Perineal musculature in the Black Bengal goat

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Abstract

With the aim of preparing topographic descriptions and illustrations of the perineal muscles of the black Bengal does, 12 adult animals were used. The animals were anaesthetized and bled to death by giving incision on the right common carotid artery. Whole vascular system was flushed with 0.85% physiological saline solution and then 10% formalin was injected through the same route for well preservation. After preservation, the muscles of the perineum were surgically isolated, transected and studied. It revealed that muscles of the pelvic diaphragm were M. levator ani and M. coccygeus. The M. levator ani was originated entirely from the sacrosciatic ligament and M. coccygeus from the medial side of the ischiatic spine and from the inside of the sacrotuberous ligament. M. levator ani was poorly developed and was blended with coccygeus for some distance at their insertion. Muscles of the urogenital diaphragm were M. urethralis, M. ischiourethralis and M. bulbo glandularis. M. bulbo glandularis was a small circular muscle which enclosed the major vestibular gland. Anal musculature of the perineum were M. sphincter ani externus, M. rectococcygeus and M. retractor clitoridis. M. sphincter ani externus completely encircled the anus. Its fibers crossed ventral to the anus and continued into the opposite labium and the labium on the same side. M. rectococcygeus inserted on the ventral surface of the 5th and 6th caudal vertebrae. M. retractor clitoridis was originated from the 3rd and 4th caudal vertebrae. Urogenital musculature of the perineum were M. transverses perinei superficialis, M. constrictor vestibuli and M. constrictor vulvae. M. constrictor vestibuli covered the ventrolateral surface of the vestibule. M. constrictor vulvae was continuous with external anal sphincter at the decussation. The overall findings of this work will be helpful for the veterinarians, veterinary students, teachers and research personnel in the relevant technical fields.

Keywords: Black Bengal doe, Perineum, Pelvic diaphragm, Urogenital diaphragm

Introduction

The goat occupies a noteworthy position and plays a very significant functional role in the small holders agrarian economy of most of the developing countries including Bangladesh. Black Bengal goat is the only recognized breed among the domestic species available throughout Bangladesh. The goat has tremendous demand all over the world due to its production of extraordinary quality meat and skin (Davendra and Burns, 1983; Islam et al., 1991; Singh et al., 1991a; Singh et al. 1991b and Husain, 1993). Considering the paramount importance of goats, the Government of Bangladesh is determined to explore its potentials for reducing poverty, increase nutritional status and increase foreign exchange earning.

There are different regions of the animal body. Perineum is such a clinically important region as it provides base of the tail, anus, external genitalia and caudal attachment of scrotum or udder. Our ignorance of the obstetrical anatomy of domestic animals- indeed of all mammals other than man-points to need for a systemic anatomical study of structures involved in parturition; for parturient dysfunction in goat, at least, may be the cause of considerable mortality of both mother and offspring. Moreover, several common surgical affections such as vaginal and uterine prolapse, atresia ani et recti, urolithiasis, perineal laceration, rupture of
vulva, scrotal hernia, sinus and fistula affect this region. Inspite of clinical importance of the perineum no comprehensive study has yet been undertaken in black Bengal goat of Bangladesh. A search of literature of veterinary anatomy for specific and detailed topographic information (muscles, nerves and vessels) of the perineum of the goat is not very rewarding. Among domestic animals, the perineum has been described in the dog (Miller et al., 1964; Nitschke, 1970), cow (Habel, 1966), ewe (Bassett, 1965), mare (Habel, 1953), cat (Martin et al. 1974), bull and ram (Larson and Kitchell, 1958). Therefore, the present study has been carried out to study the topographic descriptions and illustrations of the muscles of the perineum of black Bengal goat.

Materials and Methods

The study was conducted on 12 black Bengal does (*Capra hircus*) at the Department of Anatomy and Histology, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh. All the animals were adult and apparently healthy and devoid of any external abnormalities. The animals were anaesthetized with pentobarbital sodium @ 20 mg/kg body weight (I/m). All the animals were bled to death by giving incision on the right common carotid artery. Whole the vascular system was flashed with 0.85% physiological saline solution and injected 10% formalin for well preservation following the same route. Then the animals were placed on the dissecting table for 24 hrs for proper fixation. After fixation, careful dissection was made with the help of scalpel, scissors and forceps. The muscles were surgically isolated, transected and studied. Photographs and drawings were made during the course of dissection.

Results and Discussion

Pelvic diaphragm

The pelvic diaphragm is defined traditionally as formed by the coccygeus and levator ani muscles, together with the fascia covering their internal and external surfaces (Gray, 1966). Muscles of the pelvic diaphragm were oriented craniocaudally establishing the diaphragm as a truncated cone.

Pelvic diaphragm musculature

**M. levator ani (retractor ani):** In the present study, it was revealed that M. levator ani was originated entirely from the sacrosciatic ligament and inserted under the external sphincter muscle in goat (Plate 1). The origin of the M. levator ani is similar with the report of Habel (1953) in mare but differed from the report of May (1955) in sheep who stated that it is originated from the ischiatic spine and sacrosciatic ligament. The insertion of the M. levator ani is similar with the observation of May (1955) and Habel (1966) but differed from the report of Habel (1953) who stated its three separate insertions on the dorsal part of the muscle on the lateral wall of the anus between the suspensory ligament and the external anal sphincter. The middle part of M. levator ani is inserted around the ventral surface of the anus and the most ventral portion on the perineal septum between the anus and vestibule.
Bassett (1965) stated that in the ewe the levator ani can not be discretely separated from the coccygeus and hence considered as a single muscle entity, the ischiococcygeus. In the present study it was revealed that the M. levator ani is poorly developed and is blended with the coccygeus for a short distance and separated from the coccygeus muscle by a thin fascia in the adult animals (Plate 1).

