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Optimal Early Clinical Endpoints for Long-Term Functional Outcome Prediction After Thrombectomy

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Introduction

Early neurological recovery (ENR) is an attractive surrogate marker for long-term functional outcome of endovascularly-treated stroke patients.

The optimal definition of 24-hour ENR that best predicts 90-day functional independence (modified Rankin Scale, mRS, 0-2) has not been established. We sought to determine ENR measure that best predicted 90-day mRS 0-2 in our prospective, multi-center, “Blood Pressure after Endovascular Stroke Therapy (BEST)” study.

Methods and Materials

BEST enrolled consecutive EVT-treated adult patients with ICA, M1, or M2 occlusions at 12 comprehensive stroke centers from 11/2017 to 9/2018. In this post-hoc analysis, we measured the ability of various thresholds of both 24-hour NIHSS and Δ NIHSS (baseline minus 24-hour) to predict 90-day mRS 0-2 using Youden’s index.

The strength of the associations were assessed using logistic regression adjusted for age, glucose, hypertension, ASPECT score, time to recanalization, recanalization status, and thrombolytic treatment.

Results

Of 485 patients in the BEST cohort, 447 with 90-day follow-up were included in this study (228 females, mean age 68 \pm 15 years).

The optimal Youden’s Index was achieved at 24 hour NIHSS of ≤ 7 (sensitivity 80.1%, specificity 80.4%, area under the curve [AUC] 0.855 [0.819-0.887], $p < 0.001$).

Results

The optimal Δ NIHSS cut point was ≥ 4 (sensitivity 79%, specificity 58.5%, AUC 0.73 [0.685-0.77], $p < 0.001$; Figure), which performed less well at outcome prediction than 24 hour NIHSS (difference between the AUCs 0.126, $p < 0.001$; Figure). Strength of association between other early NIHSS endpoints and 90-day outcome is outlined in the table

Conclusions

A 24-hour NIHSS ≤ 7 best predicted functional independence at 90 days. Among Δ NIHSS thresholds, ≥ 4 points (decrease) was optimal.

These findings should be validated in independent endovascular cohorts to establish a standard short-term outcome measure for both clinical and research scenarios.

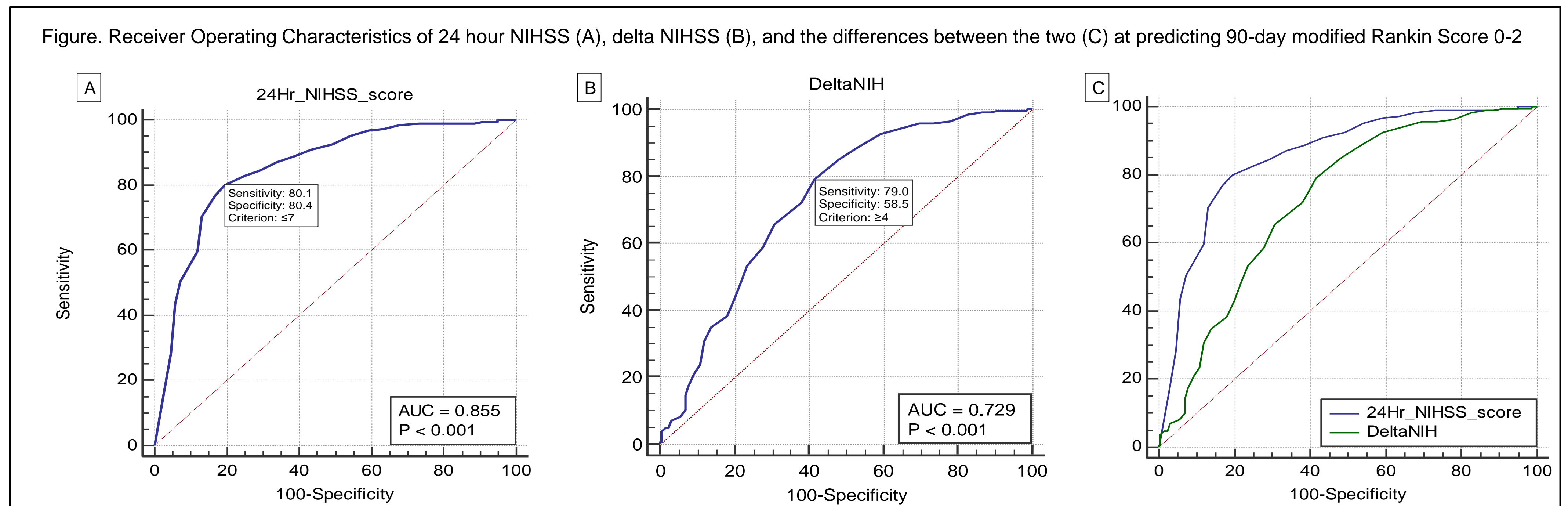


Table. Association of Various thresholds of 24-hour NIHSS and Δ NIHSS with 90-day Modified Rankin Scale 0-2

Definitions	Unadjusted OR	p-value	Adjusted OR	p-value	Sensitivity	Specificity
24-hour NIHSS as continuous	1.27 [1.22-1.33]	<0.001	1.26 [1.20-1.33]	<0.001	NA	NA
24-hour NIHSS ≤ 2	12.5 [7.14-25]	<0.001	7.69 [4.16-16.67]	<0.001	43.55%	94.23%
24-hour NIHSS ≤ 7	16.67 [10-25]	<0.001	12.5 [7.14-20]	<0.001	80.1%	80.4%
Δ NIHSS as continuous	1.11[1.07-1.13]	<0.001	1.11[1.07-1.14]	<0.001	NA	NA
Δ NIHSS ≥ 2	6.67 [4.16-11.1]	<0.001	10 [5.26-20]	<0.001	88.7%	46.5%
Δ NIHSS ≥ 4	5.27 [3.44-8.33]	<0.001	4.55[2.85-7.69]	<0.001	79%	58.5%
Δ NIHSS ≥ 8	3.7[2.5-5.56]	<0.001	3.33[2.12-5.26]	<0.001	53.2%	76.5%

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