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Original Contribution

COMPUTED TOMOGRAPHY IMAGING OF THE TOPOGRAPHICAL ANATOMY OF CANINE PROSTATE

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ABSTRACT

AIM: To investigate the topographical anatomy of canine prostate gland by computed tomography (CT) for diagnostic imaging purposes.

MATERIAL AND METHODS: Seven clinically healthy mongrel male dogs at the age of 3–4 years and body weight of 10–15 kg were submitted to transverse computerized axial tomography (CAT) with cross section thickness of 5 mm.

RESULTS: The CT image of canine prostate is visualized throughout the scans of the pelvis in the planes through the first sacral vertebra (S1) dorsally; the bodies of iliac bones laterally and cranially to the pelvic brim (ventrally). The body of prostate appears as an oval homogenous relatively hypo dense finding with soft tissue density. The gland is well differentiated from the adjacent soft tissues.

CONCLUSION: By means of CT, the cranial part of prostate gland in adult dogs aged 3–4 years exhibited an abdominal localization.

Key words: prostate gland, computed tomography, dog.

INTRODUCTION

The prostate gland in dogs has a semi oval transverse cross section with a flat dorsal surface. It is situated in the pelvic cavity. Its ventral surface attains the pubic bone (1, 2, 3, 4), and in adult animals, enters the abdominal cavity. The weight and dimensions of prostate vary depending on the age, breed and live body weight (5, 6, 7, 8, 9). The topographical anatomy of the gland is age-dependent and varies along the craniocaudal diameter of the pelvis. The prostate lies in the abdominal cavity and reaches the urachus during the second month after the birth. From this moment to adulthood, the prostate is located in the pelvic cavity and during sexual maturation, goes into the abdominal cavity again. In 4-year-old dogs, the cranial part of prostate gland is located abdominally whereas in 10-year-old dogs it is only in the abdominal cavity. In adults, enlarged prostate gland could compress the large intestine and to provoke constipation, difficult defecation and impaired micturition (10, 11, 12, 13). The diagnostic interest in canine prostate pathology is reported in many data obtained by computed tomography investigations (14, 15, 16, 17, 18). The imaging anatomy of the gland and its topography are relatively scarce and if present, they could be helpful in diagnostic interpretations (19, 20). In latter cited studies, domestic cat was the studied object but having in mind the anatomical differences between dogs and cats, these data should not be used by analogy.

The aim of the present study was to investigate the topographical anatomy of canine prostate gland by computed tomography (CT) for diagnostic imaging purposes.

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MATERIAL AND METHODS

Seven sexually mature, clinically healthy male mongrel dogs aged 3– 4 years and weighing 10–15 kg were anesthetized with 10 mg/kg Zoletil 50 (Virbac, France) i.m. (21) and then, positioned in dorsal recumbency. Contrast enhancement medium was then applied in the cephalic vein (OPTIRAY 350, HEALTHCARE LTD. UK) at a dose of 1 ml/kg and CT scans were performed with axial computed tomograph Siemens, SOMATOM, ARTX using the following technical specifications: table height 125 cm, OV=250, filter 1, 70 mA, 110 kV, scan time 3 s, high resolution – 512; gantry tilt (GT) – 0°, window (W) – 280, centre – 53 and transverse scans at 5 mm intervals. и трансверзални нива на скениране през 5 mm.

In the CT determination of the topography of prostate gland, the following bone markers were used: cranially – the body of the ilium (laterally), the pelvic brim (ventrally) and S1 (dorsally) and caudally – the caudal end of the acetabulum (laterally), the pubic symphysis (ventrally) and the end of S3.

The studies were performed under strict adherence to the European convention for the protection of vertebrates used for experimental and scientific purposes (Strasburg, 16.05. 1986), the European convention for protection of companion animals (Strasburg, 13.11. 1987) and the Law of animal protection in Bulgaria (Section IV- Experiments with animals, as per art. 26, art., 27, and art. 28; passed on 24.01.2008 and published in Official Gazette issue 13 in 2008).

