

Planum-Clival Angle (PCA) Classification: a Novel Method of Pre-Operative Evaluation of Sellar/Parasellar Surgery

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Introduction

As endoscopic transsphenoidal have become increasingly popular for management of sellar and parasellar pathologies, there has been greater interest in achieving maximal safe tumor resection, while minimizing morbidity to improve patient outcomes. In this study, we aimed to address this by classifying the planum-clival angle in 3 types.

Methods

This is a retrospective study in a single academic center. MRI and CT images were obtained prior to the first transsphenoidal surgery. Analysis included all consecutive patients with sellar/suprasellar lesions requiring first time endonasal transsphenoidal surgery between 2003 to 2013. The planum-clival angle (PCA) was obtained by measuring the mid-sagittal CT scan angle between the intersection of lines parallel to the planum sphenoidale and to the posterior clival base.

Figure1: Measurement of PCA

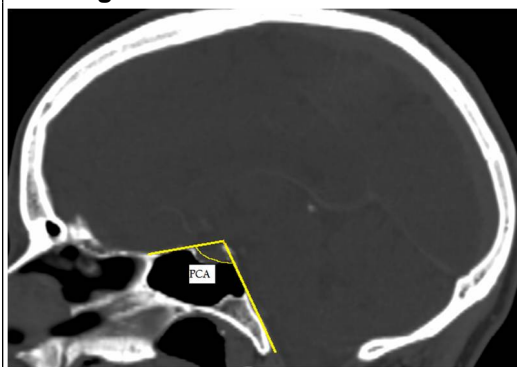


Table 1 : Classification of PCA type and angle

PCA TYPE	PLANUM-CLIVAL ANGLE
A	$\geq 121^\circ$
B	105 - 120°
C	$\leq 104^\circ$

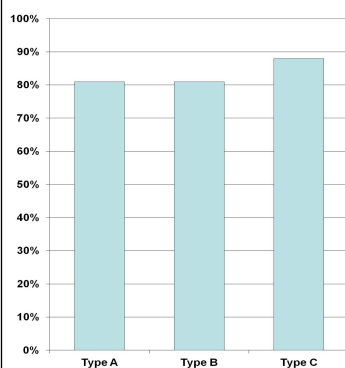
Results

114 consecutive patients were enrolled, 54 male (47%), 60 female (53%). Age ranged from 16 to 88 years. The most common pathological diagnosis was pituitary adenoma (89 patients (78%)). The remaining diagnoses were craniopharyngiomas, Rathke's cleft cysts, etc.

Table 2 : Distribution of PCA types among our patient population

PCA TYPE	NUMBER OF PATIENTS
A ($\geq 121^\circ$)	32 (28%)
B (105 - 120°)	74 (65%)
C ($\leq 104^\circ$)	8 (7%)

Figure 2: Percentage of patients with suprasellar extension



The suprasellar extension ratio ranged from 0.12 to 0.82 in type A PCA patients, 0.09 to 0.76 in type B PCA patients and 0.21 to 0.60 in type C PCA patients.

Discussion

Type B PCA, the most common PCA classification would require neutral head positioning with a standard sphenoidectomy without any further skullbase bone removal. This should be sufficient to adequately expose any pathology encountered with a "normal sella".

Type A PCA is associated with a more horizontally oriented sella. The patient would benefit from 10-20 degrees of head flexion. The patient would also require an additional posterior ethmoidectomy, +/- resection of the posterior planum if there is suprasellar extension.

Type C PCA is associated with a more vertically oriented sella. The patient would benefit from 10-20 degrees of head extension. The patient would also require additional resection of the superior portion of the clivus to access the sellar floor, especially in large tumors.

The degree of suprasellar extension may not be only related to the tumor size, but it may be also related to the planum-clival angle and the sellar orientation.

In our study, we measured the suprasellar extension in each patient and stratified our results with the PCA classification. We found that there was no clear difference between type A and B (both with 81% of patients with suprasellar extension). Type C patients had a higher percentage of patients with suprasellar extension (88%). This result is likely due to the small sample size of type C patients.

Conclusions

In this study, we proposed a new planum-clival angle (PCA) classification, intended to improve pre-operative evaluation for endonasal transsphenoidal surgeries.

At the moment, the PCA classification needs to be validated. Our next step is to initiate a large prospective study to confirm the value of this new pre-operative assessment tool.

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