Endocrine (2019) 64:200–201
https://doi.org/10.1007/s12020-019-01864-6

LETTER TO THE EDITOR

Topographical factors guiding the surgical treatment of pituicytomas

Rodrigo Carrasco-Moro[1] · Freddy J. Salge-Arrieta[1] · José M. Pascual[2]

Received: 28 January 2019 / Accepted: 5 February 2019 / Published online: 5 March 2019
© Springer Science+Business Media, LLC, part of Springer Nature 2019

To the Editor,

We have read with great interest the work recently published by Guerrero-Pérez et al. in *Endocrine* [Endocrine **63**, 36–43 (2019). https://doi.org/10.1007/s12020-018-1774-2], which deals with one of the largest original series of posterior pituitary tumors reported in the scientific literature to date. These neoplasms represent such a rare pathological entity that even those neurosurgeons specialized in the treatment of pituitary tumors will have little chance of treating one in their careers. On these premises, we have recently reported on our single experience in treating a patient diagnosed with a pituicytoma (PT) [1]. In this letter, we would like to propose some reflections on Guerrero-Pérez's article based on our in-depth review of the scientific literature that accompanied the cited report.

Despite the virtual absence of fatalities and the favorable postoperative outcome of visual deficits, we found that surgical treatment of PTs associates a high morbidity, in particular permanent endocrinological dysfunction, a risk largely linked to the specific location and anatomical relationships of the neoplasm [1]. In our opinion, a topographic classification of PTs based on the occupation of the sellar and/or suprasellar compartment—as observed on preoperative MRI scans—is too inaccurate for a neoplasm that can arise anywhere along the hypothalamic-pituitary axis [1]. As it has been proposed for other, more common tumors involving this axis (adenomas and craniopharyngiomas), a neuroimaging-based classification of PTs should reflect more reliably the relationships of the neoplasm with the elements that conform the floor of the third ventricle, as this information results essential to carry out an appropriate surgical planning [1, 2].

✉ Rodrigo Carrasco-Moro
rocamo@gmail.com

[1] Ramón y Cajal University Hospital, Madrid, Spain

[2] La Princesa University Hospital, Madrid, Spain

As the authors state in their article, PTs frequently mimic the clinical symptomatology (pituitary syndrome [3]) and radiological features of pituitary adenomas, exception made for the characteristic, but not constant, finding of copious bleeding during surgery. These tumors may develop at any position of the posterior pituitary (neurohypophysis), from its upper portion (the infundibulum), its middle segment (the stalk) or the lower neural lobe. PTs originated from the lower neural lobe will have a preferential intrasellar development, similar to macroadenomas, and may theoretically grow towards the suprasellar cistern through the sellar diaphragm and/or invade the cavernous sinuses, thus displacing dorsally the structures of the third ventricle floor (Fig. 1b, d–f) [1]. Consequently, this subgroup of PTs should be optimally approached through the transphenoidal route.

Conversely, most PTs occupy a high position in the hypothalamic-pituitary axis [1]. Such a topography, categorized by most authors as "suprasellar", represents 41.3% of the 104 PTs reported in medical literature [1]. Our assessment of the MRI scans displayed in 60 cases, allowed us to confirm that 51.6% of them were centered at the infundibulo-tuberal region [1].The lack of calcifications and the low frequency of cystic changes may result extremely useful to distinguish PTs from other tumors involving this anatomical region such as adamantinomatous craniopharyngiomas [1]. Although the natural history of PTs remains unknown and a histological analysis of the microscopic patterns of invasion of surrounding tissue is lacking for these tumors, a thorough study of published reports enabled us to differentiate the subgroup of PTs growing in the infundibulo-tuberal region from the subgroup of tumors originated from intrasellar structures [1]. As intrinsic neoplasms of the third ventricle floor, the former subgroup of PTs would theoretically infiltrate or invade the diencephalic parenchyma during their growth, displacing rostrally the optic chiasm, and tilting the mamillary bodies downwards (giving rise to a decreased value of the mammillary angle) (Fig. 1c, g) [1, 2]. Such a pattern of growth may manifest

