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Ultrasonographic features of the bulbourethral glands in the domestic rabbit (*Oryctolagus cuniculus*)

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ABSTRACT

The aim of the study was to describe some of the ultrasonographic features of domestic rabbit bulbourethral glands, with regard to their relevance to reproductive pathology. The glands of ten sexually mature, clinically healthy, white, male New Zealand rabbits, aged 18 months, with body masses ranging from 2.8-3.2 kg, were investigated following anaesthesia. A perineal sonographic approach was applied. The glands were observed in two planes. They were viewed sonographically as solid, hyperechoic, heterogeneous structures. A hyperechoic gland without a hypoechoic center was visualized in sagittal section. In transverse section, normal bulbourethral glands were visualized dorsolaterally to the bulbar urethra, and a hypoechoic urethra was located ventromedially. As part of the study, the sonographic features of the bulbourethral glands were compared in a liquid isotonic medium. The analogous results of both methods allowed us to propose the use of perineal ultrasonography as a sufficiently definitive, non-invasive method for visualizing rabbit bulbourethral glands.

Key words: bulbourethral glands, ultrasonography, anatomy, rabbit

Introduction

The bulbourethral glands form a paired organ, localized on the dorsal surface of the pelvic urethra, in the region of the pelvic arch and penile root. Their consistence is denser than that of the prostate gland, their surface is irregular and structure lobular. These glands are located in the connective tissue of the urogenital part of the perineum (BARONE, 2001).

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The bulbourethral glands of the rabbit are a compact structure, surrounded by a fibrous capsule and m. bulboglandularis. The glands are cubic in shape and extend along the dorsal urethral wall. Rabbit bulbourethral glands are connected to the prostate gland by connective tissue (VASQUEZ and DEL SOL, 2001).

These glands have been investigated anatomically in the anadol squirrel, wild mice, and the Mongolian gerbil (PINTHEIRO et al., 2003; CAKIR and KARATAS, 2004; MOLLINEAU et al., 2006).

Ultrasonography is a non-invasive method for the visualization of the male accessory sex glands. Bulbourethral glands have been examined for shape, symmetry, echogenicity and cavity-like findings (CAMPERO et al., 1988; WEBER and WOODS, 1993; BARR, 1997; HILDEBRANDT et al., 1998; DIMITROV, 2010).

Boar bulbourethral glands have been investigated transrectally by CLARK and ALTHOUSE (2002). The authors found them to be elongated, ovoid and echoic, with large anechoic central zones.

Many authors have studied the glands of the bull, stallion and elephant via transrectal ultrasonography and post mortem in a liquid medium (LITTLE and WOODS, 1987; CAMPERO et al., 1988; WEBER and WOODS, 1992; HILDEBRANDT et al., 1998).

Normal human bulbourethral glands are small, tubular, ovoid, pea-sized structures. They are situated dorsolaterally, parallel to the end of the membranous urethra, between both fasciae of the pelvic diaphragm (CHUGHTAI et al., 2005).

A sonographic perineal approach has been applied for observation of cystic degeneration - syringocele - in human bulbourethral glands (DEVAN, 1996).

The aim of the study was to describe some of the sonographic features of normal bulbourethral glands in the domestic rabbit, with regard to their relevance in imaging diagnosis and reproductive pathology.

Materials and methods

The experiments were approved by the University Animal Care Committee for compliance with the European Communities Council Directive 86/609/EEC of 24 November 1986 and national legislation. The study was performed in strict compliance with the ethical guidelines for the humane treatment of animals as defined by the European Convention for the Protection of Vertebrate Animals used for Experimental and Other Scientific Purposes, the *European Convention* for the *Protection* of Pet Animals, and the Law on Animal Protection in the Republic of Bulgaria - part IV (Animal Experimentation).

Ten sexually mature, clinically healthy, white male New Zealand rabbits, aged 18 months, and weighing from 2.8 kg to 3.2 kg, were studied. The animals were anaesthetized

with 15 mg/kg i.m. Zoletil® 50 (tiletamine hydrochloride 125 mg and zolazepam hydrochloride 125 mg in 5 mL solution) Virbac, France (DINEV and SIMEONOVA, 2009).

The study was performed using CHISON 600 VET (China) Micrus ultrasonic equipment, 7 MHz micro-convex transducer C20605 and front length 20 mm. Prior to examination, the hair of the perineum was clipped. A contact gel (Eko-gel® Lessa, Espana) was used.

We applied a perineal sonographic approach. The glands were observed in two planes - transverse and sagittal. The findings were documented on a Mitsubishi P91E printing device.

After euthanising four of the animals studied with 150 mg i. v. Thiopental® (thiopental sodium 1000 mg) Biochemie, Austria, the bulbourethral glands were extirpated and investigated in a liquid isotonic medium in transverse and saggital planes, for comparison of their sonographic features.

