

PROGNOSTIC AND TREATMENT IMPACT OF PENUMBRA IMAGING IN POOLED ANALYSIS OF RANDOMIZED TRIALS OF ENDOVASCULAR STENT THROMBECTOMY

HERMES Collaborators

Highly Effective Reperfusion evaluated in Multiple Endovascular Stroke trials (HERMES)



EXTEND -

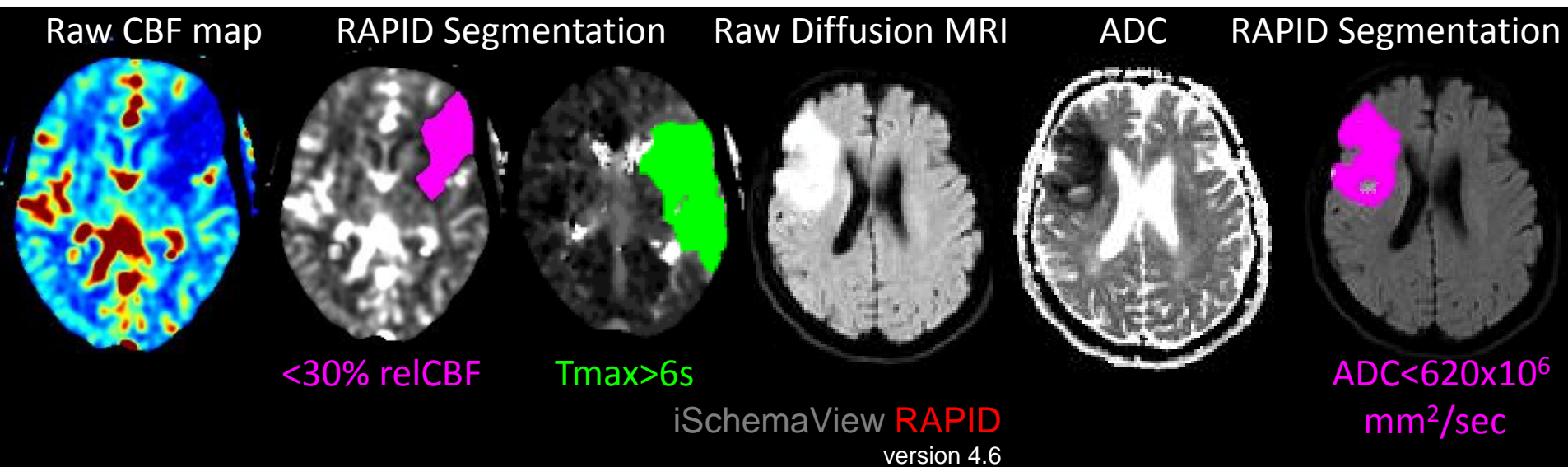


SWIFT PRIME



Methods

- Pooled baseline CT perfusion (n=591) and diffusion MRI (n=309) imaging data from MR CLEAN, EXTEND-IA, ESCAPE, SWIFT PRIME, REVASCAT, THRACE, PISTE
- Analysis performed blinded to all other imaging, treatment allocation and trial of origin
- Raw data reprocessed with RAPID - fully automated, includes motion correction, automated arterial input function selection, threshold application and lesion segmentation
- Ischemic core (irreversibly injured brain) was estimated using:
 - CTP relative cerebral blood flow threshold $<30\%$ of normal brain
 - Diffusion MRI with ADC $<620 \times 10^{-6} \text{ mm}^2/\text{s}$
- Perfusion lesion was defined as $T_{\text{max}} > 6\text{s}$
- Visual review of segmentations to detect and clean artefacts



Results 1

- CTP and MRI estimated ischemic core were both independently associated with functional outcome
 - however in logistic regression for mRS 0-2: CT vs MRI OR 0.47 (0.30, 0.72), $p=0.001$ hence CTP and MRI data not pooled
 - CTP Adjusted OR (CI) per 10mL of core for mRS 0-2
 - Endovascular: 0.79 (0.69-0.90)
 - Control: 0.71 (0.56-0.90) $p_{\text{interaction}} = 0.26$
 - MRI Adjusted OR (CI) per 10mL of core for mRS 0-2
 - Endovascular: 0.88 (0.78, 0.97)
 - Control: 0.87 (0.79, 0.96) $p_{\text{interaction}} = 0.99$
- Utility-weighted mRS: core also independently prognostic but again treatment effect interaction not significant
- Endovascular benefit no longer significant in >70mL subgroup after adjustment for age and NIHSS imbalance, but cannot exclude benefit of endovascular thrombectomy in these patients.
- Mismatch volumes were large with very few patients not meeting mismatch criteria. Mismatch volume was not associated with functional outcome overall or in the subgroup with estimated ischemic core >70mL

Results 2

- The NNT to achieve good outcomes tended to increase with increasing estimated ischemic core volume (but with wide confidence intervals). However, overall point estimates remained at levels that may be worthwhile at higher estimated ischemic core volumes, especially for a beneficial shift in ordinal analysis of mRS.
- Integration of estimated ischemic core volume with age (as a surrogate for frailty) and time to expected reperfusion may be useful in guiding treatment decisions:
 - Age, estimated ischemic core volume and imaging-to-reperfusion time were independent prognostic factors
 - 10mL increase in estimated ischemic core had a similar magnitude effect to a 30 minute delay in imaging to reperfusion time.