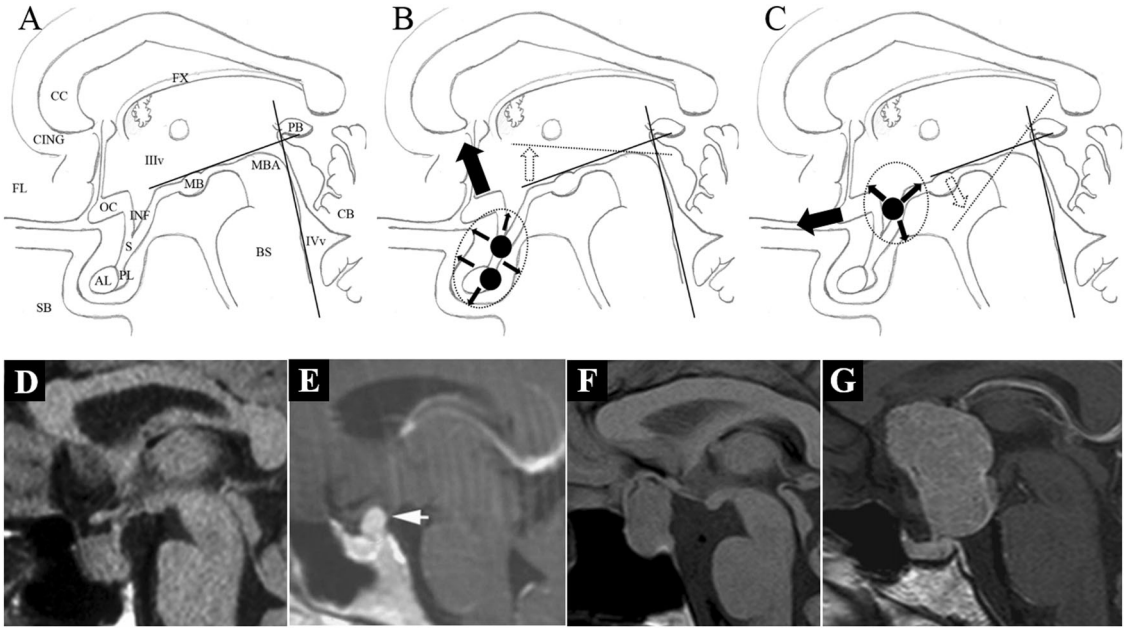

Fig. 1 Theoretical models concerning the origin and patterns of growth of PTs, including radiological illustrative examples. **a** Diagramatic representation of the anatomical structures surrounding the third ventricular area. **b**Theoretical pattern of growth for PTs arising in the posterior pituitary lobe (neurohypophysis), the pituitary stalk or the upper infundibulum (modified with permission from reference [1], explanation in the text). **c** Growth pattern of infundibulo-tuberal PTs (explanation in the text). **d** T1-weighted MRI, mid-sagittal scan showing a small-sized PT arising from the posterior pituitary lobe [Reproduced with permission from Z. Mao, W. Xiao, H. Wang, Z. Li, Q. Huang, D. He, Y. Zhu. Pituicytoma: report of two cases. Oncol. Lett. 2, 37–41 (2011). https://doi.org/10.3892/ol.2010.209]; **e** T1-weighted, Gadolinium-enhanced MRI, sagital slice displaying a small-sized pituicytoma origined in the inferior portion of the pituitary stalk [Reproduced with permission from L. Zhi, L. Yang, H. Quan, L. Baining. Pituicytoma presenting with atypical histological features. Pathology **41**, 505-509 (2009)]; **f** T1-weighted MRI, sagital slice: Big-sized PT theoretically arising from sellar structures and adopting a macroadenoma-like appearance (extracted with permission from reference [1]); **g** T1-weighted, Gadolinium-enhanced MRI, sagital slice: Big-sized infundibulo-tuberal PT with extension into the third ventricle cavity [reproduced with permission from C. Teti, L. Castelletti, L. Allegretti, M. Talco, G. Zona, F. Minuto, M. Boschetti, D. Ferone. Pituitary image: pituicytoma. Pituitary **18**, 592–597 (2015). https://doi.org/10.1007/s11102-014-0612-7]. Legend: *AL* anterior pituitary lobe, *BS* brainstem, *CB* cerebellum, *CC* corpus callosum, *CING* cingulate girus, *FL* frontal lobe, *FX* fornix, *IIIv* third ventricle, *INF* infundibulum, *IVv* fourth ventricle, *MB* mamillary bodies, *MBA* mamillary angle (defined by Pascual et al. as the intersection of two lines, one of them parallel to the base of the mamillary bodies; the other parallels the floor of the IVv [2]), *OC* optic chiasm, *PB* pineal body, *PL* posterior pituitary lobe, *S* pituitary stalk, *SP* sphenoid bone

clinically as an infundibulo-tuberal syndrome (Fröhlich syndrome, diabetes insipidus, and/or hypersomnolence) in advanced stages of the disease, which should be ruled-out preoperatively [3]. From a therapeutic standpoint, it should never be forgotten that surgical manipulation of this anatomical region associates a high risk of hypothalamic injury with independence of the approach employed, transphenoidal, subfrontal or transcallosal [1–3]. In this setting, partial removal of the PT with decompression of visual pathways should be considered, although such a conservative approach must be balanced judiciously against the still unknown rate of tumor regrowth and uncertain effect of adjuvant therapies [1].

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Publisher's note: Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

References

1. F. J. Salge-Arrieta, R. Carrasco-Moro, V. Rodríguez-Berrocal, H. Pian, J. S. Martínez-San Millán, P. Iglesias, L. Ley-Urzaiz. Clinical features, diagnosis and therapy of pituicytoma: an update. J. Endocrinol. Invest. (2018). https://doi.org/10.1007/s40618-018-0923-z
2. J.M. Pascual, R. Prieto, R. Carrasco, L. Barrios, Displacement of mammillary bodies by craniopharyngiomas involving the third ventricle: surgical-MRI correlation and use in topographical diagnosis. J. Neurosurg. **119**, 381–405 (2013). https://doi.org/10.3171/2013.1.JNS111722
3. I. Castro-Dufourny, R. Carrasco, R. Prieto, L. Barrios, J.M. Pascual, The infundibulo-tuberal syndrome caused by craniopharyngiomas: clinicopathological evidence from an historical French cohort (1705–1973). Pituitary **18**, 642–657 (2015). https://doi.org/10.1007/s11102-014-0623-4