Results

The rabbit bulbourethral glands were visualized sonographically as a solid hyperechoic, heterogenous structure. The peripheral glandular zone, including M. bulboglandularis and the fibrous capsule, displayed higher echogenicity, compared to the central hypoechoic parenchymal zone. The glands were oval and well distinguished from the connective tissue of the urogenital part of the perineum, which was hypoechoic. They were located dorsally to the pelvic brim and the root of the penis. The cranial border of the glands could not be imaged because of the limitations of the perineal approach (Fig. 1 and 2). A hyperechoic glandular structure, with no hypoechoic centre, was seen in the sagittal section (Fig. 1). The shape of the bulbourethral glands was craniocaudally elongated and ovoid (Fig. 1). The bulbourethral glands were visualized dorsolaterally to the bulbar urethra in the transverse section and the hypoechoic urethra was observed ventromedially. The glandular finding was hyperechoic, with no visible hypoechoic central part (Fig. 2).

The bulbourethral glands, extirpated *post mortem,* were studied in saggital and transverse planes in a liquid medium (Fig. 3 and 4). The glands displayed lower echogenicity, probably due to the lack of peripheral tissue, because this study was carried out in a liquid medium.

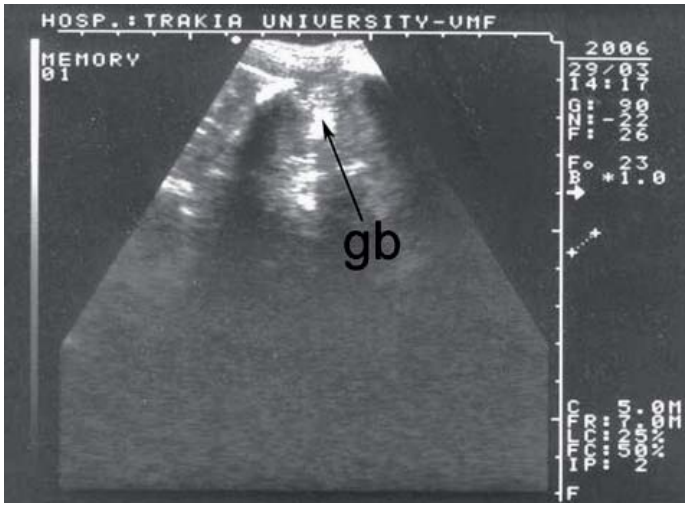

Fig. 1. Sagittal sonographic image of the bulbourethral glands (gb) in the rabbit

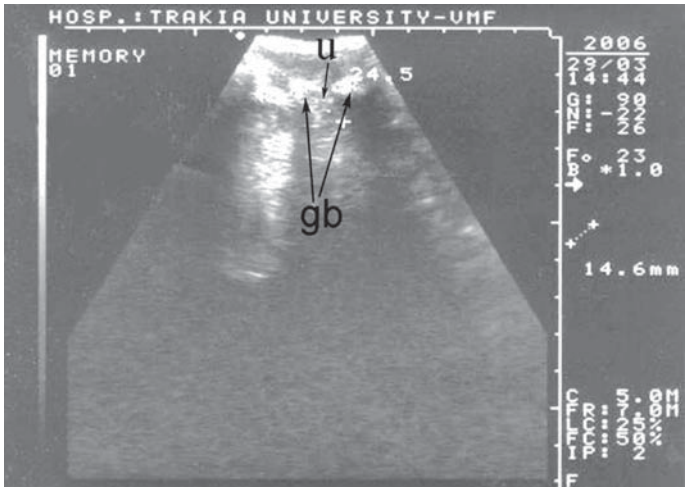

Fig. 2. Transverse sonographic image of the bulbourethral glands (gb) and the bulbar urethra (u) in the rabbit

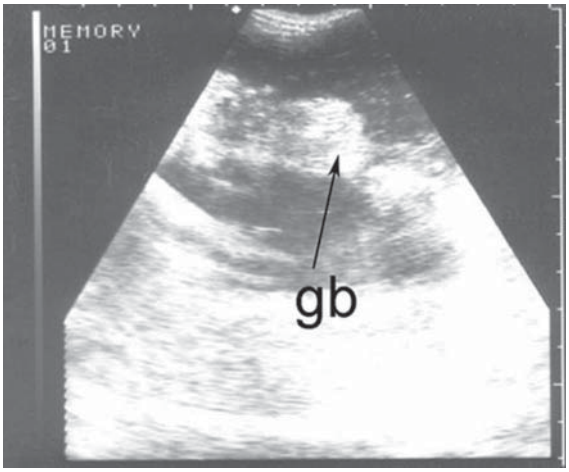

Fig. 3. Sagittal sonographic image of the extirpated bulbourethral glands (gb) in the rabbit in an isotonic liquid medium

