Ectopic Posterior Pituitary in Macroadenomas: Demonstration by Dynamic MR Imaging

Y. Miki[1], R. Asato[1], N. Hashimoto[2], J. Konishi[1], Departments of Nuclear Medicine and Diagnostic Imaging[1] and Neurosurgery[2], Kyoto University Hospital, Kyoto, Japan

Introduction

The ectopic posterior pituitary is an aberrant accumulation of neurosecretory materials at the median eminence or infundibular stem resulting in functional preservation of hormonal production and release, which is often seen in patients with transection of the pituitary stalk (1). It can also be developed due to compression to the hypothalamohypophsial tract by a large macroadenoma (2). However, to our knowledge, the frequency and location of the ectopic posterior pituitary in patients with macroadenomas have not been established.

The ectopic posterior pituitary is shown as a hyperintense structure on the T1-weighted images (1,2), however, hyperintense signal seen in macroadenomas may also represent subacute hemorrhage. Because it is impossible to histologically confirm the ectopic posterior gland for an ethical reason, we used dynamic MR imaging to distinguish the ectopic posterior pituitary high signal from subacute hemorrhage.

Materials and Methods

Forty-four cases of surgically proven macroadenoma were entered into a prospective study. MR imaging was preoperatively performed on a 1.5 T GE Signa System using a head coil. Before contrast administration, spin-echo sagittal and coronal T1-weighted images (repetition time [TR]/echo time [TE] = 400/20 msec, field of view [FOV] = 24 cm, interleaved 3-mm thick, 192 x 256 matrix, number of excitations [NEX] = 2) were obtained. Dynamic imaging of the pituitary (4,5) was performed in a sagittal or coronal plane following a bolus (approximately 5 sec) injection of a half dose (0.05 mmol/kg) of Gd-DTPA, using a spin-echo sequence (TR/TE = 200/20 msec, FOV = 24 cm, 3 mm thick with 0.6 mm gap, 192 x 256 matrix, NEX = 1). The imaging time for one acquisition of the dynamic study was approximately 40 seconds, and five successive acquisitions were performed following the injection of gadolinium. The polarity of the readout gradient on the sagittal images was set so that fatty marrow signal in the dorsum sellae was shifted posteriorly, avoiding overlap the marrow signal on adenoma, pituitary tissue, or the stalk (3).

Results

A small high signal was identified on the surface of adenoma near the median eminence in 19 cases (43%). In these cases, the posterior pituitary high signal was not identified in the normal location. The dynamic study demonstrated early, intense enhancement of all these high signals. In 11 cases (25%), posterior pituitary high signal was seen in the normal, intrasellar location. In the remaining 14 cases (32%), high signal was absent either in the normal or ectopic location. Size of adenomas with an ectopic posterior pituitary was significantly larger than those without an ectopic posterior pituitary ($P < 0.001$).

Conclusions

The early, intense enhancement of the high signals on the surface of adenoma suggested that they represented functioning ectopic posterior pituitary tissue. Central diabetes insipidus is one of the postoperative complications of pituitary adenoma. We believe that preoperative localization of the ectopic posterior pituitary is useful to prevent postoperative diabetes insipidus.

References

1. Fujisawa, I., Kikuchi, K., Nishimura, K., et al. *Radiology* 165, 487, 1987.
2. Gammal, T.E., Brooks, B.S., Hoffman, W.H. *AJNR* 10, 323, 1989.
3. Sato, N., Ishizuka, H., Matsumoto, M., Matsubara, K., Tsushima, Y., Tomioka, K. *J Comput Assist Tomogr* 15, 355, 1991.
4. Miki, Y., Matsuo, M., Nishizawa, S., et al. *Radiology* 177, 35, 1990.
5. Miki, Y., Asato, R., Okumura, R. Hua, F., Konishi, J. *J Comput Assist Tomogr* 16, 845, 1992.