Mean pressure reactivity index

Mean pressure reactivity index (PRx) values have demonstrated associations with clinical outcome in sTBI. However, the retrospective derivation of a mean value diminishes its bedside significance. We evaluated PRx temporal profiles for patients with sTBI and identified time thresholds suggesting optimal neuroprognostication.

Methods: Patients with sTBI and continuous bolt intracranial pressure monitoring were identified. Outcomes were dichotomized by disposition status (“good outcome” was denoted by home and acute rehabilitation). PRx values were obtained every minute by taking moving correlation coefficients of intracranial pressures and mean arterial pressures. Average PRx trajectories for good and poor outcome groups were calculated by extending the last daily averaged PRx value to day 18. Each patient also had smoothed PRx trajectories that were used to generate “candidate features.” These “candidate features” included daily average PRx's, cumulative first-order changes in PRx and cumulative second-order changes in PRx. Changes in sensitivity over time for predicting poor outcome was then evaluated by generating penalized logistic regression models that were derived from the “candidate features” and maximized specificity.

Results: Among 33 patients with sTBI, 18 patients achieved good outcome and 15 patients had poor outcome. Average PRx trajectories for the good and poor outcome groups started on day 6 and consistently diverged at day 9. When targeting a specificity >83.3%, an 85% maximum sensitivity for determining poor outcome was achieved at hospital day 6. Subsequent days of PRx monitoring showed diminishing sensitivities.

Conclusion: Our findings suggest that in a population of sTBI, PRx sensitivities for predicting poor outcome was maximized at hospital day 6. Additional study is warranted to validate this model in larger populations [1].

1)
Chang JJ, Kepplinger D, Metter EJ, Kim Y, Trankiem CT, Felbaum DR, Mai JC, Mason RB, Armonda RA, Aulisi EF. Time Thresholds for Using Pressure Reactivity Index in Neuroprognostication for Patients With Severe Traumatic Brain Injury. Neurosurgery. 2024 Feb 20. doi: 10.1227/neu.0000000000002876. Epub ahead of print. PMID: 38376157.