Prognostic models for chronic subdural hematoma recurrence

- A Scoping Review of the Methodologies and Reporting Standards in Recent Applications of Artificial Intelligence in Radiomics for Chronic Subdural Hematoma Imaging
- Combining Clinical-Radiomics Features With Machine Learning Methods for Building Models to Predict Postoperative Recurrence in Patients With Chronic Subdural Hematoma: Retrospective Cohort Study
- Interaction of admission platelet count with current medications and the risk for chronic subdural recurrence
- Preoperative Fibrinogen Levels and Function as Predictive Factors for Acute Bleeding in the Hematoma Cavity After Burr Hole Drainage in Patients with CSDH
- Significance of Temporal Muscle Thickness in Chronic Subdural Hematoma
- Brain re-expansion predict the recurrence of unilateral CSDH: A clinical grading system
- External validation of prognostic models predicting outcome after chronic subdural hematoma
- Development and validation of a prognostic prediction model for antithrombotic-related chronic subdural hematoma in patients with recent acute myocardial infarction

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Prognostic models for recurrence have produced equivocal results. The objective of a study was to leverage a data mining algorithm, chi-square automatic interaction detection (CHAID), which can incorporate continuous, nominal, and binary data into a decision tree, to identify the most robust predictors of repeat surgery for cSDH patients.

The model identified platelet count on admission as the most important predictor of repeat cSDH surgery, followed by preoperative statin use and anticoagulant use. Critical cutoffs for platelet count were identified, which future studies should evaluate to determine if they are modifiable or reflective of underlying disease states [1)]

FIB and TT were identified as risk factors for postoperative acute bleeding within the hematoma cavity. Wu et al. developed a prognostic model to predict the occurrence of postoperative acute bleeding within the hematoma cavity after BHD in patients with CSDH. The model incorporated FIB, TT, coronary artery disease, and Glasgow Coma Scale scores. The model exhibited good discrimination (area under the curve: 0.725) and calibration (Hosmer-Leeshawn goodness of fit test: $P > 0.1$). Furthermore, decision curve analysis demonstrated the potential clinical benefit of implementing this prediction model [2)]

A study substantiates the feasibility and clinical relevance of an ML-based predictive model, using clinical-radiomics features, for relatively accurate prognostication of postoperative recurrence in patients with CSDH. Suppose the model is integrated into clinical practice. In that case, it will be of great significance in enhancing the quality and efficiency of clinical decision-making processes, which can improve the accuracy of diagnosis and treatment, reduce unnecessary tests and surgeries, and reduce the waste of medical resources [3)]

Several prognostic models for outcomes after chronic subdural hematoma treatment have been published. However, these models are not sufficiently validated for use in daily clinical practice. Holl et al. aimed to assess the performance of existing prediction models for outcomes in patients with chronic subdural hematoma diagnosis.

They systematically searched relevant literature databases up to February 2021 to identify prognostic models for outcome prediction in patients diagnosed with CSDH. For the external validation of prognostic models, they used a retrospective database, containing data of 2384 patients from three Dutch regions. Prognostic models were included if they predicted either mortality, hematoma recurrence, functional outcome, or quality of life. Models were excluded when predictors were absent in our database or available for < 150 patients in our database. They assessed calibration, and discrimination (quantified by the concordance index C) of the included prognostic models in the retrospective database.

They identified 1680 original publications of which 1656 were excluded based on title or abstract, mostly because they did not concern CSDH or did not define a prognostic model. Out of 18 identified models, three could be externally validated in our retrospective database: a model for 30-day mortality in 1656 patients, a model for 2 months, and another for 3-month hematoma recurrence both in 1733 patients. The models overestimated the proportion of patients with these outcomes by 11% (15% predicted vs. 4% observed), 1% (10% vs. 9%), and 2% (11% vs. 9%), respectively. Their discriminative ability was poor to modest (C of 0.70 [0.63-0.77]; 0.46 [0.35-0.56]; 0.59 [0.51-0.66], respectively).

None of the examined models showed good predictive performance for outcomes after CSDH treatment in the dataset. This study confirms the difficulty in predicting outcomes after CSDH and emphasizes the heterogeneity of CSDH patients. The importance of developing high-quality models by using unified predictors and relevant outcome measures and appropriate modeling strategies is warranted [4].

1)
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3)
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4)
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