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LETTER TO THE EDITOR (BY INVITATION) - PITUITARIES

Response to: "No doubt: the invasion of the cavernous sinus is the limiting factor for complete resection in pituitary adenomas"

Carlo Serra [1] · Luca Regli [1]

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Dear Editor,

We read with attention the comment of Messerer et al. on our paper entitled "Predicting extent of resection in transsphenoidal surgery for pituitary adenoma," and we would like to thank our colleagues for giving us the chance to further illustrate our thinking.

We agree with their statement that a score "should not detract from the value of a precise analysis of the pre operative MRI and its correlation with a good appreciation of the intra-operative endoscopic visualization of the tumor Anatomy." We would even go a step further: every single patient is different from the other, so that, sensu strictu, no general surgical classification can describe the extent of the real finding. Every score represents an over simplification from a more complex reality, which results from an abstraction of an ideal rule. This applies to our score as well as to any existing grading system. Still, the literature is flooded by scores, classifications, and grades. Why so? Scores help us simplify complex disease entities, favor communication, improve comparisons and predictions, and support research. Therefore, they need to be easy and practical to use, as well as reliable among several raters.

The development of artificial intelligence will likely overtake any existing classification in the near future [8] and include in the analysis many more variables than in current scores. For now, our score has proven to better predict outcome than the existing scores, at least in our patient series. To compare data from different centers, interrater reliability is crucial. The "Zurich pituitary score," is tremendously easy to implement and showed a high interrater agreement. External multicentric validation of the score is ongoing at this time.

We would like to answer specifically some points raised by Messerer and Daniels.

The intercarotid distance (ICD) determines the surgical corridor [2]. A lesion with a maximal suprasellar extension much larger than the ICD (so called hourglass shape) is more difficult to be reached and thus subtotal resection is more likely to happen. We know that the carotid artery may be manipulated and mobilized [6]. We agree also that invasion of the cavernous sinus remains crucial. Several other factors influencing surgical outcome could be listed; however, classification will never achieve an exhaustive enumeration of all possible prognostic factors. With respect to outcome prediction, classifications are all about probability assessment. The "Zurich pituitary score" just indicates the probability that GTR is achieved, given a determined tumor to surgical corridor ratio. This likelihood is higher in class I than in class IV and proved to be significantly different among classes with respect not only to GTR, but also to EOR and residual volume. Maximal tumor diameter and ICD are both parameters easy to be measured and interrater agreement of measurements was very high.

Secondly, we believe that the statement "we were surprised to observe a different GTR rate between class I and II, as GTR may be easily obtained in both cases [3] after a careful planning of the surgical approach" is an over simplification of the real world. Intrasellar remnants do exist, although rarely, in our series, in other experienced hands, as well as in the literature [3, 7, 9]. Consecutive series with systematic high-field postoperative MRI reveals this [1, 3–5]. Moreover, some class II adenoma invade the cavernous sinus, whereas class I do not. These are the reasons why class I and II have different GTR rates.

Lastly, we agree that "only an intraoperative assessment may determine the true para-sellar extensions of the tumor, and thereby achieve (or not) a total excision", that is why we perform endoscopic pituitary surgery with intraoperative 3-Tesla MRI.

This article is part of the Topical Collection on *Pituitaries*

✉ Carlo Serra
c.serra@hotmail.it

[1] Department of Neurosurgery, Clinical Neuroscience Center, University Hospital Zurich, University of Zurich, Frauenklinikstrasse 10, 8091 Zurich, Switzerland

We thank again Dr. Messerer for his comments and the Editor for giving us room to answer.

Best Regards,

Carlo Serra

Luca Regli

On behalf of all authors

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