Dural metastatic disease in advanced prostate cancer
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Section: Neuroradiology
Area of Interest: CNS Neuroradiology brain
Imaging Technique: CT
Imaging Technique: MR
Special Focus: Cancer Metastases Case Type: Clinical Cases
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Workplace:

Patient: 69 years, male

Clinical History:
A 69-year-old man suffering from multiple cervical spine fractures following low-energetic trauma was diagnosed with diffuse osteoblastic metastases in the entire axial skeleton. Clinical work-up revealed advanced prostate cancer. For staging purposes and because of headache and altered mental status, brain CT and brain MRI were performed.

Imaging Findings:
An initial unenhanced brain CT was performed because of the patient's poor renal function. This revealed subcortical oedema in the parietal and temporal lobe on the right side, with secondary mass-effect on the right lateral ventricle. Another finding was marked right parietal and parafalcine dural thickening.

Subsequent MRI of the brain after IV gadolinium administration confirmed an enhancing right temporal, parietal and occipital dural thickening, extending to the right side of the falx. No broad dural base could be seen. There was vasogenic oedema in the right temporal lobe. Both CT and MRI also showed diffuse osteoblastic lesions in the skull.

Discussion:
Prostate cancer represents the fifth leading cause of cancer mortality in men and is the third most diagnosed form of cancer in male patients. The most important risk factors for developing this disease are age, family history of prostate cancer, black race and genetic factors [1]. The prognosis of prostate cancer is in large parts dependent on the presence of lymph node involvement as well as distant metastases. The most common sites of lymphatic metastases are the paraaortic and pelvic lymph nodes. Haematogeneous disease spread mainly occurs in bones (90%). Other relatively frequent sites of tumour spread are lungs (46%) and liver (25%) [2].

Intracranial spread of prostate cancer is rather uncommon with dural involvement accounting for only 0.04% according to a single institution study. In autopsy studies, this number increases to 5.9 % [2, 3]. However, prostate cancer is the second most common cancer form, after breast cancer, to have dural dissemination [4].

Patients with dural metastases usually present with headache and cranial nerve palsy. Other possible symptoms are visual disturbances, alterations in mental state and seizures [4, 5].
Two routes of tumour spread have been proposed. One is a direct spread through retrograde flow in the valveless vertebral venous plexus of Batson. Batson was able to illustrate this in cadaver experiments after administrating contrast in the prostatic veins. A possible different route is based upon the cascade theory. This theory proposes that metastases spread from bone to adjacent structures, and is usually accepted in patients with extensive metastases to the calvarium [6, 7, 8]. 

Dural metastases primarily appear as solitary or multifocal areas of dural thickening, which may be nodular. Since there is no blood-brain barrier at this level, the lesions show intense homogeneous enhancement after administration of IV-contrast. Adjacent bony erosions and metastases in the skull may help to differentiate dural metastases from meningioma. Rapid lesion growth on subsequent scans also favours metastases. In rare cases, dural metastases may cause subdural haematoma [4, 5]. 

Patients with advanced prostate cancer and dural metastases generally have a poor prognosis with an estimated mean survival of 3 to 4 months [4].

Written informed patient consent for publication has been obtained.

**Differential Diagnosis List:** Dural metastases from advanced prostate carcinoma, Dural metastases, Meningioma, Subdural haematoma, Lymphoma

**Final Diagnosis:** Dural metastases from advanced prostate carcinoma

**References:**


Figure 1

Description: Axial scan through the temporal lobes shows white matter oedema in the right temporal lobe with effacement of surrounding sulci. **Origin:** © Department of Radiology, University Hospitals Leuven, Belgium, 2018
Description: Sagittal scan through the right hemisphere shows a subtle, slightly hyperdense dural thickening at the level of the right anterior temporal lobe as well as at the posterolateral side of the right parietal lobe. Origin: © Department of Radiology, University Hospitals Leuven, Belgium, 2018
Description: Axial FLAIR image through the temporal lobes confirms the vasogenic white matter oedema in the right temporal lobe. Origin: © Department of Radiology, University Hospitals Leuven, Belgium, 2018
**Description:** Axial T1-weighted image after IV gadolinium administration through the temporal lobes show marked homogeneous enhancement of the thickened dura extending along the temporal and sphenoid bone. **Origin:** © Department of Radiology, University Hospitals Leuven, Belgium, 2018
Description: Sagittal T1-weighted image after IV gadolinium administration through the right hemisphere shows the extension of the enhancing right anterior temporal dural thickening and a second area of enhancing dural thickening at the level of the posterolateral parietal lobe. Origin: © Department of Radiology, University Hospitals Leuven, Belgium, 2018