RESULTS

Transverse CT scan at the S1 level (Fig. 1)

The CT image of prostate is visualized on pelvic scan in the anatomotopographic planes through the first sacral vertebra (dorsally), the bodies of iliac bones (laterally) and cranially to the anterior border of pelvic symphysis (ventrally). The anatomical image of prostate body is an oval homogenous, relatively hypodense finding with soft tissue density as compared to the hyperdense rectal wall. The gland is well differentiated from the adjacent soft tissues. At the S1 level, the prostatic urethra is not visible.

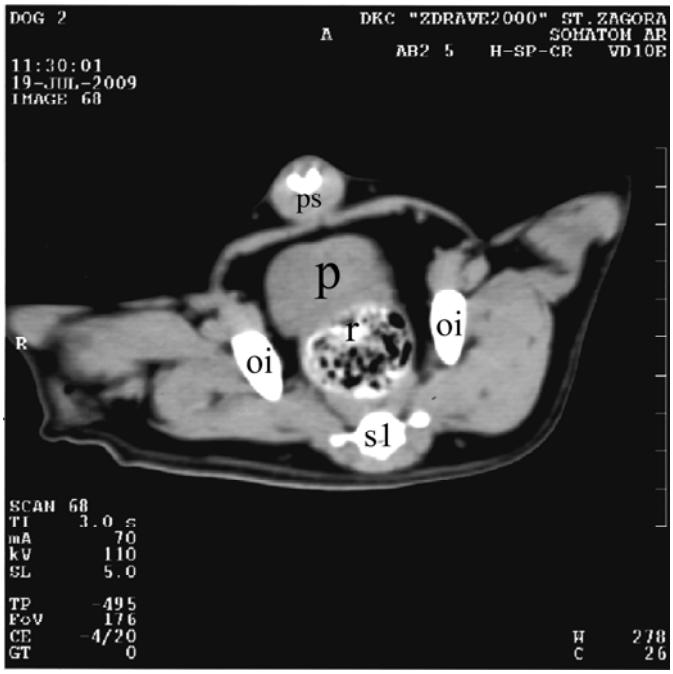

Fig. 1. Transverse CT scan through the first sacral vertebra (S1). Prostate gland (p), rectum (r), body

Transverse CT scan at the S2 level (Fig. 2)

The caudal parts of the glandular body are observed in the plane through second sacral vertebra (dorsally), coxofemoral joints (laterally) and cranially to the pelvic brim (ventrally). The lobes of prostate gland are relatively homogenous, soft-tissue and hyper dense structures. Its borders are well defined from adjacent soft tissue structures. Similarly to the finding at the S1 level, the prostatic urethra is not visualized.

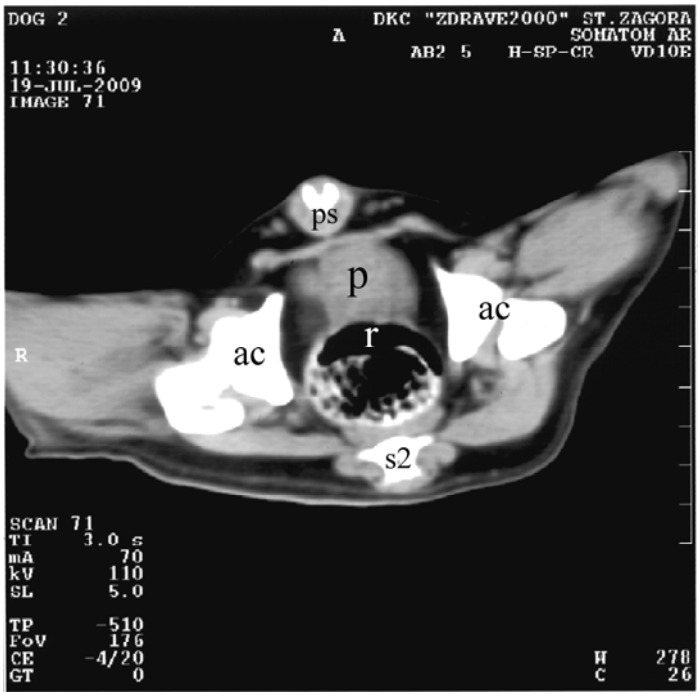

Fig. 2. Transverse CT scan through the second sacral vertebra (S2). Prostate gland (p), rectum (r), coxofemoral joint (ac) and penis (ps).

