Volumetric dynamic contrast enhanced Computed Tomography (DCE-CT) for preoperative assessment of the vascularity of spinal metastases

Caroline Clausen, Carsten Ammitzbøl Lauridsen, Benny Dahl, Martin Lundsgaard, Susanne Christiansen Frevert, Michael Bachmann Nielsen, Lars Lönn

Purpose
To investigate the feasibility of measuring and grading the vascularity of spinal metastases using dynamic contrast enhanced CT (DCE-CT).

Materials and methods
Prior to surgical treatment of symptomatic metastatic spinal cord compression, 20 patients were examined using DCE-CT. The 320–detector row CT scanner allowed a volumetric acquisition over a range of 16 cm, covering three to four vertebrae. Image analysis was performed at a dedicated workstation, encompassing quantitative and qualitative measurement of the arterial flow (AF) in mL/min/100mL of the vertebrae. The perfusion values were analysed using a single input, maximum slope model. The AF assessed by DCE-CT of affected and non-affected vertebrae will be compared, and furthermore, the correlation between AF and intraoperative blood loss will be examined.

Results
Preliminary results for 5 patients:
In two patients the AF differed markedly between the affected and non-affected vertebrae (83.4 vs. 32.6 and 78.1 vs. 35.3 (mL/min/100mL) respectively). These metastases were from neuroendocrine lung cancer and non-small-cell lung carcinoma. The remaining three patients with similar AF in both affected and non-affected vertebrae had metastases from prostate cancer (2) and bladder cancer (1). The median AF of the non-affected vertebrae was 35.2 mL/min/100mL (range 15.9 to 54.8 mL/min/100mL).

Conclusion
The results from DCE-CT in spinal metastases indicate that non-affected vertebrae demonstrate similar AF values. In two of five patients higher AF values were detected in the affected compared to non-affected vertebrae, suggesting hypervascularity.

Clinical relevance statement
Preoperative evaluation of the vascularity of spinal metastases by DCE-CT may aid in determine the indication for preoperative embolization in patients undergoing surgical treatment of symptomatic metastatic spinal cord compression.