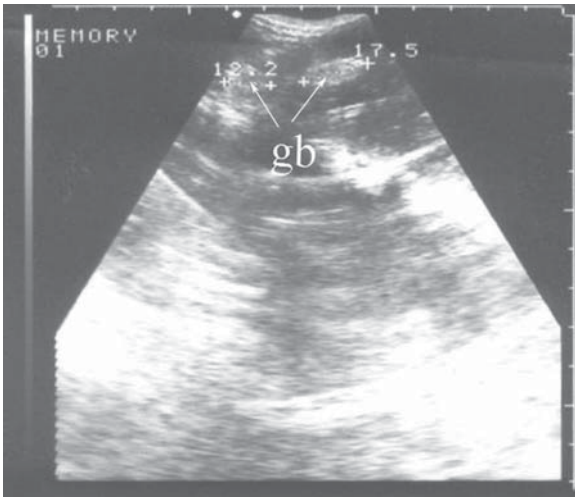

Fig. 4. Transversal sonographic image of the extirpated bulbourethral glands (gb) in the rabbit in an isotonic liquid medium

Discussion

Our results confirmed the opinions of BARONE (2001) and VASQUEZ and DEL SOL (2002), regarding the localization, structure and morphology of these glands in the rabbit.

The shape and localization of the bulbourethral glands in the rabbit confirmed the data on these glands in wild rodents (PINHEIRO et al., 2003; CAKIR and KARATAS, 2004; MOLLINEAU et al., 2006). The bulbourethral glands in the rabbit were ovoid and similar to those in the boar, but they had no solid anechoic central parts (CLARK and ALTHOUSE, 2002). Our results corresponded to this and other studies, performed by CAMPERO et al. (1988), WEBER and WOODS (1992), BARR (1997), HILDEBRANDT et al. (1998), CLARK and ALTHOUSE (2002) in other animals and humans.

The glands, studied in a liquid medium, displayed similar findings as for the bull, stallion and elephant (LITTLE and WOODS, 1987; CAMPERO et al., 1988; WEBER and WOODS, 1993; HILDEBRANDT et al., 1998).

The ultrasonographic investigation of rabbit bulbourethral glands revealed important sonographic features of these organs in terms of diagnosing cavital glandular lesions and corresponded to the study of human glands by DEWAN (1996) .

For the first time, we proposed the perineal approach to ultrasonography of the rabbit bulbourethral glands, with regard to the visualization of their caudal parts, in contrast to the transrectal approach used to investigate human, boar, stallion and elephant glands, mainly the dorsal and cranial aspects (LITTLE and WOODS, 1987; CAMPERO et al., 1988; WEBER and WOODS, 1992; HILDEBRANDT et al., 1998; CLARK and ALTHOUSE, 2002).

Our results allowed us to propose the use of perineal ultrasonography as a sufficiently definitive, non-invasive method of visualizing the bulbourethral glands in rabbits in the transverse and sagittal sections.

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DIMITROV, R. S., P. Y. YONKOVA, K. D. STAMATOVA, D. G. YOVCHEV: Ultrazvučne značajke bulbouretralnih žlijezda kunića (*Oryctolagus cuniculus*). Vet. arhiv 82, 193-200, 2012.

SAŽETAK

Cilj ovog istraživanja bio je opisati neke ultrazvučne značajke bulbouretralnih žlijezda kunića s obzirom na njihovu važnost u patologiji spolnih organa. Nakon anestezije bile su pretražene žlijezde 10 spolno zrelih, klinički zdravih kunića bijele novozelandske pasmine u dobi od 18 mjeseci, tjelesne mase 2,8 - 3,2 kg. Ultrazvučna pretraga obavljena je u perinealnom području. Žlijezde su bile pretražene u dvije ravnine. Ultrazvučno su se vidjele kao dvije hiperehogene solidne, heterogene tvorevine. Hiperehogena žlijezda bez hipoehogenog centra bila je uočljiva na sagitalnoj ravnini. U poprječnoj ravnini normalne bulbouretralne žlijezde uočavale su se dorzolateralno od bulbarne uretre, a hipoehonogena uretra bila je smještena ventromedijalno.

Ultrazvučne značajke bulbouretralnih žlijezda bile su uspoređivane u odnosu na izotonični tekući medij. Na osnovi postignuća sličnih rezultata dvjema metodama može se predložiti perinealni ultrazvučni pristup kao primjerena neinvazivna metoda za vizualizaciju bulbouretralnih žlijezda kunića.

Ključne riječi: bulbouretralne žlijezde, ultrazvuk, anatomija, kunić