Middle anatomical landmarks for visualization of rabbit bulbourethral glands at helical

(Subject of area: Imaging anatomy)

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ABSTRACT

Ten mature clinically healthy rabbits were studied. The bulbourethral glands were scanned by helical computed tomography. The animals were positioned in supine recumbence and contrast agents were applied. The pelvis was scanned in the transverse level through the transition between 2nd and 3rd coccygeal vertebra (dorsally), tabula of ischium (laterally) and sciatic part of pelvic symphysis (ventrally). The glandular borders were well defined. The bulbourethral glands' images were replaced dorsolaterally to the urethtra's walls. The localization of the median septum, that separates the glands, is defined difficultly. Contrast anatomical helical CT study could add data which are suitable for the imaging anatomical status of these organs in the rabbit.

Keywords: Bulbourethral glands, Imaging anatomy, Topography.

INTRODUCTION

Bulbourethral glands in the rabbit are enveloped by fibrous capsule and are covered by the striated bulboglandular muscle. Their shape is cuboid, craniocaudal elongated and dorsoventral flattened. The rabbit bulbourethral glands possess six surfaces: dorsal, ventral, cranial, caudal, left and right. They are relatively higher than those in the man and are voluminous organs as the boar glands (Holtz and Foote, 1978; Vásquez and del Sol, 2001).

According to Sikorski (1977) the human bulbourethral glands are characterized topographically to the pelvic diaphragm as diaphragmal, diaphragm-bulbar and bulbar. According to the anomalies, which are observed in them, the glands are classified into separated, connected and inosculated ones.

CT images are with better definitiveness compared to the images obtained by ultrasound conventional radiological study. The authors administrate per os and parenteral contrast agents (Yunusa et al., 2013) (3% gastrograffin; 76% urografin; low-osmolar contrast medium iohexol iopamiro) in patients in order to be visualized soft tissue findings at thickness of CT slices from 5 to 10 mm. They prove that helical CT study characterizes in detail the human abdominal organs and it detects the localization and features of the focal findings (Yunusa et al., 2013).

Axial precontrast and contrast CT study of the rabbit bulbourethral glands has been conducted by Dimitrov (2011). It is found that the glands are transversely oval homogeneous and relatively hyper dense structures to the adjacent soft tissues.

The study could add the morphological and diagnostic information for these organs in the small domestic animals.

MATERIALS AND METHODS

Materials

Ten mature clinically healthy rabbits 12 months of age, from the New Zealand white rabbit breed with weight between 2.8 kg and 3.2 kg were anesthetized (IM) with Ketaminol[®] 10 solution (Intervet) (Ketamine hydrochloride 100 mg/ml and Benzethonium chloride 0.1 mg/ml) of 0.5 ml/kg (Dimitrov, 2013).

Methods

Anatomical protocol: The bone findings which were used as anatomical markers for helical CT study were tabula of ischium (laterally), sciatic part of the pelvic symphysis (ventrally), the transition between second and third coccygeal vertebra (dorsally) (Dimitrov, 2011).

Imaging protocol: The studied animals were positioned in ventrodorsal (supine) recumbence as in four of them was not applied contrast (Dimitrov, R, 2015).

Contrast media: Used contrast media were Optiray 350 (nonionic low osmolar contrast medium) (Healthcare Ltd. UK) and UROGRAFIN 76% 20 ml (SCHERING LTD. GERMANY). The first was applied parenteral (IV) in cephalic vein at a dose of 3 ml/kg m. These condcontrast material was orally administrated (per os) as 1.52 % water solution (30 ml/ kg m) (Dimitrov, 2013).

Imaging techniques: For this purpose it was used a whole body multi-slice helical computed tomography scanner (Light Speed QX/I GE, Genaral Electric USA). CT protocol is standard for this device and studied tissues (Dimitrov, 2013; Dimitrov, R, 2015).

Ethicalprotocol

The study was approved by the institutional committee of animal care (Trakia University, Faculty of Veterinary Medicine, Stara Zagora, Bulgaria) (Approval № 51/29. 09. 2012).

RESULTS

When scan the pelvis in the transverse plane (level) through the transition between 2ndand 3rdcoccygeal vertebra (dorsally), tabula of ischium (laterally) and sciatic part of pelvic symphysis (ventrally) the bulbourethral glands were visualized with well-defined and thickened hypercontrasted (hyperattenuated) homogenous capsule part. The image of the glandular parenchyma was hyperattenuated and homogeneous. The gland's shape was distinctly oval. The median septum, separating both glands was heterogeneous, with irregular outlines and not well-defined. The glandular borders were well defined. The bulbourethral glands' images were replaced dorsolaterally to the urethra's walls. The soft tissue contrasted differentiation between capsular and parenchyma glandular part was difficultly found. It was central between both glands and rectum (figure 1 and figure 2).



Fig. 1. Helical anatomic contrasted computed tomography of the rabbit pelvis trough the cranial part of third coccygeal vertebrae (C3): TI - tabula of ischium, u - pelvic urethra, b - bulbourethral gland, R - rectum, PS - pelvic symphysis. R - right, L - left. (positive image) (ventrodorsal recumbency)



Fig. 2. Helical anatomic contrasted computed tomography negative image of the rabbit pelvis trough the cranial part of third coccygeal vertebrae (C3): TI - tabula of ischium, u - pelvic urethra, b - bulbourethral gland, R – rectum, PS – pelvic symphysis. R – right, L – left. (negative image) (ventrodorsal recumbency)

The membranous urethra was located close to the sciatic part of the pelvic symphysis, as between them missed the image of the negatively attenuated periprostate adipose depot. The shape of the urethra was irregularly dorsoventrally oval, as the images of the urethral lumen and wall were not well defined each other.

The rectum was found dorsally and was hypercontrasted, homogeneous lumen and with oval shape. Its wall was not visualized.

DISCUSSION

The results show that the topography of the rabbit bulbourethral glands is changed: in caudal direction the localization of the glands to the pelvic urethra is changed in dorsolateral.

The glands' shape is changed also in cranio-caudal direction in oval and dorsoventrally flattened.

The localization of the median septum, that separates the glands, is defined difficultly and its outlines were indistinct.

The results confirmed data for localization and topography of the rabbit bulbourethral glands, but they are different to the definition of many authors for the shape of these organs (Holtz and Foote, 1978; VásquezanddelSol,2001).The helical CT study found that their shape is oval. This is due to the difference in the nature of the methods of research (Holtz and Foote, 1978; Vásquez and del Sol, 2001). Striated bulboglandular muscle is completely accreted with glandular capsule, which is a reason for lack of soft tissue definition (Holtz and Foote, 1978; Vásquez and del Sol, 2001).

In comparison to the investigation of Sikorski (1977) does not characterize in this way the gland morphology. Our results show that the gland morphology is defined topographically by close soft and bone tissues.

In comparison to the radiological conventional study of Pinós et. al. (2001) the present imaging study - helical CT is applied to demonstrate the normal imaging features of these glands in the rabbit.

Like CT studies of Yunusa et al. (2013) for the man, in this research have been administrated oral and parenteral positive contrast agents in order to improve the quality of imaging soft tissues.

In accordance to Dimitrov (2011) the same glands have been studied by helical CT. Highly specialized and detail information has been obtained for these organs.

We conclude that by contrast anatomical helical CT study could be added data which are suitable for the imaging anatomical status of these organs in the rabbit.

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