*Original Article*

# ULTRASONOGARAPHIC INVESTIGATION ON THE NORMAL VESICULAR GLANDS OF DOMESTIC RABBIT *(ORYCTOLAGUS CUNICULUS)*

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## Summary

The aim of the study was to investigate the ultrasonographic features of the vesicular glands of domestic rabbit, which is often used as an animal model in demonstrating many andrological problems in males. We studied 10 sexually mature, white New Zealand male rabbits, aged 12 months, weighing 2.8-3.2 kg. The glands were examined by ultrasonography in two planes – transversal and sagittal, and metric studies were performed. The sonographic approach used was percutaneous, transabdominal, and prepubic. The rabbit vesicular glands were visualized as solid heterogeneous echoic findings. The peripheral glandular part showed higher echogenicity, compared to the central hypoechoic parenchymal part. The glands were well-differentiated from the surrounding soft tissues. They were found dorsally to the caudal part of the urinary bladder body and neck. In sagittal and transversal sonographic aspects, a hyperechoic glandular structure with well-differentiated central parenchymal zone, was visualized. Ultrasound studies demonstrated a craniocaudally, ovoidly elongated and dorsoventrally shape of the rabbit vesicular glands. Our results motivate us to recommend the use of the prepubic ultrasonography as a good method for visualization of the rabbit vesicular glands in transversal and sagittal aspect.

**Key words:** vesicular glands, anatomy, ultrasonography, rabbit

## Introduction

The rabbit vesicular glands are lobular organs with irregular shape and variable size and volume, because of the presence of secretion in the lobule lumen and their dilatation. The ventral surface of the vesicular glands is connected with vas deferens ampules. The cranial part from the dorsal glandular surface reaches the rectum and colon, while the caudal part reaches the prostate and forms the end parts of the ejaculator ducts [1-5].

Some authors perform transrectal ultrasonographic study of the accessory sex glands, because of their common connection with ejaculation problems. The sonographic characteristics of stallion vesicular glands vary widely, which is probably connected with sexual activity. There are differences in the echogenicty between left and right

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**Received:** July 1, 2010
**Revision received:** November 9, 2010
**Accepted:** November 11, 2010

vesicular glands [6-8].

Using transrectal ultrasonography, authors describe giraffe sex glands in connection with their reproductive status [9]. In the giraffe and the rest of ruminants, the vesicular glands are better developed, and the prostate is vaguely formed.

The deer accessory sex glands are studied via percutaneous and transrectal ultrasonography, with a view to the ascending quantitative alterations in their morphology through the generative period [10].

The boar and bull accessory sex glands are investigated by transrectal ultrasonography in order to estimate their reproductive qualities. The vesicular gland wall is thin, and the parenchyma has small hypoechoic sections, which join in the central duct [11, 12].

By ultrasonographic and morphometric study of the vesicular glands in brasilian agati, [4, 13] it has been found that these glands are localized on the left and right side of the urinary bladder, which is situated centrally in the pelvis.

Transversal reconstructed images, obtained by ultrasonography, are used to estimate the status of human vesicular glands. Vesicular gland cysts and amiloidosis are manifested as a diffuse thickening of the glandular walls [14, 15].

Obstruction of the ejaculator ducts is rare but it is a considerable factor in human sterility. Some researchers perform sonography of the vesicular glands to detect the obstructive lesion [16].

The anatomical details and pathological changes (dilatation, cysts and concrements) in human seminal vesicles are investigated by transrectal ultrasonography [17].

The lack of literature data on the ultrasonographic characteristics of normal rabbit vesicular glands motivated us to investigate some sonographic features of rabbit vesicular glands, which are often used as an animal model to demonstrate many human andrological problems.

## Materials and Methods

Ten sexually mature, clinically healthy male white New Zealand rabbits, aged 12 months, weighing 2.8 -3.2 kg were studied. We anesthetized the animals with 15 mg/kg Zoletil® 50 (tiletamine hydrochloride 125 mg and zolazepam hydrochloride 125 mg in 5 ml solution, Virbac, France).

