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EDITORIAL COMMENT

Editorial Comment: Radiomics analysis allows for precise prediction of silent corticotroph adenoma among non-functioning pituitary adenomas

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The manuscript entitled "Radiomics analysis allows for precise prediction of silent corticotroph adenoma among non-functioning pituitary adenomas"[1] evaluates the effectiveness of using radiomic image features to preoperatively predict silent corticotroph adenomas (SCAs) among non-functioning pituitary adenomas (NFPAs).

Pituitary adenomas and especially the NFPAs are among the most common neoplasms in the sellar region, this entity encompassing several histologies [2, 3]. In the setting of NFPAs, SCAs harbor a more aggressive pattern with a higher risk of cavernous sinus invasion and may benefit for a more aggressive resection strategy [4]. However, detection of SCAs remains troublesome due to the absence of biochemical or clinical evidence of hypercortisolism and a sometimes aspecific imaging. Previous radiomics-based models were proposed but with inconsistent results [5, 6].

Acknowledging this specific clinical situation and the relevance of efficient and non-invasive tools for the characterization of SCAs, the authors developed an ensemble model combining several machine learning algorithms such as support vector machine, random forest, and neural network based on the pre-operative magnetic resonance imaging (MRI). The overall cohort consisted of 302 patients among which 146 patients (48.3%) were diagnosed with SCA. After building and fine tuning the performance of the model on the training cohort consisting of 80% of the overall cohort (242 patients), the ensemble model was then tested on the remaining patients (60 patients). Among all tested features (radiomics features along with clinical, laboratory, and radiology-associated features), the three most important features were the radiomic prediction followed by the gender and the age, microcystic change, surgical history and cystic change being ranked as less relevant. Using a five-fold cross validation for hyperparameter tuning robustness of the ensemble model was evaluated on the overall cohort with a bootstrap approach resulting in a 95% confidence interval for the AUC of 0.667–0.905.

Several manuscripts evaluating the benefit of radiomics features in the setting of SCAs were previously published [7–11]. In the present article [1], the superlearner model combined several machine learning algorithms, one inaccurate prediction being possibly corrected by another algorithm using a voting mechanism. Prediction is thus often higher, especially in the training cohort but with a higher risk of overfitting and a complexified model. Indeed, the explainability of such prediction is often limited even if the authors provide a ranking of each feature by importance. Comparison with other prediction models remains limited, the proposed ensemble model achieving nevertheless very high results, with only 8 misclassified patients out of the 60 patients from the testing cohort, in an overall cohort representing one of the largest cohorts focusing on SCAs.

This model combining several features appears as promising for the pre-operative detection of SCAs but awaits further validation such a prospective and multicentric validations, assessing the practicality of such algorithms for the clinical use as well as the robustness to center's variability (segmentation and MRI scan).

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Methodology
• Editorial Comment

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