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Original Contribution

COMPUTED TOMOGRAPHY IMAGING OF PELVIC URETHRA IN MALE CATS

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ABSTRACT

The purpose of the study was the imaging and determination of some anatomical features of pelvic urethra in male cats using computed axial tomography (CAT).
The study was performed on 7 sexually mature European shorthair male cats under anaesthesia and aged between 1 and 2 years and weighing 2.8–4 kg.
The positive contrast (Ultravist 300) was applied intravenously and transurethrally to 5 of these animals whilst the other 2 had no contrast applied.
The study was performed on a computed tomograph TOMOSCAN – CX/Q.
The pelvis was scanned transversally from the transverse plane between the first and second coccygeal vertebrae to the plane between the third and fourth coccygeal vertebrae.
The thickness of cuts and the distance between them was 2 mm.
The pelvic urethra of the male cat was depicted during the scan of the pelvis from the cranial part of 2nd to the caudal part of the 3rd coccygeal vertebrae. The urethra was depicted as a tubular, heterogeneous, relatively hyperdense finding with a soft tissue density and hyper- or hypodense lumen during both contrast and native investigation. The significant difference between height and width of urethral lumen (0.6 mm), confirmed the dorsoventral ovoid profile of the lumen.

Key words: tomcat, urethra membranosa, imaging

INTRODUCTION

The short pelvic urethra in the male cat, that is specific for the species, is located behind the prostate gland, over the pelvic symphysis, under the rectum, behind the pelvic brim and anterior to the pelvic arc. It is embedded by the urethral muscle, passes through the pelvic diaphragm and reaches backwards to the bulbospongiosus muscle, in front of penile root (1).

The membranous urethra in male cats is studied morphometrically, anatomically and functionally with regard to topography of urethral sphincters and the values of intraurethral pressure via catheterisation with a microtransducer (2, 3, 4).

Pelvic urethra in male cats is studied both radiologically and endoscopically on the occasion of impaired micturition secondary to disorders in the lower urinary tract (5, 6, 7). Normal male reproductive organs in the pelvis are studied by computed tomography and magnetic resonance imaging, providing evidence about the big definition potential of both methods for visualization of soft tissue pelvic findings (8, 9).

Radiologically, human male pelvic urethra was often investigated in order to visualise urethral bulbar narrowing – the so-called Cobb's collar and congenital anterior diverticulum with lythiasis (10, 11, 12).

The compression of bulbar urethra from bulbourethral glandular cysts in men is studied via retrograde urethrography, computed tomography and magnetic resonance imaging (13, 14, 15).

The anterior urethral diverticula and valves in children are studied radiologically and via endoscopy on the occasion of their relationship with bulbourethral cysts – syringocele (16).

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The scarce literature data about the computed tomography imaging of normal pelvic urethra in the cat, encouraged the present study aiming to visualise this organ. The results could serve as reference diagnostic imaging data for the differentiation of normal from pathologically altered pelvic urethra in male cats.

MATERIAL AND METHODS

The study was performed on 7 clinically healthy, sexually mature, male European shorthair cats aged 1–2 years, weighing 2.8–4 kg.

The cats were anaesthetised with atropine sulphate at 0.03 mg / kg s.c. (*Sopharma*®), followed after 15 min by xylazine (*Alfazan*) at 2 mg/kg i.m and after another 15 min by ketamine (*Alfazan*) at 15 mg/kg i.m. (17).

In two animals, a native study was performed (without contrast amplification) whereas in the other 5 – a positive contrast material (*Ultravist; Schering, Germany*; 300 mg I/ml) was applied. The contrast was introduced slowly intravenously at 3 ml/kg and via retrograde transurethral route at 1ml/kg.

The study was done on an axial computed tomograph TOMOSCAN – CX/Q, with table height 149 cm, FOV = 250. The scanning time was 4.5 s, filter 1, anode tension 120 kV, supply current 110 mA, index 0.5. A high-resolution mode was employed.

The animals were positioned in a dorsal recumbency.

The transversal CT pelvic scans included the transverse plane between the 1st and 2nd coccygeal vertebrae to the plane between the 3rd and 4th coccygeal vertebrae, with thickness of cuts of 2 mm.