The experiments were made in strict compliance with European convention for vertebrate animals protection, used for experimental and other scientific purposes (Strasbourg, 16th May, 1986), European convention for companion animals protection (Strasbourg, 13th November 1987) and animal protection law in Republic of Bulgaria (section IV-Experiments with animals, art. 26, 27 and 28, received on 24th January 2008 and published in Official gazette, 13/2008).

The urinary bladder of the studied animals was catheterized and filled with 10 ml sterile saline solution (0.9% Sodium chloride; Balkanpharma), as an acoustic window for vesicular glands' visualization. We made the investigation with ultrasonic equipment CHISON 600 VET (China) and multi frequent micro convex transducer C20605 with frequency of 7 MHz and radius of 20 mm. The findings were documented with Mitsubishi P91E thermoprinter device. Contact gel (Eko-gel® Lessa, Espana) was used for establishing better contact between the skin and the probe. The glands were observed in two planes – transversal and sagittal. The used approach was percutaneous, transabdominal, prepubic. For transversal imaging of the glands, the transducer was positioned transversally on the ventral abdominal wall and parallel to the pelvic arch. For sagittal visualization of the vesicular glands, the transducer was placed perpendicular to the pelvic arch.

Metric studies of vesicular gland length (l-mm) and height (h-mm) were made in the sagittal visualization, and in the transversal one – the same studies of vesicular gland width (w-mm) and height (h-mm) (Fig.1, Fig.2). The obtained statistical data were processed with a statistics program (StatMost for Windows, USA DataMost Corporation; 1994 ).

## Results

The rabbit vesicular glands were visualized as solid heterogeneous findings with relatively higher echogenicity, compared to the adjacent soft tissues and the acoustic lumen of the filled urinary bladder, which was used as an acoustic window. The peripheral glandular part, including the fibrous capsule, was with echogenicity higher as compared with that of the central hypoechoic parenchyma part. The glands were well differentiated from the surrounding soft tissues. They were found dorsally from the caudal part of the urinary bladder body and neck.

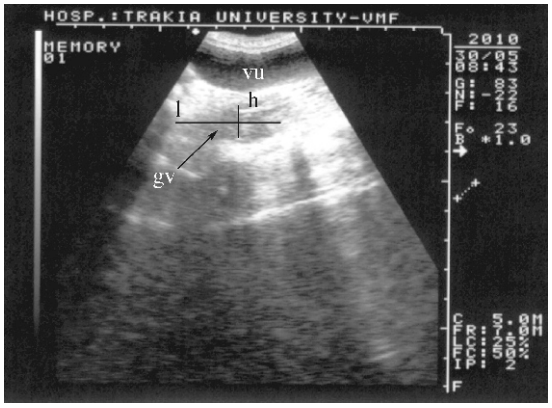


**Figure 1**. Length (l) and height (h) of the vesicular glands (gv) in sagittal plane; urinary bladder (vu)

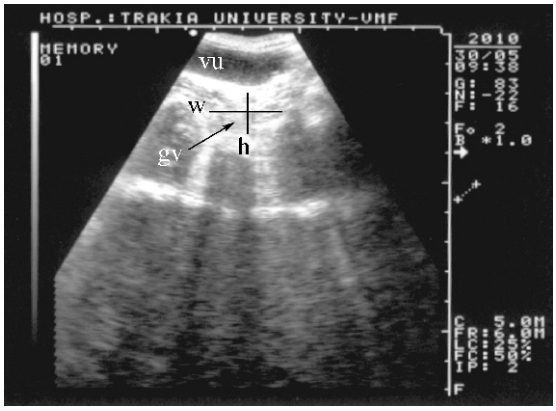


**Figure 2.** Width (w) and height (h) of the vesicular glands (gv) in transversal section; urinary bladder (vu)

In sagittal and transversal sonographic aspect of the vesicular glands, there were hyperechoic findings with a linear pattern in the hypoechoic parenchyma zone (Fig.3, Fig.6, Fig.7).

