Parasellar growth

Parasellar growth is one of the most important prognostic variables of pituitary neuroendocrine tumor surgery, with pituitary neuroendocrine tumors regarded as not completely resectable if they invade the cavernous sinus (CS) but potentially curable if they displace CS structures.

A study of Micko et al., was conducted to correlate surgical treatment options and outcomes to the different biological behaviors (invasion vs displacement) of adenomas with parasellar extension into the superior or inferior CS compartments or completely encasing the internal carotid artery (Knosp grades 3A, 3B, and 4).

This was a retrospective cohort analysis of 106 consecutive patients with Knosp high-grade pituitary neuroendocrine tumors with parasellar extension who underwent surgery via a primary endoscopic transsphenoidal approach between 2003 and 2017. Biological tumor characteristics (surgical status of invasiveness and tumor texture, The 2017 World Health Organization classification of tumors of the pituitary gland, proliferation rate), extent of resection, and complication rate were correlated with parasellar extension grades 3A, 3B, and 4 on preoperative MRI studies.

Invasiveness was significantly less common in grade 3A (44%) than in grade 3B (72%, $p = 0.037$) and grade 4 (100%, $p < 0.001$) adenomas. Fibrous tumor texture was significantly more common in grade 4 (52%) compared to grade 3A (20%, $p = 0.002$), but not compared to grade 3B (28%) adenomas. Functioning macroadenomas had a significantly higher rate of invasiveness than nonfunctioning pituitary neuroendocrine tumors (91% vs 55%, $p = 0.002$). Mean proliferation rate assessed by MIB-1 was > 3% in all groups but without significant difference between the groups (grade 3A, 3.2%; 3B, 3.9%; 4, 3.7%). Rates of endocrine remission/gross total resection were significantly higher in grade 3A (64%) than in grade 3B (33%, $p = 0.021$) and grade 4 (0%, $p < 0.001$) adenomas. In terms of complication rates, no significant difference was observed between grades.

According to the authors' data, the biological behavior of pituitary neuroendocrine tumors varies significantly between parasellar extension patterns. Adenomas with extension into the superior CS compartment have a lower rate of invasive growth than adenomas extending into the inferior CS compartment or encasing the internal carotid artery. Consequently, a significantly higher rate of remission can be achieved in grade 3A than in grade 3B and grade 4 adenomas. Therefore, the distinction into grades 3A, 3B, and 4 is of importance for prediction of adenoma invasion and surgical treatment considerations [1].

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Micko A, Oberndorfer J, Weninger WJ, Vila G, Höftberger R, Wolfsberger S, Knosp E. Challenging Knosp high-grade pituitary neuroendocrine tumors. J Neurosurg. 2019 May 31:1-8. doi: 10.3171/2019.3.JNS19367. [Epub ahead of print] PubMed PMID: 31151112.