RESULTS

The computed tomographic transverse image of the cranial part of membranous urethra was observed during the pelvic scan through the cranial part of the 2nd coccygeal vertebra (dorsally), the caudal parts of pubic bones (ventromedially) and the coxofemoral joints (dorsolaterally). The urethral lumen was contrasted (hyperdense) and located in close vicinity to the pelvic symphysis. The urethral wall was with soft tissue density. It was relatively hypodense and homogenous compared to the dorsal wall of the rectum. (**Figure 1**).

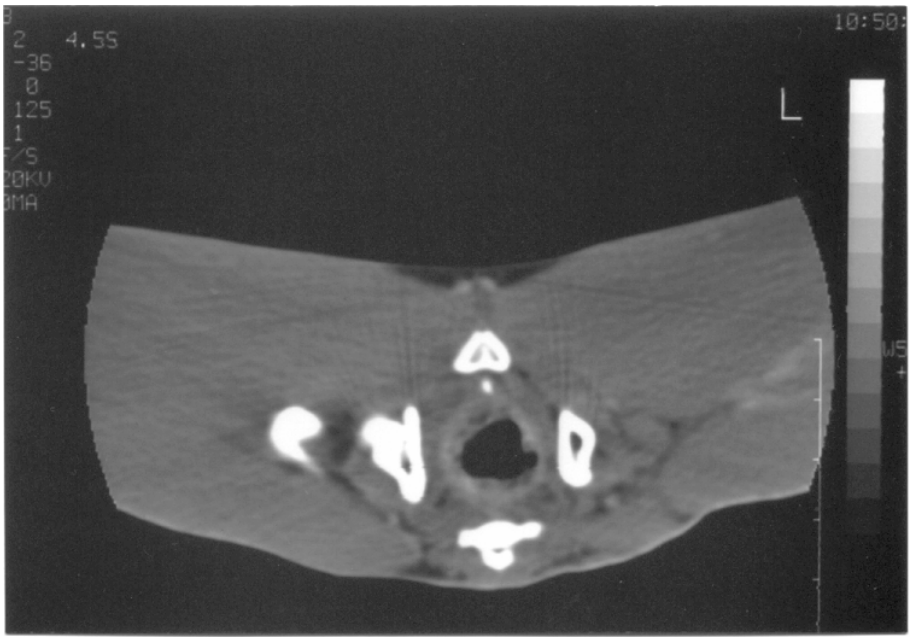

Figure 1: *Transverse CT scan of feline pelvis through the second coccygeal vertebra – C2.* *(cut thickness 2 mm)*

The transverse CT image of the middle third of membranous urethra was observed during the pelvis scans in the plane between the 2nd and the 3rd coccygeal vertebrae (dorsally) the middle of pelvic symphysis (ventrally) and the acetabular part of the bony pelvis (laterally). The urethral lumen was not contrasted (hypodense) and was visualized between the hypodense retropubic fat depot (ventrally) and the hypodense rectal lumen (dorsally). The urethral wall was with a soft tissue density and relatively hypodense than the rectal wall (**Figure 3**).

The transverse CT image of the caudal part of membranous urethra was observed during the scan of pelvis through the caudal

end of the 3rd coccygeal vertebra (dorsally), the ischiatic part of pelvic symphysis (ventrally) and seat bones (laterally). The urethral lumen was contrasted (hyperdense) (**Figure 2**).