**M. coccygeus:** The M. coccygeus in goat was originated from the medial side of the ischiatic spine and from the inside of the sacrotuberal ligament and inserted on the transverse processes of the first three or four caudal vertebrae (Plate 1). The origin is similar to the report of Habel (1966) in cow but differed from the report of Martin et al. (1974) in cat who stated the origin from the major ischiatic notch.

The insertion of the M. coccygeus is similar with the report of Habel (1953) in mare but differed from the report of Habel (1966) in cow who stated the insertion on the transverse processes of first three caudal vertebrae and from the report of May (1955) in sheep who stated the insertion on the transverse processes of first two or three caudal vertebrae.

**Urogenital diaphragm**

Geiger (1956) in his description of the perineum of the sheep and goat said that the urogenital diaphragm is formed by the M. constrictor vestibuli and M. transversus perinei superficialis. The fascia of the urogenital diaphragm extend from the ischial arch inward and cranially to the ventral and lateral walls of the vestibule (Habel, 1966).

**Urogenital diaphragm musculature**

**M. urethralis:** The present study revealed that the M. urethralis covered the pelvic urethra and the lateral walls of the genital tract at the junction of the vagina and the vestibule (Plate 2b). This observation was more or less similar to the report of Habel (1966) in the cow and Martin et al. (1974) in cats.

**M. ischiourethralis:** The M. ischiourethralis was not discretely separated from the urethralis in goat (Plate 2b). But it is distinct in mare (Habel, 1953) and in cat (Martin et al., 1966).

**M. bulboglandularis:** In the present study, it was found that the M. bulboglandularis was a small circular muscle which enclosed the major vestibular gland (Plate 2a). It curved around the major vestibular gland. Its fibers continued with the constrictor vestibuli. This observation is more or less similar with the report of Habel (1966) but differed from the report of Martin et al. (1974) who stated that it is a triangular muscle passed cranioventrally to cover the major vestibular gland.

**Urogenital musculature of the perineum**

**M. transversus perinei superficialis:** In the present study, the M. transversus perinei superficialis was found as a rudimentary band extended from the decuussation of the external anal sphincter for a variable distance toward the tuber ischii (Plate 2b). This report is similar to the report of Habel (1966) in cow.
Plate 1. Dissection showing the perineal muscles of black Bengal doe (Caudolateral view)
A: Rectococcygeus M., B: Sphincter ani externus M., C: Coccygeus M.,
D: Levator ani M., E: Constrictor vestibuli M., F: Retractor clitoridis M. and Sc:
Sacrosciatic ligament

Plate 2a. Deep dissection showing the perineal muscles of black Bengal doe (lateral view)
A: Constrictor vulvae M., B: Bulboglandularis M., C: Retractor clitoridis, D: Major
vestibular gland, Re: Rectum, Va: Vagina and U: Urethra

Plate 2b. Deep dissection showing the perineal muscles of black Bengal doe
(caudoventral view)
A: Urethralis M., B: Ischiourethralis M. C: Transversus perinei superficialis M., Re:
Rectum, Va: Vagina and U: Urethra
M. ischiocavernosus: The present study revealed that the M. ischiocavernosus was absent in black Bengal doe. This observation corresponds to the report Bassett (1965) in ewe.

M. Constrictor vestibuli: The M. constrictor vestibuli in black Bengal doe was originated from the ventral border of the levator ani muscle and passed under the vestibule where the muscle was attached to the semimembranosus fascia, ischium and clitoris (Plate 1). This observation is similar to the report of Habel (1953) in mare. The M. constrictor vestibuli covered the ventrolateral surface of the vestibule.

M. Constrictor vulvae: The M. constrictor vulvae in black Bengal doe was continuous with external anal sphincter at the decussation (Plate 2a). This observation suggests the report of Habel (1966) in cow and May (1965) in sheep. The superficial fibers of the muscle were spread out in the labia and the deep part of the muscle embraced the clitoris.

Anal musculature of the perineum

M. Sphincter ani externus: It was found in the present study that the M. sphincter ani externus completely encircled the anus. Most of the fibers of M. sphincter ani externus crossed ventral to the anus and was continued into the opposite labium and a few lateral fibers passed into the labium on the same side (Plate 1). This observation is in agreement with the report of Habel (1966) in cow and Bassett (1965) in ewe.

M. rectococcygeus: In the present study, it was revealed that the M. rectococcygeus was derived from the smooth muscle coat of the terminal rectum forming a cord and inserted on the ventral surface of the 5th and 6th caudal vertebrae in black Bengal goat (Plate 1). This report differed from the report of Martin et al. (1974) in cat who stated that the M. rectococcygeus inserted on the ventral surface of the 6th and 7th caudal vertebrae.

M. retractor clitoridis: It has been observed that the M. retractor clitoridis was originated from the 3rd and 4th caudal vertebrae in black Bengal goat (Plate 2a). This report differed from the report of Habel (1966) in cow as he stated the origin from the 2nd and 3rd caudal vertebrae.

The M. retractor clitoridis crossed obliquely the medial surface of the constrictor vestibuli and ran ventrally between the constrictor vestibuli and vulvae. This muscle was divided into several strands one or more of which were inserted on the corpus clitoridis and others on the wall of the vestibule. This observation is similar to the report of Habel (1966) in cow.

References


