Final infarct volume discriminates outcome in mild strokes

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Introduction

Our knowledge of how final infarct volume (FIV) predicts disability after mild stroke is limited.

Our objective was to determine if FIV could differentiate good versus poor outcome after mild stroke.

Methods

We retrospectively identified 65 patients with mild stroke (NIHSS ≤5) from a multicenter registry and assessed their baseline ASPECTS, proximal arterial occlusion (PAO), collateral scores and FIV.

Logistic regression was used to evaluate associations between favorable outcome (mRS 0-1) and FIV, and to determine the optimal FIV threshold that discriminates outcome based on receiver operating characteristic curve.

Table 1. Patient characteristics of mild stroke cohort

Characteristics	Total N=65	FIV<20 mL N=50	FIV>20 mL N=15	P value
Age, y, median (IQR)	66 (59, 75)	68.5 60, 77)	59 (49, 70)	0.12
Male, no. (%)	38 (58%)	26 (52%)	12 (80%)	0.07
Baseline NIHSS, median (IQR)	4 (3, 5)	3 (3, 4)	4 (3, 5)	0.12
24 hr NIHSS, median (IQR)	2 (2, 4)	2 (1, 3)	4 (2, 5)	0.01
Baseline ASPECTS, median (IQR)	10 (8, 10)	10 (9, 10)	8 (7, 10)	0.02
Collateral score	N=64 2 (1.5, 3)	N=49 2 (2, 3)	N=15 2 (1, 3)	0.22
Final infarct volume, cc, median (IQR)	7.2 (1.9, 18.7)	3.48 (1.34, 8.73)	51.2 (34.85, 69.98)	<0.01
90-day mRS, median (IQR)	N=59 1 (0, 2)	N=45 1 (0, 1)	N=14 2 (1, 2)	0.02
90-day mRS 0-1, no. (%)	42 (71%)	37 (82%)	5 (36%)	<0.01

Figure 1: ROC curve for FIV in predicting favorable outcome

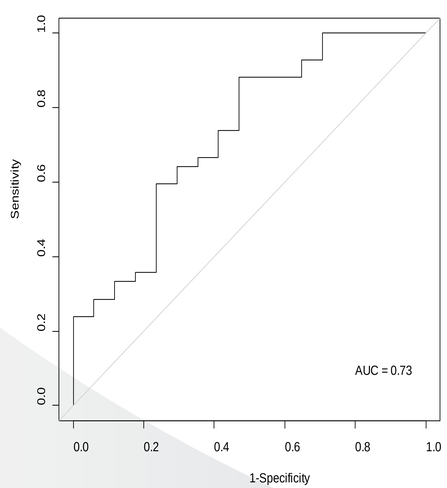

Table 2. Logistic regression models

	OR (95% CI)	P-value
Model predicting 90-day favorable outcome		
Reduced Model		
FIV		
>20 mL	0.11 (0.02, 0.50)	<0.01
<20 mL	Reference	
Collateral score	2.43 (1.12, 527)	0.02
Full Model		
FIV		
>20 mL	0.08 (0.01, 0.49)	0.01
<20 mL	Reference	
Collateral score	2.34 (0.98, 5.57)	0.06
PAO	0.68 (0.15, 3.14)	0.62
NIHSS	0.79 (0.42, 1.48)	0.46
Female	0.50 (0.10, 2.60)	0.41
Age	0.97 (0.91, 1.03)	0.30
ASPECTS	0.99 (0.59, 1.66)	0.98
Model predicting high FIV (>20 mL)		
Reduced Model		
PAO	3.20 (0.93, 11.0)	0.07
Full Model		
Collateral score	0.67 (0.30, 1.52)	0.34
PAO	2.35 (0.59, 9.29)	0.22
NIHSS	1.57 (0.84, 2.90)	0.15
Female	0.32 (0.07, 1.56)	0.16
Age	0.99 (0.94, 1.03)	0.58
ASPECTS	0.88 (0.64, 1.20)	0.42

Results

Study population: Of 2,453 patients in our registry, 90 qualified for the current study with mild stroke. Patients with missing follow-up MR imaging data (n=22) and who received intravenous thrombolysis treatment (n=3) were excluded, leaving 65 patients for this analysis. Demographic characteristics, imaging, and outcomes for the mild stroke cohort are provided in Table 1.

Association Between FIV and clinical outcome: An optimal FIV cut-point of 20 mL was identified for differentiating between favorable and poor outcomes (sensitivity 88%; specificity 53%; area under curve 0.73, 95% CI: 0.58-0.88) (Figure 1). Of the 45 patients with FIV <20 mL, 37 (82%) had a favorable outcome compared to 5 out of 14 (36%) with FIV ≥20 mL (P<. 01). In the multivariable model, FIV ≥20cc remained strongly associated with poor outcome (adjusted OR=0.11; 95% CI: 0.02-0.50, P<. 01), independent of age, gender, stroke severity, ASPECTS and PAO. In addition, a higher collateral score was also found to be associated with favorable outcome (adjusted OR=2.43; 95% CI: 1.12-5.27, P=0.02) (Table 2).

Predictors of FIV: Although no statistically significant associations were observed between FIV>20mL and clinical and imaging characteristics, there was a trend toward higher FIV among patients with versus without baseline PAO (OR=3.20; 95% CI: 0.93-11.0) (Table 2).

Conclusions

A final infarct volume cut-point of 20 mL was found to best differentiate between the likelihood of good versus poor outcome in patients with mild stroke.

Further validation of FIV as a surrogate marker in mild stroke is warranted.