Extension Patterns in Pituitary Macroadenomas and Relation to T2-Weighted Signal on Diagnostic MRI Examinations

Iulia Potorac[1], Françoise Cattin[2], Julie Kreutz[1], Patrick Petrossians[1], Albert Beckers[1] and Jean-François Bonneville[1]

[1]CHU de Liège-University of Liège, Liège, Belgium
[2]CHU Jean Minjoz, Besancon, France

Introduction: Cavernous sinus invasion and optic chiasm compression are two of the most relevant factors in the management and prognosis of pituitary adenomas. However, few publications have dealt with the different types of extensions of pituitary macroadenomas depending on their functional type. T2-weighted signal begins to impose itself as a new criterion that separates pituitary adenomas, at least in the case of GH-secreting ones, into subgroups with different behavior. The aim of our study was to compare extension patterns in 3 of the most frequent types of pituitary macroadenomas and to relate them to adenoma T2-weighted signal on diagnostic MRIs.

Materials and methods: The diagnostic MRI examinations of 148 patients with pituitary macroadenomas (PA) (≥10mm) recently diagnosed in 2 tertiary medical centers were reviewed. These pituitary adenomas were GH-secreting (GHPA) in 79 cases, prolactin-secreting (PRLPA) in 32 and non-functioning (NFPA) in 37 cases. The following details were recorded: gender, age at diagnosis, maximum diameter of adenoma, presence of cavernous sinus invasion and of optic chiasm compression, predominant vertical direction of adenoma extension, as well as T2-weighted signal of adenoma.

Results: For GHPA and NFPA, distribution between genders was relatively equal. Age at diagnosis was lowest in PRLPA patients (43yrs), followed by GHPA (47yrs) and highest for NFPA patients (62yrs). Median maximum diameter of adenoma was highest for NFPA (25mm), compared to PRLPA (21.5mm) and GHPA (17mm). Cavernous sinus invasion was more frequent in NFPA: 59% compared to 41% for PRLPA and only 30% of GHPA ($p=0.01$). Optic chiasm compression was significantly more frequent in NFPA (65%) compared to PRLPA (31%) and GHPA (25%) ($p<0.0001$). Predominant inferior extension was rarer for NFPA (24%) compared to GH (61%) and PRLPA (59%) ($p=0.0007$). Hyperintensity on T2-weighted sequences was more frequent in NFPA (89% of adenomas) and PRLPA (44%), compared to GHPA (24%). For GHPA, T2-hypointensity was more often encountered (62%), whereas only 1 NFPA, respectively 2 PRLPA T2-hypointense adenomas were found.

Conclusions: Functionally different types of pituitary macroadenomas present with different patterns of extension. T2-weighted signal at diagnosis seems to be related to the functional character of the adenoma with hyperintensity and to a lesser extent, isointensity being more frequent in NFPA and PRLPA. Macroadenomas with these types of T2-weighted signal seem to be larger, with more important extensions (towards the cavernous sinus and the optic chiasm), thereby defining a more

aggressive type of pituitary adenoma. T2-weighted signal intensity could therefore represent an indicator as to the underlying morphological characteristics of the adenoma and genetic mechanism of tumorigenesis and could constitute a prognostic factor for the evolution of pituitary adenomas.