



Original Contribution

**COMPUTED TOMOGRAPHY (CT) OF THE CRANIAL MEDIASTINUM
IN THE CAT (*FELIS SILVESTRIS F. DOMESTICA*)**

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ABSTRACT

Prevailing computed tomography (CT) data on the dog over those on the cat and the differences between their mediastinal anatomy necessitate the specification of the CT images in the cat. For this purpose 14 mature clinically healthy domestic cats were studied using contrast computed tomography. Tomographic slices were made transversally across second (Th2) and third (Th3) thoracic vertebrae. The study was carried out using a soft-tissue and lung window. When using a lung window (Th2) the mediastinum was visualised as a heterodense mass, delineated by the lungs. The use of a soft-tissue window at levels Th2 and Th3 visualised the main mediastinal vessels and allowed a precise anatomic CT analysis.

Key words: CT, anatomy, mediastinum, cat

INTRODUCTION

The heightened anatomic interest in the mediastinum of the domestic cat is caused by the development of pathological processes in this field, their differentiation and image diagnostics. Computed tomography study of the thoracic cavity in veterinary medicine focuses attention mainly on its diagnostic possibilities. In human medicine CT of the mediastinum is applied when a detailed anatomic description of the structures is needed, as it makes precise images for morphological evaluation. As such CT facilitates information gathering, specifying the diagnosis or study of the therapeutic efficiency (1-10).

The CT diagnostic capacities in veterinary medicine, the prevailing data on the dog over those on the cat and the differences between their mediastinal anatomy necessitate the specification of the computed tomography images (11-17).

The aim of this study is to show a detailed anatomotopographic description of the CT images of the cranial mediastinum in the cat.

MATERIALS AND METHOD

14 mature clinically healthy domestic cats (*Felis silvestris f. domestica*), each weighing between 2.9 and 4.0 kg, were studied. The animals were anaesthetised as follows: premedication with atropinum sulfuricum 1mg (*Sopharma®*, Bulgaria) was given subcutaneously at 0.02 - 0.045 mg/kg of body weight. Every 15 minutes 1 - 2 mg/kg xylazine 2% (*ALFASAN*, Holland the Netherlands) was injected intramuscularly, followed by 10 - 15 mg/kg ketamine 10% (*ALFASAN*, Holland the Netherlands) intramuscularly. (18).

The cats were positioned in dorsal recumbency on a CT table (*TOMOSCAN CX/Q*, *SIEMENS*). Settings for the CT examination were as follows: 120 kV; 110 mA; filter 1; magnification coefficient 1.5; high resolution; h=149 cm. Tomographic slices were made transversally to the median plane across the second (Th2) and the third (Th3) thoracic vertebrae. At Th2 level the study was carried out using a lung and soft-tissue window, and at Th3-a soft-tissue one. The distance between the slices was 10 mm (**Figure 1**, slice 05 and 06).

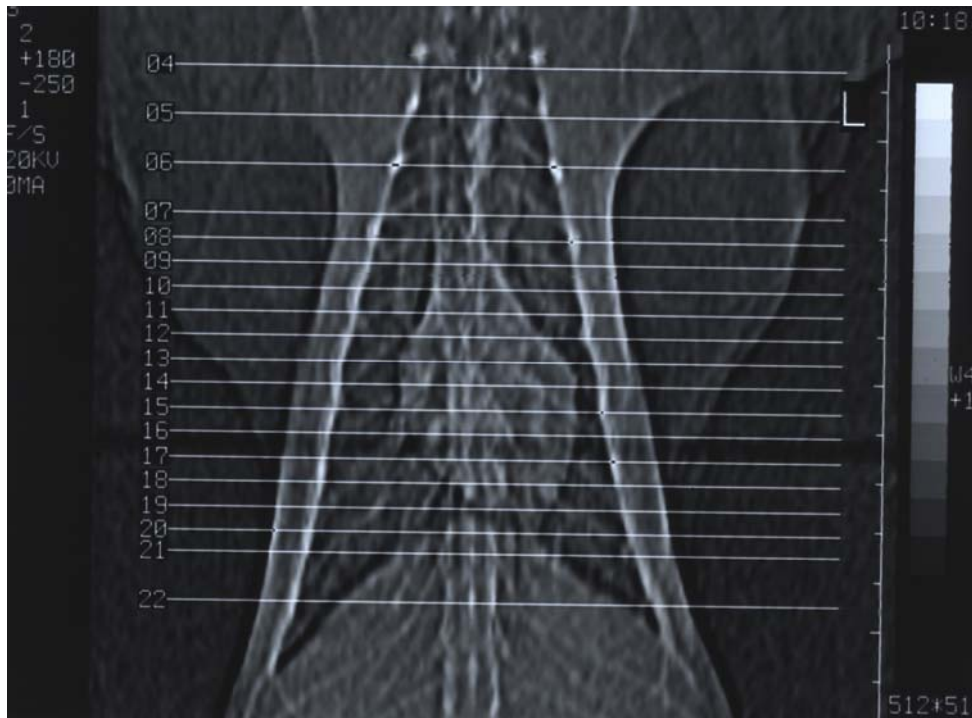


Figure 1. Ventrodorsal representation of the thorax in cat with marked transverse levels of computed tomography (CT) slices (from 04 to 22).

