Pituitary macroadenoma case series

2022

One hundred forty patients were identified who had transsphenoidal resection of nonfunctional pituitary neuroendocrine tumors. Macroadenomas had a median volume of 6 cm3 (IQR 3.4-8.7), and 17% had a unilateral Knosp grade of at least 3B. On multiple logistic regression, only smaller log-transformed preoperative tumor volume was independently associated with increased odds of gross total resection (GTR; odds ratio: 0.27, 95% CI: 0.07-0.89, P < .05) when controlling for tumor proliferative status, age, and sex (area under the curve 0.67). The Knosp criteria did not independently predict GTR in this cohort (P > .05, area under the curve 0.46).

Increasing the use of volumetric 3D imaging may better anticipate the extent of resection compared with the Knosp grade metric and may have a greater positive predictive value for GTR. More research is needed to validate these findings and implement them using automated methods ¹⁾

2018

Cappelletti et al. from the Neurosurgery Unit, "Sapienza" University of Rome. Institute of Neurosurgery, University Hospital, Verona and Padua, Italy, considered 66 consecutive cases treated for pituitary macroadenomas. All patients underwent to preoperative MRI and CT, as well as to postoperative MRI. From the analysis of surgical reports and preoperative radiological investigations, we extracted data related to size, extension, morphological characteristics, consistency, type of approach used, sellar or an expanded approach. The degree of removal was judged to be total, near total, subtotal, or partial.

data demonstrated that in some cases it is possible to assume in advance that there is a need for an expanded endoscopic approach (EEA). The features that led to an extended approach for extracapsular dissection of the lesion are the size of the tumor; an Hourglass/dumbbell shape; lateral extension to the suprasellar carotid artery; Knosp degree 3 or 4; contrast enhancement heterogeneity; intratumoral hemorrhage, erosion or discontinuity of the sellar floor; and increased sellar depth, which predicts increased thickness.

The ability to predict the consistency of pituitary neuroendocrine tumors allows the surgeon to design a surgical procedure patient tailored. This approach has advantages concerning the extent of resection and allows to pursue a radical strategy with a single surgical procedure ²⁾.

2016

Seven patients (4.1%) with oculomotor cistern extension and tracking were identified in a cohort of 170 patients with pituitary macroadenoma. The most common presenting symptoms were visual deficit (6 patients; 86%), apoplexy (3 patients; 43%), and oculomotor nerve palsy (3 patients; 43%). Lone oculomotor nerve palsy was seen in 2 patients without apoplexy and 1 patient with an apoplectic event. Gross-total resection was achieved via a microscopic endonasal transsphenoidal approach with or without endoscopic aid to the sella in 14%, near-total resection in 29%, and subtotal

resection in 57% of patients in the data set.

pituitary neuroendocrine tumor extension along the oculomotor cistern is uncommon; however, preoperatively recognizing such extension should play an important role in the surgeon's operative considerations and postoperative clinical management because this extension can limit gross-total resection using the transsphenoidal approach alone ³⁾.

Eighteen patients with pituitary macroadenomas underwent transsphenoidal surgery during 2013-2014 under low-field intraoperative magnetic resonance imaging (iMRI) control (PoleStar N20, 0.15 T). Intrasellar balloons were used in all of them to assess the presence of tumoral remnants. Jiménez et al. compared the findings in iMRI and postoperative high-field MRI control scans and also analyzed the number of intermediate imaging controls needed during surgery using this technique.

In total, of the 18 patients, 14 underwent a complete resection. In the remaining four patients, a maximal safe resection was performed, leaving a remnant because of cavernous sinus invasion. In all cases, the balloons were a major help in distinguishing the anatomical structures from the tumoral remnants. Fewer imaging controls were required, and there were no false-positives or negative intraoperative findings. No complications related to the technique were registered.

The "intrasellar balloon technique" is a useful tool that facilitates surgeons' intraoperative decision making. It is an important contribution to overcome the limitations of low-field iMRI as it provides a precise delineation of the resection margins, reduces false-positives and -negatives, and decreases the number of intermediate imaging controls required ⁴⁾.

2009

Fifty-five transsphenoidal surgeries were performed for macroadenomas (modified Hardy's Grade II-IV) resections. All of the surgical processes were guided by real-time updated contrast T1-weighted coronal and sagittal images, which were acquired with 0.15 Tesla PoleStar N20 iMRI (Medtronic Navigation, Louisville, CO). The definitive benefits as well as major drawbacks of low-field iMRI in transsphenoidal surgery were assessed with respect to intraoperative imaging, tumor resection control, comparison with early postoperative high-field magnetic resonance imaging, and follow-up outcomes.

Intraoperative imaging revealed residual tumor and guided extended tumor resection in 17 of 55 cases. As a result, the percentage of gross total removal of macroadenomas increased from 58.2% to 83.6%. The accuracy of imaging evaluation of low-field iMRI was 81.8%, compared with early postoperative high-field MRI (Correlation coefficient, 0.677; P < 0.001). A significantly lower accuracy was identified with low-field iMRI in 6 cases with cavernous sinus invasion (33.3%) in contrast to the 87.8% found with other sites (Fisher's exact test, P < 0.001).

The PoleStar N20 low-field iMRI navigation system is a promising tool for safe, minimally invasive, endonasal, transsphenoidal pituitary macroadenomas resection. It enables neurosurgeons to control the extent of tumor resection, particularly for suprasellar tumors, ensuring surgical accuracy and safety, and leading to a decreased likelihood of repeat surgeries. However, this technology is still not satisfying in estimating the amount of the parasellar residual tumor invading into cavernous sinus, given the false or uncertain images generated by low-field iMRI in this region, which are difficult to discriminate between tumor remnant and blood within the venous sinus ⁵⁾.

1)

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