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Dynamic CT scanning in the evaluation of pituitary ACTH-secreting adenomas.

J F Bonneville and F Cattin

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Dynamic CT Scanning in the Evaluation of Pituitary ACTH-Secreting Adenomas

We read with interest the paper by Marcovitz et al., "The Diagnostic Accuracy of Preoperative CT Scanning in the Evaluation of Pituitary ACTH-Secreting Adenomas" [1]. We do not totally agree with its conclusions that "CT scanning with current state-of-the-art equipment has poor diagnostic accuracy in Cushing's disease" or that "CT scanning with current state-of-the-art equipment and technique is much less helpful in Cushing's disease than in prolactinomas."

First, the fourth-generation EMI scanner used by the authors has not been manufactured since 1980. Second, we have shown that the state of the art is true dynamic CT scanning [2]. Scanning during and just after IV injection of 60 ml of iodinated contrast medium at a rate of 15 ml/sec (Fig. 1A) allows demonstration of the pituitary tuft and pituitary progressive enhancement (Fig. 1B). With this technique, we have noted 70% of abnormal glands in 48 patients with Cushing disease, and these results have been confirmed at surgery [3].

The paper by Marcovitz et al. gives us an opportunity to claim once again that dynamic CT scanning is mandatory for demonstration of intrasellar microadenomas.

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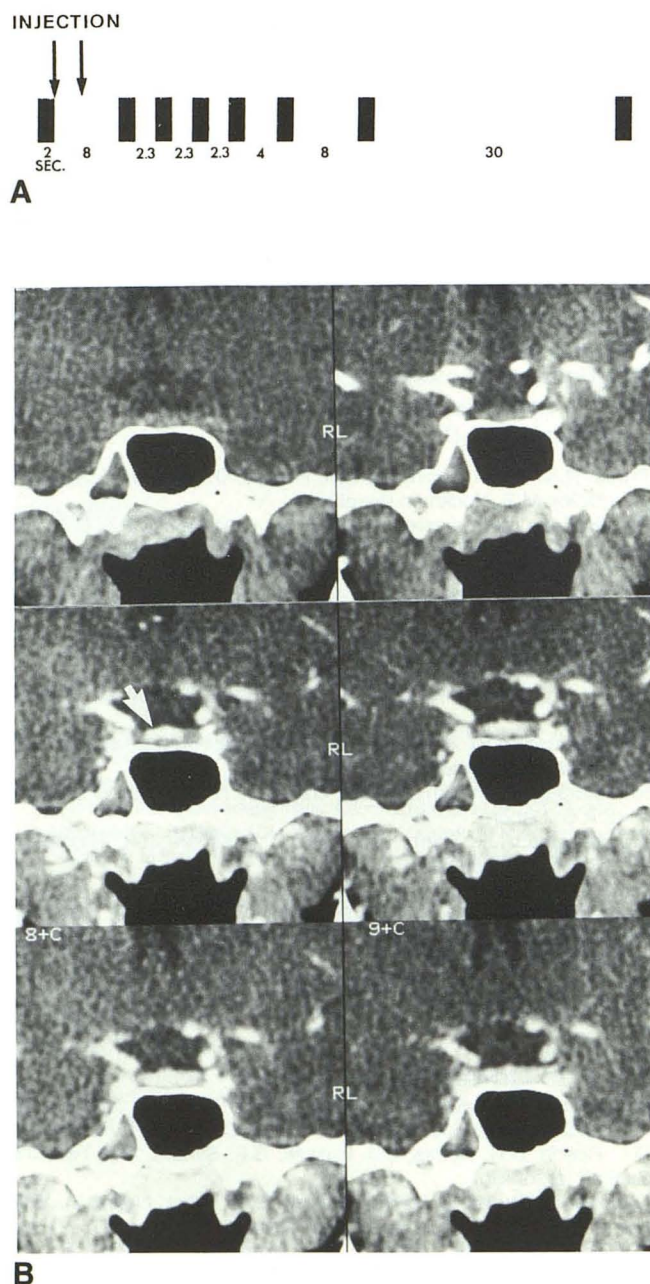
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Fig. 1.—Dynamic CT scan of pituitary gland.

A, Schematic shows times of injections and scans. Section thickness = 1.5 mm; scan time = 2 sec. Each scan is represented by a black bar.

