attachment of the distal end of the infravaginal gubernaculum to the adjacent mesenchyme of the inguinal region or of the scrotal region. it is in the vaginal gubernaculum that the myoblasts of the cremaster muscle develop which found at any position in the gubernaculum proper or in its continuation as the infravaginal gubernaculum. And 3 week after birth testes reached the scrotal sac.



Fig.1. Photograph of a 60 day old camel fetus showing right testes (1), gubernaculum (2), a segment of large intestine (3).



Fig.2. Photograph of a 90 day old camel fetus showing right testes (1), reached near the caudal pole of respective metanephros, gubernaculum (2).



Fig.3. Photograph of a 120 day old camel fetus showing right testes(2), located away from caudal pole of metanephros, left testes(1) at lower level than right, gubernaculum(3).

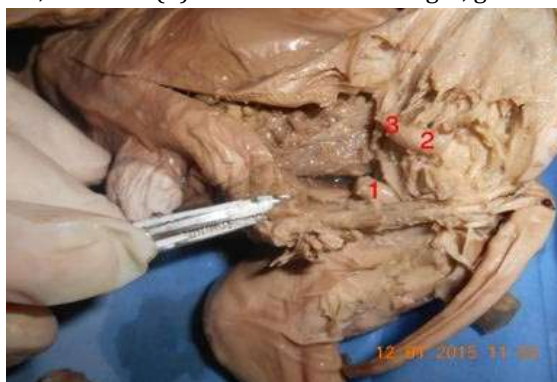


Fig.4. Photograph of a 180 day old camel fetus showing right testes(1), left testes (2), gubernaculum(3).

DISCUSSION

Satoh [15] agreed that differentiation and growth of gonad before 35 day of gestation is impassible. Noden & lahunt [11] says that primordial germ cell in mammalian observed in caudal yolk sac endoderm at the first time. According to this observations these cell move caudally to the caudal mesenteric then goes to mesonephrose, where gonads formed, then growth of gonads as swelling in ventromedial aspect of each mesonephrose have been seen. Noden & lahunt [11] observed the genital ridge on 28ed respectively in bovines. The occurrence of genital ridge in present study is not early it might be due to the fact that the camel has longer gestation period than that of bovines. In this study, each testes presented rounded extremities and a relatively large caput epididymis as observed lateral to the proximal extremity of testes. Singh [17] also observed relatively larger and heavier epididymis as compared to the corresponding testes in eleven month of camel fetus. Soder [18] Reported that sexual differentiation does not have seen macroscopically until 42 days of gestation in human fetuses. In this study on 10 week of gestation we observed the testes with the round extremities situated in the middle of the ventromedial aspect of the mesonephros for the first time. Similar observation was made by Gier & Marion [7] in mammals. Sadler [14] says that up to 2nd month (60 days) tubules and glomerul's of mesonephrose kidney have been regressed and only some of terminal tube and mesonephric duct remained, which is shaped epididymis and vasa deferent. In this study, the regression of cranial part of mesonephrose on 9 week pushed the gonads close to the metanephrose, in 11 week of gestation the testes became oblong and shifted to the cranial pole of mesonephrose, then mesonephrose destroyed in 13 week of gestation, and the fragment of mesonephric duct changed to the epididymis. Similar observation was made by Noden [11] and Brauer [3]. Persaud [12] reported that the first transportation of the testes dependent on testes elongation and movement along caudal abdominal wall when mesonephrose kidney regressed. Backhouse and butler [2] described that at 56th of gestation the gubernaculum appeared as solid mass of mesenchymal cells. And backhouse & butler [2] agreed that this structure is plica gubernaculi indeed. Whereas Wensaing [22] reported as mesenchymal mass. The cytoplasm of mesenchymal cells was highly eosinophilic. The nuclei were spherical or ovoid in shaped. Few of the mesenchymal cells were arranged in circular manner and they enclosed a space leading the development of future capillaries. Weber and Fletcher [5] shows that gubernaculum appeared as a mesenchymal mass and extend to the inguinal canal at time of testes descendance. In this study swelling and extension of gubernaculum observed on 24-25 week of gestation and continued until testicular descendance in scrotum. In fact, an increasing in the absolute and relative size of both the proximal; and distal gubernaculum proper, the swelling reaction, dilates the vaginal ring and also enlarges the area occupied by the gubernaculum in the inguinal region, in effect making larger the inguinal canal. We proposed that this elongation and bulbous swelling, distal to an increasingly tonic deep inguinal ring, exerts traction upon the abdominal part of the gubernaculum, shortening it and thus pulling the testes to the deep inguinal ring. With the subsequent regression of the gubernaculum proper and shift in the relative position of the superficial and deep inguinal rings, the testes passes in to the area formerly occupied by the gubernaculum proper and resides in the scrotal compartment, still unattached to the scrotal fascia. Vander schoot [20] agreed that testicular migration occurs in 15-22 days of pregnancy in rat. Abdel-raouf [1] says that in 6 month of gestation, testes descended to the scrotum in calves. Fletcher and weber [5] reported that as testicular descendance to the scrotum, gubernaculum lose their water. Sadler [14] says, when gubernaculum regressed testes descended to the scrotal sac. Noden [11] agreed that after testicular descendance, gubernaculum mesenchyme regressed. Even and Sac [4] showed that testicular descendance to the scrotum occurs in 20 the week of gestation in calf. Our finding showed that gubernaculum communicated to the scrotal sac, going to be regressed from 52 week of gestation and this regression completed among fetal growth and at birth, normal descent of vaginal process becomes the definitive vaginal tunic. The inner visceral layer covers the testes, epididymis, and spermatic cord and at the vaginal rings it is continuous with the mesoductus. Along the caudal aspect of the descent testes and epididymis, the visceral layer of the vaginal tunic is reflected from these viscera as the mesorchium and mesoepididymis to become continuous with the parietal layer. The parietal layer is continuous at the vaginal ring with the parietal peritoneum. The caudal, free border of the mesorchium contains a fibrous cord attaching the tunica adventitia of the epididymal tail to the internal spermatic fascia. The ligament of the caudal of the epididymis. The fascia of the scrotal wall is the external spermatic fascia which is an extension of the external abdominal fascia. In the sleeve of vaginal gubernaculum mesenchyme the cremaster muscle and the internal spermatic fascia develop. Loose adhesion develops between all these fascia, those near the tail of epididymis becoming a most obvious connection. This study has described the selected stages of morphogenesis of testes in camellus dromedary's fetuses. Much attention was given to the differentiation of the blood supplies and the formation of nerves in testes. It is important to note that there are significant but complex changes that occur in the differentiation of the testicular descendance