Transverse CT scan at the S3 level (Fig. 3)
The transverse scan of the pelvis in the plane through the third sacral vertebra (dorsally), coxofemoral joints (laterally) and the pelvic brim (ventrally) shows the urethral wall, thickened by the terminal caudal segments of the gland. The finding is relatively hyper dense, soft tissue structure with well-defined borders.

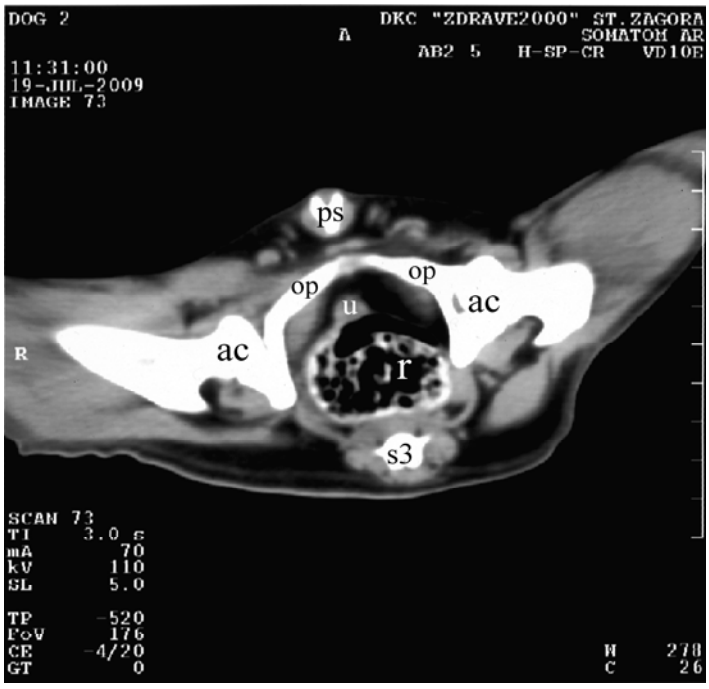

Fig. 3. Transverse CT scan through the third sacral vertebra (S3). Prostate gland (p), rectum (r), cranial border of the pubic bone (op), coxofemoral joint (ac) and penis (ps).

DISCUSSION

The present results allowed us to assume that the CT imaging with cross-section thickness of 5 mm, similarly to what is reported (17), is an acceptable option for anatomical imaging of canine prostate gland. Compared to slice thickness of 13 mm (18), the thickness of 5 mm allows a precise anatomo-topographic and diagnostic analysis. The intimate vicinity of the gland with the ventral rectal wall at all investigated levels and with the urethra (At the S3 level) is, from one part, an anatomical prerequisite for pathological alterations (10, 11, 12, 13) and from the other permits a simple approach for rectal examination similarly to humans (22).

The topographic anatomy results showed that the major part of canine prostate lies in the transverse plane through S1, the iliac bodies and cranially to the pelvic brim. Therefore, the anatomical image of prostate gland in dogs at the age of 3-4 years appears abdominally for its cranial part, thus confirming data from native anatomical studies in dogs (5, 6, 7, 8, 9), but is different from findings in male cats (10, 11, 12, 19, 20), where the prostate gland is visualized between the first and the second coccygeal vertebrae. From the point of view of the topography, canine prostate is situated relatively cranially vs. feline prostate, thus excluding interpretations by extrapolation in carnivores.

CONCLUSIONS

The anatomical CT image of the cranial part of prostate gland in adult dogs aged 3–4 years exhibited an abdominal localization. This could be used in interpretations of prostate pathological states in this animal species.

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