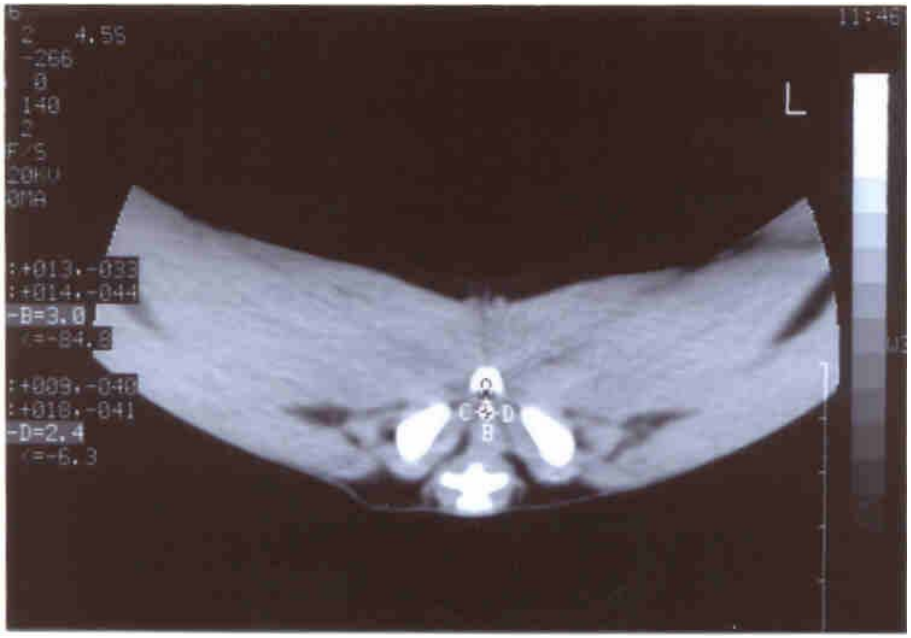

Figure 2: *Transverse CT scan of feline pelvis through the third coccygeal vertebra – C3. (cut thickness 2 mm)*

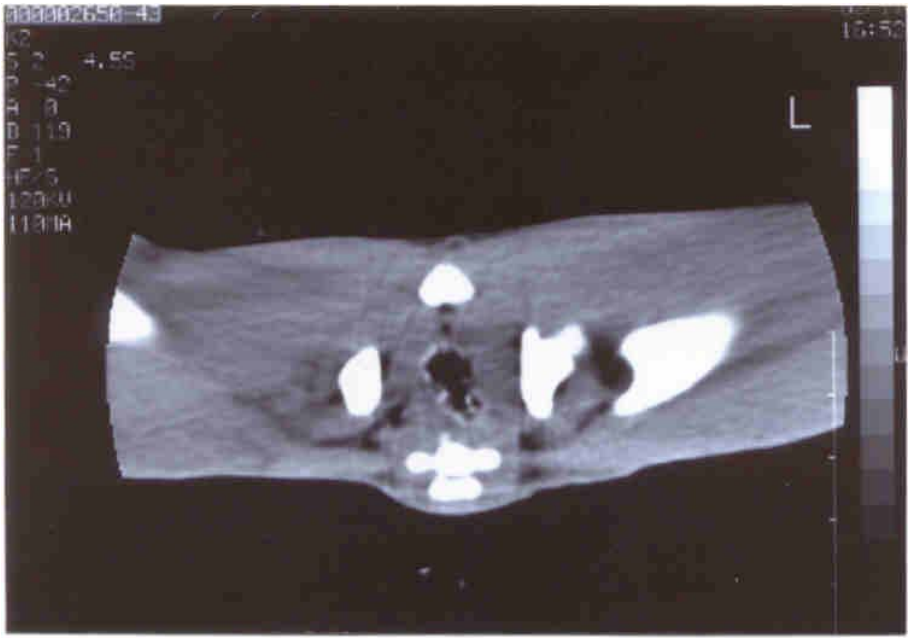

Figure 3: *Transverse CT scan of feline pelvis between the second and the third coccygeal vertebrae – C2 - C3 (cut thickness 2 mm)*

The height of urethral lumen was 3 mm, and its width – 2.4 mm.

DISCUSSION

The results allowed us to believe that the first appearance of the CT image of pelvic urethra in the male cat was in the transverse plane through the cranial part of the second coccygeal vertebra, the caudal parts of pubic bones and coxofemoral joints.

The transverse CT image of the middle third of membranous urethra was observed during the pelvis scans in the plane between the 2nd and the 3rd coccygeal vertebrae, the middle of pelvic symphysis and the acetabular part of the bony pelvis.

CT image of the caudal part of pelvic urethra was observed during the scan of pelvis through the caudal end of the 3rd coccygeal vertebra, the ischiatic part of pelvic symphysis and seat bones.

The significant difference between height and width of urethral lumen (0.6 mm), confirmed the dorsoventral ovoid profile of the lumen.

The CT imaging provides information about the anatomo-topographic features of pelvic urethra and its lumen in male cats unlike the retrograde urethrography and urethroscopy, that reveals the characteristics of its mucosa (5, 6, 7).

In both men and cats, the CT study of membranous urethra could be used for investigation of its anatomic features and occurring abnormalities – diverticula, strictures, lythiasis and valves (8, 9, 11, 14, 16).

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