

# Meningioma hyperostosis

Hyperostosis in meningiomas can be present in 4.5% to 44% of cases. Radical resection should include aggressive removal of invaded bone. It is not clear however to what extent bone removal should be carried to achieve pathologically free margins, especially that in many cases, there is a T2 hyperintense signal that extends beyond the hyperostotic bone. In this study we try to investigate the perimeter of tumour cells outside the visible nidus of hyperostotic bone and to what extent they are present outside this nidus. This would serve as an initial step for setting guidelines on dealing with hyperostosis in meningioma surgery.

**Methods:** This is a prospective case series that included 14 patients with convexity meningiomas and hyperostosis during the period from March 2017 to August 2018 in two university hospitals. Patients demographics, clinical, imaging characteristics, intraoperative and postoperative data were collected and analysed. In all cases, all visible abnormal bone was excised bearing in mind to also include the hyperintense diploe in magnetic resonance imaging (MRI) T2 weighted images after careful preoperative assessment. To examine bony tumour invasion, five marked bone biopsies were taken from the craniotomy flap for histopathological examinations. These include one from the centre of hyperostotic nidus and the other four from the corners at a 2-cm distance from the margin of the nidus.

**Results:** Our study included five males (35.7%) and nine females (64.3%) with a mean age of 43.75 years (33-55). Tumor site was parietal in seven cases (50%), fronto-parietal in three cases (21.4%), parieto-occipital in two cases (14.2%), frontal region in one case and bicoronal (midline) in one case. Tumour pathology revealed a World Health Organization (WHO) grade I in seven cases (50%), atypical meningioma (WHO II) in five cases (35.7%) and anaplastic meningioma (WHO III) in two cases (14.2%). In all grade I and II meningiomas, bone biopsies harvested from the nidus revealed infiltration with tumour cells while all other bone biopsies from the four corners (2 cm from nidus) were free. In cases of anaplastic meningiomas, all five biopsies were positive for tumour cells.

**Conclusion:** Removal of the gross epicentre of hyperostotic bone with the surrounding 2 cm is adequate to ensure radical excision and free bone margins in grade I and II meningiomas. Hyperintense signal change in MRI T2 weighted images, even beyond visible hyperostotic areas, doesn't necessarily represent tumour invasion <sup>1)</sup>.

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The invasion of bone responsible for hyperostosis is a typical phenomenon associated with [en plaque meningiomas](#). Although the sphenoid wing and sphenoid-orbital region are most frequently affected, petrosal involvement is rare and its surgical treatment difficult. Hyperostosis is caused by bone invasion, is responsible for the clinical signs, and prompts the surgeon to use an à la carte drilling that has to be evaluated preoperatively and carried out depending on tumor extension and the treatment goals.

<sup>1)</sup>

Fathalla H, Tawab MGA, El-Fiki A. Extent of Hyperostotic Bone Resection in Convexity Meningioma to Achieve Pathologically Free Margins. J Korean Neurosurg Soc. 2020 Nov;63(6):821-826. doi: 10.3340/jkns.2020.0020. Epub 2020 Aug 5. PMID: 32750757; PMCID: PMC7671773.

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