Neurocirugia. 2023;34(Supl 1):SS155

Neurocirugía

https://www.revistaneurocirugia.com

O-049 - MORTALITY PREDICTION IN PATIENTS WITH SUBARACHNOID HEMORRHAGE USING AN ARTIFICIAL INTELLIGENCE MODEL BASED ON INITIAL CT SCAN AND NEURAL NETWORKS

S. García García[1], S.M. Cepeda Chafla[1], D. Müller[2], A. Mosteiro Cadaval[3], R. Torné Torné[3], S. Agudo[4], N. de la Torre[4], I. Arrese Regañón[1] and R. Sarabia Herrero[1]

[1]Hospital Universitario del Río Hortega, Valladolid, Spain; [2]University of Augsburg, Augsburg, Germany; [3]Hospital Clínic de Barcelona, Barcelona, Spain; [4]Facultad de Medicina de Valladolid, Valladolid, Spain.

Resumen

Introduction: Subarachnoid hemorrhage (SAH) entails high morbidity and mortality rates. Several risk factors have been identified as mortality and functional outcome estimators. Artificial intelligence (AI) algorithms enable handling high volumes of complex data. Among different AI classifiers, neural networks (NN), an automated machine learning technique, is capable of generating highly accurate predictions from imaging data.

Objectives: To predict mortality in a consecutive cohort of SAH patients by processing the initial CT scan on a NN based algorithm,

Methods: Retrospective multicenter study of a consecutive cohort of patients with SAH between 2010 and 2022. Demographic, clinical and radiological variables were analyzed. Initial CT scan images were pre-processed and used as input to train a NN which architecture is based on DenseNet-121. The output variable was mortality in the first three months. The training, validation and test cohorts were obtained by random split from the initial dataset.

Results: Images from 219 patients were processed, 175 for training and validation of the NN and 44 for its evaluation. 52% of patients were female, and the median age was 58 years. 18,5% were idiopathic SAH. The median WFNS on admission was 2, and mortality was 31%. The model showed a great performance predicting death in SAH patients exclusively using the images of the initial CT scan (Accuracy = 74%, F1 = 75% and AUC = 82%).

Conclusions: Modern image processing techniques based on AI and NN make possible to predict mortality in SAH patients with high accuracy using CT scan images as the only input. These models might be optimized by including more data and patients resulting in better training, development and performance on tasks which are beyond the skills of conventional clinical knowledge.