Background Machine learning (ML) may be superior to traditional methods for clinical outcome prediction. We sought to systematically review the literature on ML for clinical outcome prediction in cerebrovascular and endovascular neurosurgery.
Methods A comprehensive literature search was performed, and original studies comprising patients undergoing cerebrovascular surgeries or endovascular procedures that developed a supervised machine learning model to predict a postoperative outcome or complication were included.
Results A total of 60 studies predicting 71 outcomes were included. Most cohorts were derived from single institutions (66.7%). The studies included stroke (32), subarachnoid hemorrhage ([SAH] 16), unruptured aneurysm (7), arteriovenous malformation (4), and cavernous malformation (1). A total of 245 testing scores were reported and area under the receiver operator characteristics curve (AUROC) was the most used metric. Random forest was the best performing model in 12 studies (20%) followed by XGBoost (13.3%) and neural networks (11.7%). Among 42 studies in which the ML model was compared to a standard statistical model, ML was superior in 33 (78.6%). Out of 10 studies in which the ML model was compared to a non-ML clinical prediction model, ML was superior in 9 (90%). External validation was performed in 10 studies (16.7%). In studies predicting functional outcome after mechanical thrombectomy the pooled AUROC of the test set performances was 0.84 (95% CI 0.79 - 0.88 [figure 1]). For studies predicting outcomes after SAH, the pooled AUROC for functional outcomes and delayed cerebral ischemia were 0.89 (95% CI 0.76 - 0.95) and 0.90 (95% CI 0.66 - 0.98), respectively.
Conclusion ML performs favorably for clinical outcome prediction in cerebrovascular and endovascular neurosurgery, however multicenter studies with external validation are needed to ensure the generalizability of these findings.
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P-023 EVALUATING PSEUDOSUPERDYNA IMAGING TECHNIQUE IN POST-TREATMENT ASSESSMENT OF CEREBRAL ANEURYSMS

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Introduction Cerebral aneurysm treatment has undergone significant advancements recently, with precise post-treatment evaluation becoming the cornerstone for optimizing patient outcomes, irrespective of the device used. Building upon the SuperDyna technique, which combines high-resolution cone-beam computed tomography (CBCT) with contrast-enhanced 3D digital subtraction angiography (DSA), we have developed an innovative approach termed PseudoSuperDyna. This technique leverages a novel rotational flat panel angiography protocol, incorporating advanced image processing algorithms, aimed at minimizing radiation exposure without compromising image quality. Our study aims to validate PseudoSuperDyna as a reliable alternative for post-procedural evaluation of intracranial aneurysms.
Materials and Methods We conducted a retrospective analysis of a series of 16 patients who received cerebral aneurysm treatment at our institution between December 4, 2023, and February 20, 2024. A total of 20 devices were utilized and post-treatment assessments were conducted using the Pseudo-SuperDyna imaging technique. Demographics, aneurysm characteristics, devices used for treatment, quality of visualization, and radiation exposure data were evaluated, and a descriptive analysis was performed.
Results Of the 16 patients studied, 12 (75%) underwent follow-up after previous treatment, with 2 (12.5%) needing further intervention and immediate imaging after the deployment of an additional device. The other 4 (25%) were new cases, assessed directly after their initial treatment. The PseudoSuper-Dyna technique enabled clear visualization of device struts or aneurysm coil folds in all cases. The patient cohort had an average age of 58.6 years (SD = 12.2), predominantly females (15; 94%), with only 1 (6%) male patient. Aneurysm locations were diverse, with the ophthalmic artery (3 cases), anterior communicating artery (2 cases), and superior hypophyseal artery (2 cases) being the most common. The maximum diameter of the aneurysms had a median of 3.6 mm (IQR = 5.55). Treatment modalities included endovascular coiling (11 cases, 55%), flow diverters (6 cases, 30%), a single Contour device placement (5%), a single stent (5%), and a single clip (5%). Notably, successful flow diverter opposition was confirmed in all cases when utilized. General anesthesia was administered in 6 (37.5%) of the procedures, while the remaining 10 (62.5%) patients were awake, holding their breath during image acquisition. The occlusion status could be appreciated in 100% of the cases. The median radiation exposure per specific run was 63.59 mGy (IQR=9.11), with a median total procedure radiation dose of 620.75 mGy (IQR = 1129.96).
Conclusion In conclusion, PseudoSuperDyna proves to be a dependable and innovative approach, offering an alternative with reduced radiation exposure for the thorough assessment of intracranial aneurysms treatments. Its capacity to provide accurate and detailed visualization of neurovascular structures, along with interactions between the device and the vasculature, facilitates the verification of therapeutic success and promotes patient safety. While further investigation with a larger patient population is warranted and currently in progress, our findings represent a significant step forward in the field of post-treatment evaluation.
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P-024 MECHANICAL THROMBECTOMY OF RADIAL ARTERY FOR TRANSRADIAL APPROACH IN NEUROINTERVENTION

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Background Radial artery occlusion (RAO) is a relatively common but benign complication following transradial endovascular approaches. Transradial access in the occluded vessel has been described as safe and feasible in recent literature. Radial artery thrombectomy offers a potential strategy for re-access.

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