The CT study was carried out using contrast enhancement with intravenous infusion by OMNIPAQUE™ 350 mgI/ml (NYCOMED, Ireland) 3 ml/kg, i.v.

Animals recovered without complications after the CT study.

RESULTS

CT scanning using a lung window at the level of the second thoracic vertebra (Th2), (Figure 1, slice 05).

The bodies of *mm. longus colli* were clearly visible on the Th2 ventral surface (Figure 2). Below them, slightly to the right the trachea was located. The mediastinal structures were visible as a compact mass whose silhouette was delineated by the lungs.

CT scanning using a soft - tissue window at the level of the second thoracic vertebra (Th2), (Figure 1, slice 05).

The bodies of *mm. longus colli* were visible immediately under Th2 (Figure 3). Beneath them and slightly to the right of the median plane the trachea was located, and dorsally to it and to the left of the median plane, between *mm. longus colli*, lay the oesophagus.

Immediately next to the ventral surface of the trachea *v. cava cranialis* and *tr. brachiocephalicus* were visible. To the left of and above the *tr. brachiocephalicus* *a.carotis*

communis sinistra was established. Above and to the left of *a. carotis communis sinistra* *a. subclavia sinistra* was located. To the left and laterally next to *a. subclavia sinistra* *a. thoracica interna sinistra* was observed.

CT scanning through a soft-tissue window across third thoracic vertebra (Th3), (Figure 1, slice 06).

Mm. longus colli continued along the Th3 ventral surface (Figure 4). The oesophagus was situated between the two muscular bodies, nearly in the midline in comparison with the scanning level of Th2 and the trachea lay to the right and below the oesophagus. As in Th2, the branches of *arcus aortae - tr. brachiocephalicus* and *a. subclavia sinistra* were observed again at Th3 level, but with changed anatomotopographic interrelations. *Tr. brachiocephalicus* was located ventrally and to the left of the trachea. *A. subclavia sinistra* was visible slightly dorsolaterally to *tr. brachiocephalicus*. *V. cava cranialis* lay ventrally to the trachea and to the right of the median plane.

A. carotis communis sinistra was not established at this studied Th3-segment and *a. thoracica interna sinistra* was visible parasternally, parallel to *a. thoracica interna dextra*.

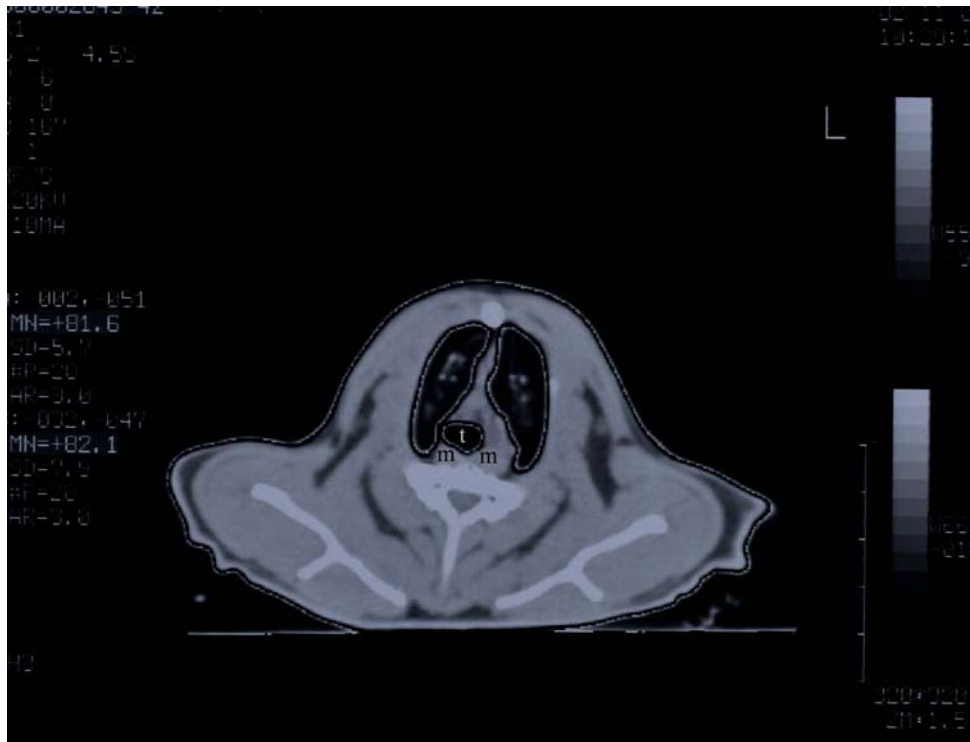


Figure 2. Transverse CT scanning through a lung window at the 2nd thoracic vertebra level (Th2, **Fig. 1**, slice 05) in cat. Trachea (t); mm. longus colli (m).

