Natural History of Unruptured aneurysms: prediction of aneurysm rupture by AI

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Purpose:
Prediction of cerebral aneurysm growth and rupture are challenging. We evaluate risk factor of unruptured cerebral aneurysms growth and rupture by using computational fluid dynamic analysis and AI technology.

Methods:
We constructed a database of unruptured aneurysm diagnosed and/or treated at three institutions, focusing on patient clinical information such as size of aneurysm and underlying disease. The machine learning model for rupture prediction was developed using the data from the Institution A (more than 6000). Applying the developed machine learning model to the data from the Institution B (1500) and C (800), we evaluated the sensitivity and specificity by comparing the rupture prediction results with the actual results in a backward-looking manner.

Results:
The sensitivity and specificity of the developed machine learning model were 0.74 and 0.77, respectively, based on cross-validation using the data from Institution A. When the machine learning model was applied to the database from Institution B and C, the sensitivity and specificity were 0.8 and 0.7, respectively.

Conclusions: Our results imply that our machine learning model to predict aneurysmal rupture have generalizability of its performance. We will also discuss cutting edge basic sciences of cerebral aneurysms.

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