Meningioma Neuroimaging

They are usually benign neoplasms, with characteristic pathologic and imaging features. However, there are several important histologic variants of meningioma, and even a histologically typical meningioma can have unusual or misleading radiologic features that may not be suggestive of meningioma. The typical meningioma is a homogeneous, hemispheric, markedly enhancing extraaxial mass located over the cerebral convexity, in the parasagittal region, or arising from the sphenoid wing. Meningiomas may originate in unexpected locations such as the orbit, paranasal sinus, or ventricles or be entirely intraosseous (within the calvaria). Unusual imaging features such as large meningeal cysts, ring enhancement, and various metaplastic changes (including fatty transformation) can be particularly misleading. Because meningiomas are so common, the radiologist must be aware of their less frequent and uncharacteristic imaging features in order to suggest the correct diagnosis in cases that are atypical ¹⁾.

Plain X-rays

May show: calcifications within the tumor (in \approx 10%), hyperostosis or blistering of the skull (including floor of frontal fossa with olfactory groove meningiomas), enlargement of vascular grooves (especially middle meningeal artery).

The cross-sectional imaging modalities, MRI and CT, have improved in resolution and fidelity. These modalites now provide not only improved structural information but also insights into functional behavior. MRI has, in particular, proven to have powerful capabilities in evaluating meningiomas because of the ability to assess soft tissue characteristics such as diffusion and vascular supply information, such as perfusion. Recent investigational advances have also been made using a combination of X-ray fluoroscopy for selective catheterization followed by MR perfusion measurement performed with intra-arterial injection of contrast. Together all these modalities provide the radiographer with powerful capabilities for evaluating meningiomas ²⁾.

СТ

see Intracranial meningioma CT

3D-CTA

The aim of a study was to evaluate the clinical value of multislice 3-dimensional computed tomographic angiography (3D-CTA) in the preoperative assessment of intracranial meningiomas. A total of 331 cases with meningiomas confirmed by CT and MRI were examined using 3D-CTA. The locations of the tumors were observed to be as follows: parasagittal and falcine in 125 cases, sphenoidal in 39 cases, in the olfactory groove in 19 cases, tentorial in 21 cases, parasellar in 33 cases, petroclival in 29 cases, intraventricular in 7 cases and on the convexity of the brain in 58 cases. The reconstructed images were processed by shaded volume rendering, maximum intensity

projection and color-shaded surface display. The 3D-CTA images were used to imitate the surgical approach. Surgery was performed according to the information provided in the 3D-CTA images. 3D-CTA provided clear 3D images of the meningioma and the relationship with the adjacent vessels and the skull base, and demonstrated the optimal surgical approach for removing the neoplasm. The results of 3D-CTA corresponded extremely well with the surgical observations. 3D-CTA is able to provide 3D images of the meningioma, adjacent vessels and the bones in the skull base. Furthermore, 3D-CTA supplies information vital in the selection of the optimal surgical approach and information that aids the management of the sinus during the surgery. 3D-CTA is of great value in the preoperative evaluation of meningiomas ³⁾.

Magnetic resonance imaging

Magnetic resonance imaging for intracranial meningioma diagnosis.

Angiography

Intracranial meningioma angiography.

Positron emission tomography

see Positron emission tomography for intracranial meningioma.

68Ga-DOTATATE PET for meningioma diagnosis

68Ga-DOTATATE PET for meningioma diagnosis

References

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