Factors Associated With Poor Functional Outcome Despite Low Post-treatment Infarct Volume in the ESCAPE Randomized Controlled Trial

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Background and Aims Improved outcomes after endovascular thrombectomy (EVT) are associated with smaller infarcts. However, patients with small post-treatment infarct volumes (PIV) sometimes fare poorly. We explored factors potentially associated with low PIV and poor outcome, hypothesizing differences in comorbidities and/or post-stroke complications.

Methods: We identified ESCAPE patients (EVT/control) with $PIV \leq 25^{\text{th}}$ percentile, per 24-48-hour CT/MRI. We compared “discrepant cases” – 90-day modified Rankin Scale (mRS) score ≥ 3 despite low PIV – against “non-discrepant cases” (mRS 0-2), examining imaging modality, other outcomes (Barthel Index [BI], EQ-5D), ASPECTS locations, NIHSS, post-stroke complications, demographics, and comorbidities using Fisher’s exact for binary variables and Wilcoxon rank-sum for continuous variables. Multi-variable logistic regression was used to evaluate factors independently associated with low-PIV/poor-outcome.

Results: Median PIV was 21mL (IQR 7-72mL, $n=315$). 79 had $PIV \leq 7\text{mL}$; 27(34.2%) were discrepant cases (mRS ≥ 3).

Compared to non-discrepant cases with $PIV \leq 7\text{mL}$, discrepant cases had worse 90-day BI and EQ-5D (e.g. mean BI 44.6, 95%CI 27.1-62.1 vs 98.9, 97.4-99.9, $p < 0.001$), with no significant differences in EVT use (53.9% vs 69.2%, $p = 0.22$) or CT versus MRI for volume ascertainment (84.6% vs 75.0%, $p = 0.39$). However, discrepant cases had higher 24-hour/48-hour NIHSS (mean 24-hour 8.0, 5.6-10.4 vs 3.1, 2.2-4.1, $p = 0.0002$), were older (mean age 78.1, 73.5-82.7 vs 69.4, 65.7-73.2, $p = 0.007$), more frequently had cancer (15.4% vs 0%, $p = 0.01$), and post-stroke complications (42.3% vs 5.7%, $p < 0.0001$), especially pneumonia (11.5% vs 0%, $p = 0.03$). On multi-variable regression, age ($p = 0.025$), 24-/48-hour NIHSS ($p = 0.015$), post-stroke complications ($p = 0.007$) or cancer (perfect) were independently associated with low-PIV/poor-outcome.

Conclusions: Poor outcome despite low PIV is not explained by discrepancies in imaging modality or outcome assessment, but is associated with older age, 24-/48-hour NIHSS, comorbidities (cancer), and post-stroke complications. Preventing complications may mitigate discrepant outcomes.

Figure 1 – Comparison of representative key variables that differed between patients with small post-treatment infarct volume ($PIV \leq 7\text{mL}$) and poor outcome (“discrepant”, blue, defined as either mRS ≥ 3 or mRS ≥ 4) and those with $PIV \leq 7\text{mL}$ and good outcome (“non-discrepant”, red): (A) age, (B) cancer, (C) 24-hour NIHSS, and (D) post-stroke serious adverse events (SAEs).

References

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