Olfactory groove meningioma diagnosis

Plain X-rays

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

Magnetic resonance imaging

Olfactory groove meningioma magnetic resonance imaging

Fine-cut CT or CT angiography (CTA)

The studied parameters are maximum tumor diameter; tumor volume, using the modified ellipsoid formula (A*B*C)/2; the presence of hyperostotic bone and calcified tumor (on CT/CTA studies, when available); tumor shape (rounded vs lobular); vascular encasement (on CTA and T2-weighted MRI); optic canal invasion (on fine-cut axial T1-weighted, postcontrast MRI/ CT); and the presence of cortical cuff between the tumor and anterior cerebral vasculature [1].

Identification of SMO and AKT1 mutations in meningiomas has raised the hope for targeted therapies. It would be useful to know the precise frequency of these mutations in anatomical subgroups and clarify their prognostic value.

Molecular diagnosis of SMO L412F/W535L and AKT1 E17K mutations improves prognostic evaluation in olfactory groove meningiomas and opens new therapeutic perspectives with SMO or AKT inhibitors for recurrent cases [2].

Strickland et al., performed targeted sequencing in a large cohort of patients with anterior skull base meningiomas (n = 62) to better define the frequency of SMO and AKT1 mutations in these tumors. The authors found SMO mutations in 7 of 62 (11%) and AKT1 mutations in 12 of 62 (19%) of their cohort. Of the 7 meningiomas with SMO mutations, 6 (86%) occurred in the olfactory groove. Meningiomas with an SMO mutation presented with significantly larger tumor volume (70.6 ± 36.3 cm3) compared with AKT1-mutated (18.2 ± 26.8 cm3) and wild-type (22.7 ± 23.9 cm3) meningiomas, respectively.

Combined, these data demonstrate clinically actionable mutations in 30% of anterior skull base meningiomas and suggest an association between SMO mutation status and tumor volume. Genotyping of SMO and AKT1 is likely to be high yield in anterior skull base meningiomas with available surgical tissue [3].

Angiography

Low frontal median meningiomas (e.g. olfactory groove): feed from ethmoidal branches of the ophthalmic artery

1)
Endoscopic endonasal surgery for olfactory groove meningiomas: outcomes and limitations in 50 patients Maria Koutourousiou, M.D.1, Juan C. Fernandez-Miranda, M.D.2, Eric W. Wang, M.D.3, Carl H. Snyderman, M.D., M.B.A.2,3, and Paul A. Gardner, M.D.2
2)
Boetto J, Bielle F, Sanson M, Peyre M, Kalamarides M. SMO mutation status defines a distinct and frequent molecular subgroup in olfactory groove meningiomas. Neuro Oncol. 2017 Jan 12. pii: now276. doi: 10.1093/neuonc/now276. [Epub ahead of print] PubMed PMID: 28082415.
3)
Strickland MR, Gill CM, Nayyar N, D'Andrea MR, Thiede C, Juratli TA, Schackert G, Borger DR, Santagata S, Frosch MP, Cahill DP, Brastianos PK, Barker FG 2nd. Targeted sequencing of SMO and AKT1 in anterior skull base meningiomas. J Neurosurg. 2016 Nov 25:1-7. [Epub ahead of print] PubMed PMID: 27885953.