Relative Diagnostic Value of Air Study and Angiography in Suprasellar Masses

LOUIS BARAY, M.D., AND BERTEN C. BEAN, M.D.
Division of Neurosurgery, State University of New York at Buffalo, School of Medicine, and Departments of Neurosurgery and Radiology, Buffalo General Hospital, Buffalo, New York

Experience has shown that changes in the size and configuration of the sella turcica associated with visual symptoms with or without endocrinological deficiency indicate the presence of a sellar or suprasellar tumor but these signs do not indicate the exact location, size, or type of the neoplasm. Pneumoencephalography usually will give adequate information as to the size, shape, and degree of suprasellar extension of these tumors. The increasingly routine use of carotid angiography for all supratentorial lesions has not been evaluated properly from the point of view of these small midline basal neoplasms. It is our purpose to evaluate the relative efficacy of angiography versus encephalography for the delineation of sellar and parasellar tumors. Several authors in the past have considered pneumography more reliable than angiography for the evaluation of the extrasellar extensions of pituitary adenomas. However, Chase and Tavera concluded recently that pneumography was superior in only 48 per cent of cases; both procedures were considered equal in 27 per cent and arteriography was considered superior in 25 per cent. El-Banhawy and El-Nadi came to the conclusion that both encephalography and angiography are important and complementary procedures for the investigation of sellar and suprasellar space-occupying lesions.

Material and Method

The material used in this study consists of 28 cases of space-occupying lesions arising from the pituitary gland, the sella turcica or immediately adjacent structures. All patients were seen by one or both of the authors at the Massachusetts General Hospital or at the Buffalo General Hospital. Only patients who had air studies and angiography performed during one hospitalization were included in order to obtain truly comprehensive data regarding the relative value of the two contrast studies. The majority had bilateral carotid angiograms, but those who had unilateral angiograms had contralateral compression for visualization of both anterior cerebral arteries.

A comparison of the important anatomical landmarks visualized on air studies and in angiography shows them to be in different anatomical position. The horizontal portion of the anterior cerebral artery corresponds fairly well to the chiasmatic cistern, but the ascending portion of the same artery is situated at some distance from the corresponding structures visualized on air studies—the frontal horn and cisterna laminae terminalis. Changes in the configuration of the carotid siphon and the supraclinoid part of the internal carotid artery are usually, but not always, reflected by changes in the outline of the sella turcica, chiasmatic cistern and anterior part of the third ventricle, respectively. Even less comparable is the relationship between the middle cerebral artery, the anterior choroidal artery and the temporal horn. Considering the spatial differences between these landmarks, it is not surprising that individual cases show changes of diagnostic value on air studies which may escape detection on angiograms and vice versa.

Chromophobe Adenomas

The sella turcica was greatly enlarged and the posterior clinoid processes were eroded or completely destroyed in 10 cases. It was normal in every respect in 1 patient. All adenomas were verified by surgery. They varied in size, but none of them was...
unusually large. This makes their radiological evaluation more valuable than would be the case with truly large tumors when any diagnostic roentgen-ray procedure would be informative. In 2 patients the adenoma was confined to the enlarged sella with minimal growth above the diaphragma sellae. Of the other 9 patients, the extrasellar extension pointed upward in 7. This upward extension varied from 0.5 to 2.5 cm. above the diaphragma sellae. In 2 patients, the extension was predominantly lateral.

Pneumography. The superior extension was outlined in lateral projections by air in the chiasmatic and crural cisterns which were filled in all cases. In all but 1 case, the outline of the suprasellar extension was enhanced further by a filling defect in the anterior inferior portion of the third ventricle (Figs. 1 and 2). A further advantage of the lateral projection is the ease with which the extension in an anteroposterior direction can be demonstrated. In anteroposterior projection the blunted lower end of the third ventricle indicates the height of the "dome" of the tumor (Fig. 1). Air studies indicated the extent of lateral projection of the tumor in only 4 patients. Asymmetry of the posterior portions of the olfactory sulci was the only indication of lateral extension in 1 of the patients. In the other patient with palsies of the 3rd and 6th nerves, the air study failed to indicate the lateral extension on the floor of the middle fossa, although this was found to be quite impressive at the time of operation.

Arteriography. The supraclinoidal portion of the internal carotid artery showed some degree of lateral displacement on anteroposterior views in 9 of the 11 patients. This displacement was slight in many cases and could not be classified definitely as abnormal had it not been associated with other changes of the arterial tree. The typical deformity noted on the lateral projection was a widening of the anterior genu or complete "uncoiling" of the siphon with occasional changes in caliber in the parasellar area (Fig. 3). This deformity was evident in 10 of the 11 cases including those of purely intrasellar adenoma. A considerable variation in the configuration of the two internal carotid arteries was noted in 4 patients although their adenoma was in the midline. The internal carotid arteries are seldom symmetrical even in normal subjects; a feature that accounts for the difficulty encountered in recognizing mild displacements or stretching of the arterial tree met with in these lesions. El-Banhawy and El-Nadi correctly described asymmetrical displacements of the carotid siphon as being characteristic of all sellar and suprasellar growths, but this asymmetry is even

Fig. 1. A. S., BGH D69806. Chromophobe adenoma with suprasellar extension.