



Cranial Anatomical Landmarks For Helical Computed Tomography (CT) Visualization of Rabbit Bulbourethral Glands

KEYWORDS

helical CT, imaging anatomy, bulbourethral glands

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ABSTRACT *The bulbourethral glands of ten sexually 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 studied. The animals were positioned in ventrodorsal (supine) recumbence. Contrast enhancement was applied. The glands were visualized by helical anatomic CT at the transverse plane through the cranial part of the 2nd coccygeal vertebra (dorsally), tabula of ischium (laterally) and the sciatic part of the pelvic symphysis (ventrally). Should be written as separate words - We can therefore conclude that contrast anatomical helical CT study of the rabbit bulbourethral glands is definitive to be obtained imaging anatomical data for the glandular morphology.*

Introduction

The bulbourethral glands in man and domestic animals also called Cooper, is pair organ of pea-like shape, which is located caudal to prostate. It produces mucous fluid, which is drained into the spongy urethra and neutralizes the traces of acid urine. The bulbourethral glands are localized in the perineal region, at the basis of the penis and are dorsolateral to the urethra. They are exocrine glands, each possesses one excretory duct that passes through the perineal membrane and opens in the proximal part of the spongy urethra (McEntee, 1990; Chughtai et al., 2005).

X-ray anatomical image of these glands, obtained by application of retrograde urethrography has been studied by Currarino and Fuqua (1972). The authors distinguish two types of glandular diverticular lesions - globular and tubular.

Computed tomography (CT) and radiology are methods for imaging study based on the properties of X-rays, but CT provides more detailed information for the investigated structures. In CT, like conventional radiology, are used positive and negative contrast agents, which improve the image's quality. In helical CT compared to axial CT patient moves smoothly to the detector and gantry is rotated around the studied area in order to obtain quickly a large number of serial sections. In this method are eliminated the artefacts, caused by the object's movement. CT is based on the different absorption of the X-rays in the target tissues. Thus an image is created, which is referred to cross-sectional imaging. Computed tomography produces transversal slices and is also called "slices" of anatomy (Hendee, 1989; Goldman, 2007; Weir et al., 2011).

The aim of the study is to precise some imaging features of the rabbit bulbourethral glands by helical CT application.

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 studied. The animals 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) and the second coccygeal vertebra (dorsally) (Dimitrov, 2011).

Imaging protocol: The studied animals were positioned in ventrodorsal (supine) recumbence.

Contrast media: Used contrast media were Optiray 350 (non-ionic low osmolar contrast medium) (Healthcare Ltd. UK) - (IV) cephalic vein at a dose of 3 ml/kg mand UROGRAFIN 76% 20 ml (SCHERING LTD. GERMANY) - (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, General Electric USA). Computed tomography study was carried out at the standard protocol (Dimitrov, 2013).

Ethical protocol: 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

Helical anatomic CT contrast study of the pelvis at the transverse plane (level) through the cranial part of the 2nd coccygeal vertebra (dorsally), tabula of ischium (laterally) and the sciatic part of the pelvic symphysis (ventrally) visualized the following soft tissue structures: The bulbourethral glands were visualized as soft tissue findings. They were located ventrally to the hypercontrasted (hyperattenuated) rectum and dorsally to the relatively hypocontrasted (hypoattenuated) membranous urethra. Both glands were each other separated by hypercontrasted heterogeneous median septum, which reached dorsally to the contrasted image of the rectum, and ventrally - to the hypocontrasted image of urethra. The peripheral capsular glandular zone was hyperattenuated and homogenous, compared to the centrally located homogeneous hypoattenuated parenchyma. The shape of each gland was oval, regularly contoured and laterally flattened. The glands were situated approximately at the middle of the dorsolateral diameter of pelvis

outlet.

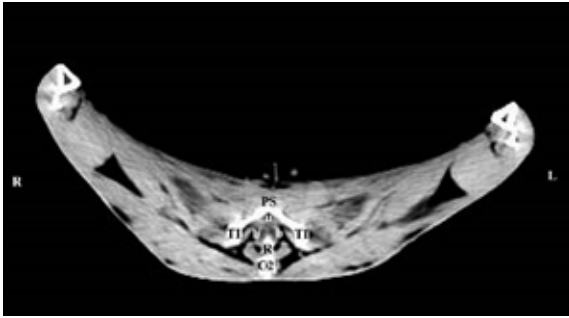


Figure1. Helical anatomic contrasted computed tomography positive image of the rabbit pelvis through the cranial part of second coccygeal vertebrae (C2): TI - tabula of ischium, u - pelvic urethra, b - bulbourethral gland, R - rectum, PS - pelvic symphysis. R - right, L - left. (ventrodorsal recumbency)

The membranous urethra was situated between the sciatic part of the pelvic symphysis and dorsally established bulbourethral glands. Urethral lumen was heterogeneous hypoattenuated, and this of the urethral wall - hyperattenuated and homogeneous. Urethra's shape was oval, dorsoventrally flattened and with regular outlines.



Figure2. Helical anatomic contrasted computed tomography negative image of the rabbit pelvis through the cranial part of second coccygeal vertebrae (C2): TI - tabula of ischium, u - pelvic urethra, b - bulbourethral gland, R - rectum, PS - pelvic symphysis. R - right, L - left. (ventrodorsal recumbency)

Discussion

The obtained results show a trend of change of the morphology and topography of the rabbit bulbourethral glands to the pelvic urethra, as their dorsal localization to the urethra.

The glands' shape is changed also from oval to laterally flattened.

The hypoattenuated heterogeneous zone, occupying central position between glands, urethra and rectum, is probably a finding from the pelvic diaphragm in the area of perineum.

The shape of each of CT studied glands is close to their shape in the man and rodents, which corresponds to data of McEntee(1990) and Chughtai et al. (2005).

Like CT studies of Hendee (1989), Goldman (2007) and Weiretal. (2011) Should be written as separate words - for man, in the present study have been applied oral and parenteral positive contrast agents in order to improve the quality of imaging soft tissues. In Helical CT study is obtained detail, definitive, timely, cross-sectional and with higher resolution imaging anatomical information in comparison with that obtained by conventional radiological studies. The data obtained from this study are maximum deprived of the presence of artifacts.

In contrast to the axial CT data of Dimitrov and Toneva (2005) for bulbourethral glands in the cat, by the present study has been achieved a highly definitive imaging of these organs in the rabbit, using helical CT. Like Dimitrov (2011) who has conducted axial CT study of the rabbit bulbourethral glands, here the same glands have been studied by helical CT. Highly specialized and detail information has been obtained for these organs.

We can therefore concluded that by contrast anatomical helical CT study of the rabbit bulbourethral glands, are obtained definitive and specialized imaging anatomical data for the glandular morphology.

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