during the period from 25 week of prenatal development of the fetus in camellus dromedaries, which is continued in the postnatal life.

REFERENCES

1. Abdel-Raouf, M.,(1974).The development of the fetal testes in the buffalo.,*Australian natural therapists association*,Anta.Ent.,144:227-236.
2. Backhouse,K.M.,ButlerH.,(1960).The gubernaculum testes of the pig(sues scropha),*journal of anatomy*,94:107-20.
3. Brauer, P.R.,(2004).Human embryology ,Hankey &Belfus,Canada,PP:43-45.
4. Evans,H.E., Sac,W.O.,(1973).Prenatal development of domestic and laboratory mammals. ,*Anatomia, Histologia Embryologia*,2:11-45.
5. Fletcher,F., weber,A.,(2004).veterinary anatomy, Mosby london,pp:42-44.
6. Getahun,T, B ,Kassa.,(2002).Camel husbandry practices in eastern Ethiopia: The case of Jijiga and Shinile Zones .*Nomadic People* .,6:158-163.
7. Gier, H.T.,Marion,G.B.,(1970).Development of mammalian testes. In: The testes.Johnson,A.J., Gomes,W.R.& Vandemark,N.L.(Eds).New York,Academic Press.,pp.2-43.
8. Mc Geady,T. A.,Quinn ,P. J.,Fitzpatrickand, E. S., Ryan ,M .T.,(2006).Veterinary embryology.1st.ed.Blackwell publishing.,331-336.
9. Mehari ,Y,Z,Mekuriawb ., G,Gebbru.,(2007).Potential of camel production in Babilie and kebribeyah woredas of the jijiga Zone,somali region, Ethiopia *livest.,Research for Rural Development*,19,4-7.
10. M.M,Farooqui.,Chandra pal.,Arehana.,Ajay,Prakash.,(2011).Anatomical study on the Descent of testes in Prenatal Goat(capra hircus),*international journal of morphology* ,29(2):318-324
11. Noden,D.,Lahunta,A.,(1985).The embryology of domestic animals.,*Williams & Winkins*,pp:323-326.
12. Persaud,M.,(2003).The development of human.7thed .,Saunders,pp:323-324.
13. R.L,hullinger.,C.J.G,Wensing.,(1985).Descent of the testes in the fetal calf.,*Acta anatomica*,121,63-68.
14. Sadler, T.W.,(2004).Longmans medical embryology 9th ed.,Lippincott,pp:319-343.
15. Satoh,M.,(1994).Histogenesis and organogenesis of the gonadal in humans embryos., *Journal of Medical Electron microscopy*,27(3-4).
16. Schwartz,H.J& M,Dioli.,(1992).The one humped camel in Eastern Africa :A pictorial Guide to Disease .,Health care and management .,Verlag Josef Margraf,Scientific Books,Weikersheim FR,Germany.
17. Singh,Y., Sharma, D.N. & Dhingra,L.D. (1975). Morphogenesis of the testes in goat. *Indian journal of Animal Sciences*,49(11):925-31.
18. Soder,o.,(2007).Sexual dimorphism of gonadal development .,*Best practice and research*,21(3):381-391.
19. Tura,I,G,Kuria.,H,Walaga & J,Lesuper.,(2010).camel Breeding management among the somali.sakuye,Gabbara and rendille pastoralism of northern Kenya., *Kenya Agricultural Research institute* .,Tropentage ,September., 14-16.
20. Vander schoot, P.,(2000).Doubts about the first phase of testes descent in the rat as a valid concept.,*Anatomy and embryology*,187(2),203-8.
21. Wardeh,M.,(2004).classification of the dromedary camels.,*Journal of Camel Science*,1:1-7.
22. Wensing,C.J.G.,(1968).Testicular descent in some domestic mammals., *Anatomical aspects of testicular descent* .,Proc.K.ned.Akad.Wetenseh.C,7:423-434.