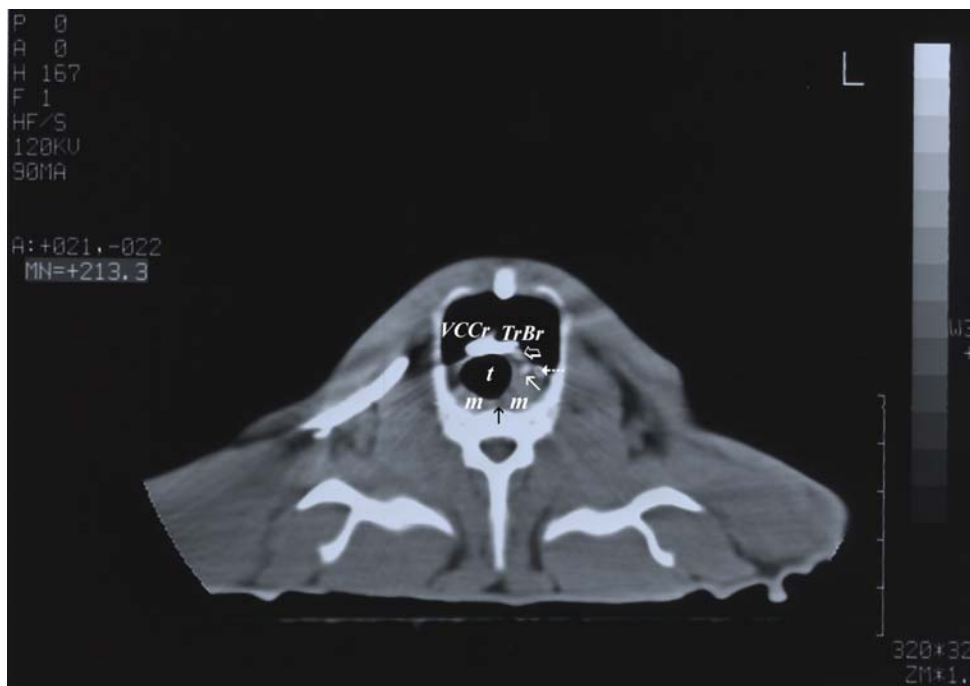


Figure 3. Transverse CT scanning using a soft-tissue window at the 2nd thoracic vertebra level (Th2, **Fig. 1**, slice 05) in cat. Trachea (t); oesophagus (*black arrow*); mm. longus colli (m); v. cava cranialis (VCCr); truncus brachiocephalicus (TrBr); a. carotis communis sinistra (*wide arrow*); a. subclavia sinistra (*white arrow*); a. thoracica interna sinistra (*white dotted arrow*).

DISCUSSION

Anatomic sources describe the structures in the cranial mediastinum in cat using classical anatomic methods (19-25). CT as a method *in vivo* is extremely reliable and provides a dynamic anatomotopographic basis for diagnostic needs (2, 15, 26). (24) described the location of the oesophagus in the Th2

segment between the *trachea* and *v. cava cranialis* in anatomic description of thorax frozen slices. This fact is probably due to the post-mortem change in the turgor of soft tissues. The results from a CT study showed that the oesophagus was located between *mm. longus colli*, slightly to the left of the median plane and immediately below the Th2 body

and in Th3-was in ventromedian position to the vertebral body. There were no significant variations in the longitudinal location of the trachea at the studied levels. The mediastinal vessels and organs were visualised using transverse scanning planes. The CT study, made at a 10 mm - distance between the transverse slices, gave the opportunity to specify the anatomic details, compared to these at a 15 mm - distance (17). That allowed the visualisation at Th2- level (soft-tissue window) of the branches of *tr. brachiocephalicus* - *a. carotis communis sinistra* and of *a. subclavia sinistra* - *a. thoracica interna sinistra*. These branches were not observed at Th3, but their ramification

was visualised *in vivo* at Th2. The study through a soft-tissue window and a contrast enhancement presented a sharp outline of the vessel lumen and helped in a precise anatomic analysis. The use of a lung window was not relevant to the mediastinal study and did not allow the obtaining of morphological information.

Computed tomography study of the cranial mediastinum in the cat gives the opportunity for a CT analysis of the anatomical structures and their interrelations. This will successfully aid the clear visualisation of the anatomic features, individual differences and the diagnosis of mediastinal pathology in the cat.



Figure 4. Transverse CT scanning through a soft-tissue window at the 3rd (Th3, **Fig.1**, slice 06) in cat. Trachea (*t*); oesophagus (*black arrow*); mm. longus colli (*m*); v. cava cranialis (*VCCr*); truncus brachiocephalicus (*TrBr*); a. subclavia sinistra (*ASs*); a. thoracica interna sinistra et dextra (*white dotted arrow*).

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