In the sagittal section, an echoic glandular finding with hyperechoic periphery and well differentiated hypoechic centre was visualized (figure 3). In the sagittal observation of the gland, filled with a secretion, a hyperechoic central region was found, which corresponded to the drained part, dilatated by secretion. This part was surrounded by a hypoechoic striped zone, and corresponded to the secreting parenchyma and was situated over the hyperechoic capsule (Fig. 4).

In the sagittal and transversal section of the normal rabbit vesicular glands, the glands were visualized dorsolaterally to the caudal half of the urinary bladder (Fig.6, Fig.7).

In the transversal observation of the cranial parts of the vesicular glands, a hyperechoic heterogeneous finding without clearly differentiated hypoechoic central zone was found (Fig. 5). An echoic finding was marked by transversal visualization of the middle and caudal part of the glands, which presented with a well manifested hypoechoic central part, as the latter was well determined in caudally (Fig.6, Fig.7).

The data obtained from the metric sonographic study showed that the vesicular glands are 20 mm to 25 mm long (mean value 22±0.52 mm), 3 mm to 4 mm in height (mean value 3.6 ± 0.16 mm), and 10 mm to 12 mm in width (mean value 10.7±0.21 mm).

Ultrasound studies revealed an ovoid shape of the rabbit vesicular glands, craniocaudally elongated (Fig.3) and dorsoventrally flattened (Fig.6).