B, Normal coronal dynamic scan shows opacification of pituitary tuft (arrow) followed by progressive homogeneous enhancement of gland.



Reply

We are honored that Drs. Bonneville and Cattin have read our paper. We have read their comments with interest, but we do not agree with their objections, for the following reasons:

It is true that the EMI 7070 scanner that we use has not been available since 1980, but this is not because of major technological shortcomings. This scanner does have a fourth-generation configuration, and no significant advance in gantry design has occurred in the interval since 1980. Although some of the newer software may not be available in our scanner, our data show that this is not a hindrance to our ability to detect adenomas in the pituitary gland. Moreover, our comments on state-of-the-art equipment were supported not only by our own data but also by the other published reports that we were able to review. The work described in some of those other reports was done with equipment currently still on the market. Thus, to paraphrase a well-known statesman: "We do not care about the age of the CAT so long as it catches mice."

In their second comment, Drs. Bonneville and Cattin raise two points; namely, the diagnostic value of their "tuft sign" and the high detection rate of ACTH adenomas by CT in their series of 48 patients. Regarding the value of the tuft sign [1], we find several problems in evaluating their published data. First, the standard they used in assessing the reliability of this sign appears to have been the concomitant presence of a hypodense lesion on CT; no mention was made of correlation with tissue diagnosis aside from seven patients who were scanned after surgery. Second, of 125 scans, only 100 were of adequate technical quality. Third, the secretory types of the tumors were not mentioned. Also, it is difficult to know whether the 39 "patients" whose scans were considered normal were referred for scanning because of endocrine abnormalities or whether they were normal, volunteer control subjects; and it is unclear how rigorously coexistent pituitary adenomas were excluded in the patients with empty sella. It has been shown that coexistence of adenomas and empty sella occurs quite commonly [2-7]. Fourth, for 26 microadenomas included in their series, the tuft sign was present in only 69% and was shifted laterally in 65%. Although one case is shown as an example in their book [8], nowhere in their publications is it stated how frequently an abnormal tuft sign could be used accurately to diagnose an ACTH microadenoma that was not seen as a hypodense lesion on CT but that was documented at surgery. In fact, the same authors stated, "Moreover, the tuft sign may be uncertain or even absent for certain corticotrophic-cell microadenomas localized on the midline." Thus we conclude that the tuft sign may be an interesting image to see, but its diagnostic value for ACTH adenomas has not been documented.

Drs. Bonneville and Cattin mention their CT detection rate for ACTH adenomas [8] and imply that it is better than that found in our series. Here again we come across several problems in interpreting their data. In their chapter on ACTH adenomas [8], they stated that 55% of 48 patients had "clearly defined" adenomas on CT, and 15% had "an abnormal pituitary gland, but showing no clearly defined microadenoma"; in regard to the latter category, it was not stated what the radiologic abnormalities of the pituitary gland were, and the

tuft sign was not mentioned. The authors stated that all patients with abnormal scans who underwent surgical exploration had an adenoma found at surgery or on histologic examination of the removed tissue. However, they did not state how many of the patients did have operations, how many had selective removal of distinct adenomas vs total or partial hypophysectomies, nor what proportion of the lesions were macro- vs microadenomas. Of the 30% of patients who did not have abnormal scans (i.e., 15 cases), six underwent surgical exploration; of these, one had a distinct adenoma, three had very small adenomas found only on pathologic examination, and two had negative explorations. Thus, it is impossible to calculate sensitivity and specificity for this series of patients from the data as they were published or to do a detailed comparison with our own series. However, if we accept an accuracy rate of 70% and use the χ^2 method to compare it with the accuracy rate of 62.8% in our group of 35 patients, we find no statistically significant difference between the two groups. We conclude, then, that whatever secondary CT signs or sophisticated CT equipment Drs. Bonneville and Cattin have used in the diagnosis of ACTH adenomas, their published results are not significantly superior to ours.

On the other hand, if we compare both of these accuracy rates for ACTH adenomas with the figure of 92.1% in our series of 102 patients with suspected prolactinomas who had surgical exploration [6], the differences between groups are significant at $p < .01$. Accuracy data for Drs. Bonneville and Cattin's series of prolactinomas are not available. On the basis of these calculations, we think that our original conclusions about the relative accuracy of CT for pituitary ACTH adenomas and prolactinomas are valid.

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