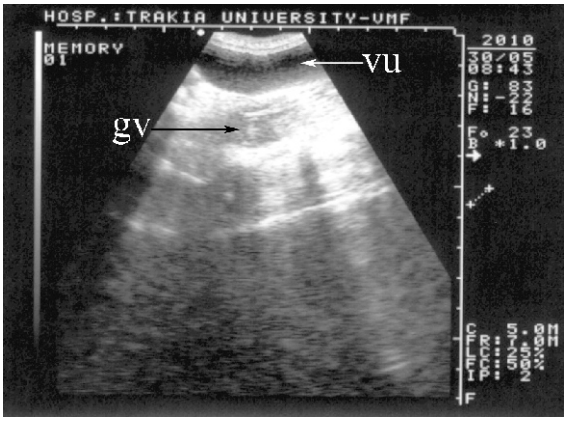


**Figure 3.** Sagittal section through the vesicular glands (gv); urinary bladder (vu)

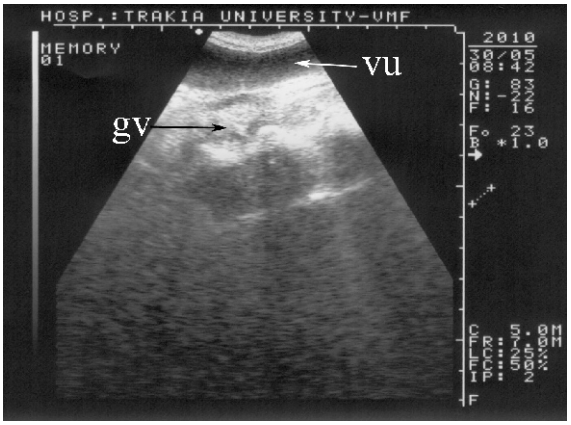


**Figure 4.** Sagittal section through the vesicular glands (gv), filled with secret; urinary bladder (vu)

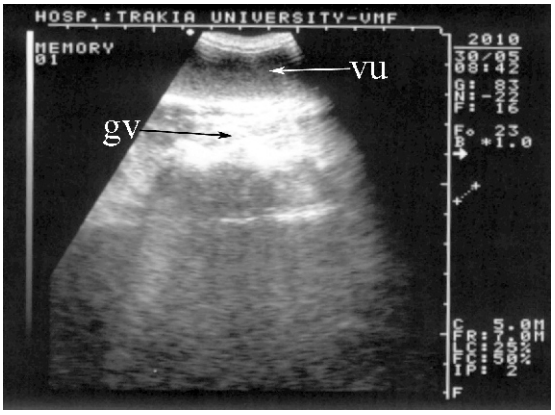


**Figure 5.** Transversal section through the cranial parts of the vesicular glands (gv); urinary bladder (vu)

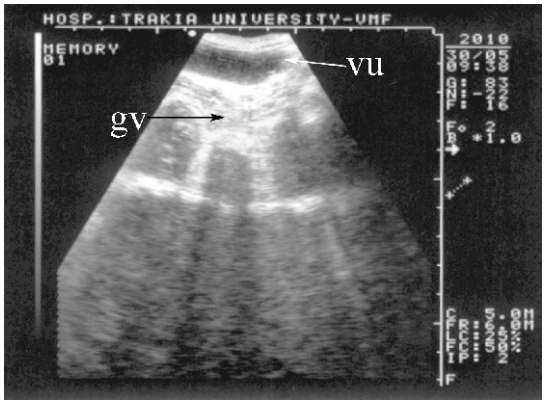


**Figure 6.** Transversal section through the middle parts of the vesicular glands (gv); urinary bladder (vu)

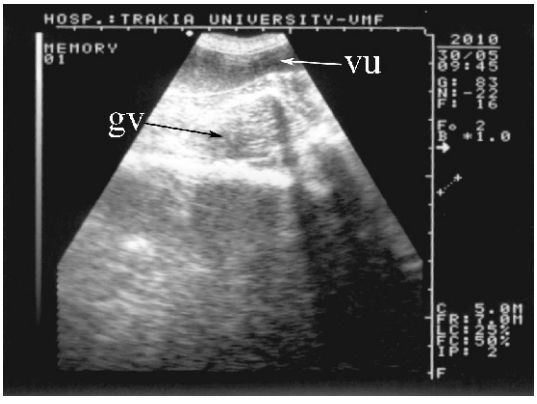


**Figure 7.** Transversal section through the caudal parts of the vesicular glands (gv); urinary bladder (vu)

## Discussion

For the first time, data about the sonographic qualitative and metric features of domestic rabbit vesicular glands are presented.

The data obtained on the topography and shape of the rabbit vesicular glands confirmed literature data of [1, 2, 3, 4, 5] about the irregular shape of these organs and their variable size, due to the presence of secretion in the lobules' lumen and the dilatation it causes.

Our results demonstrate that the qualitative and quantitative characteristics of rabbit vesicular glands vary in rather limited ranges, as compared to the ranges characteristic for stallion glands, which vary in wide ranges associated with sexual activity [7, 8]. As regards variations in the echogenicity of left and right stallion vesicular glands, reported by the above mentioned authors, no such variations were found in rabbit vesicular glands.

The data obtained from the present sonographic study concerning some quantitative characteristics of rabbit vesicular glands correspond with the aims of the investigation [9, 10], which describe giraffe and deer accessory sex glands in connection with their reproductive status.

In comparison with investigations on boar and bull vesicular glands, proving small echoic parts in the glandular parenchyma, that are united in a central duct [11,12] we found a hypoechoic central zone with linear hyperechoic findings in sagittal and transversal sonographic visualization of rabbit vesicular glands.

We prove that these rabbit glands are visualized dorsolaterally to the caudal half of the urinary bladder, and our results are similar to ones reported [4, 13], namely that that Brazilian agati vesicular glands are localized on the left and right side of the urinary bladder, being situated centrally in the pelvis.

Our results correspond with some studies on human vesicular glands [14, 15], particularly in regard to the glands' normal status estimation by use of transversal images.

The data obtained about the ultrasonographic features of rabbit vesicular glands can be useful as anatomical imaging base to interpret some glandular lesions as cysts, neoplasms, lithiasis and obstruction of the ejaculator ducts in animals, similar to the investigations in these conditions in humans [16, 17]. Unlike these authors, who obtained their results about the vesicular glands by applying transrectal ultrasonography, we apply and recommend the use of percutaneous transabdominal prepubic ultrasonography with filled urinary bladder (acoustic window) as a good method for visualization of the vesicular glands in sagittal and transversal planes.

## Conclusions

The results from the present study motivate us to conclude that detailed imaging anatomic data about glandular structure of rabbit vesicular glands can be obtained using ultrasonography. Such studies may prove important in both diagnostic and clinical practice, as well as for assessment of reproductive capacity of male animals.

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