Evaluation of Acute Ischemic Stroke Using CT perfusion: RAPID versus Syngo.via

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Purpose

- To compare CT perfusion parameters obtained by RAPID versus Siemens Syngo.via software in the clinical decision of endovascular treatment (EVT), and correlate with post EVT result and final infarct volume

Approach/Methods:

- Thirty-six consecutive patients (18M/18F, mean age 65, range 30-85 years) presenting to our hospital with acute ischemic stroke between August and October 2019 underwent CT perfusion and CT angiography (37 exams).

- CT perfusion raw data were post-processed using both RAPID (iSchemaView) and Syngo.via (Siemens) to estimate infarct core and penumbra volumes.

- The parameters were compared, and the values were used to predict clinical decision according to the DEFUSE III trial. The cases following EVT were further reviewed for angiographic appearance and final infarct volume estimated by diffusion weighted MR images within 24 hours following EVT.

Findings/Discussion:

- The absolute infarct core volume estimated by Syngo.via and RAPID showed fair agreement (Bland-Altman plot, Figure 1) and good correlation, with rho_c=0.875, SE 0.036 (P<0.0001, Lin's concordance correlation, Figure 2). On the other hand the penumbra volume showed more variable differences, although there is a generally good correlation, with rho_c=0.829, SE 0.048 (P<0.0001).

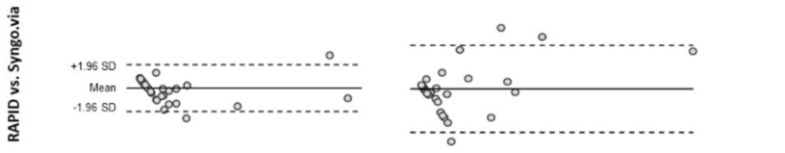


Figure 1: Bland-Altman plot

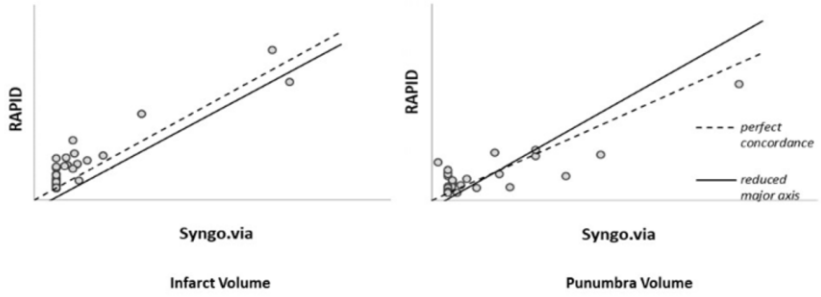
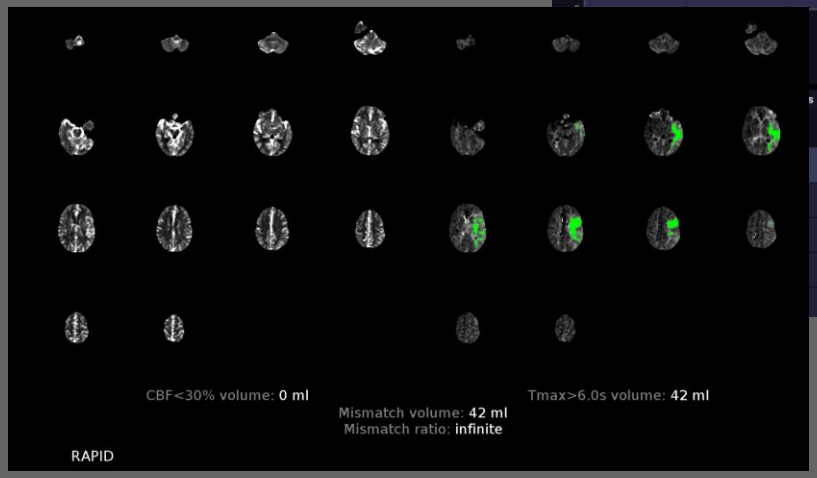


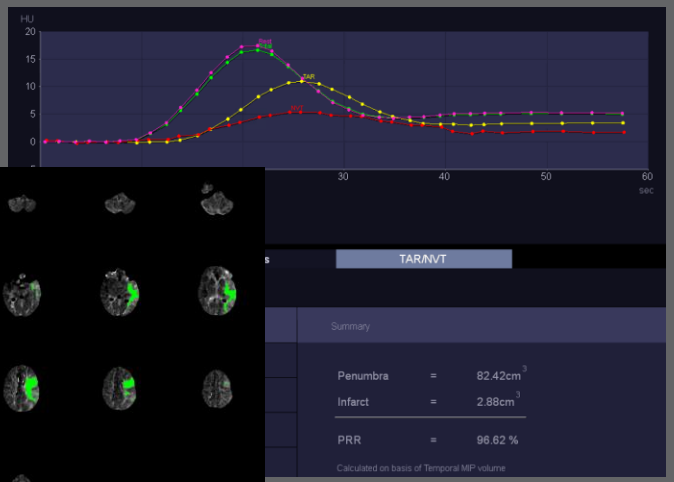
Figure 2: Lin's concordance

Findings/Discussion:

- Among 36 patients, 9 underwent EVT; 5 fulfilled the selection criteria for EVT according to both analyses and 3 would have been recommended for intervention according to RAPID only
- Criteria for EVT includes estimate of core infarct (rCBF <30%) and estimate of perfusion deficit (> 6s)
- Target Profile includes:
  - Core < 70 cc
  - Mismatch Ratio > 1.8
  - Mismatch Volume > 15

RAPID

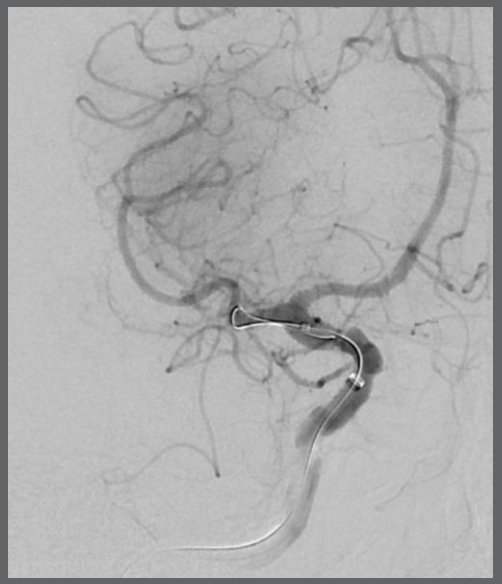




SYNGO.VIA

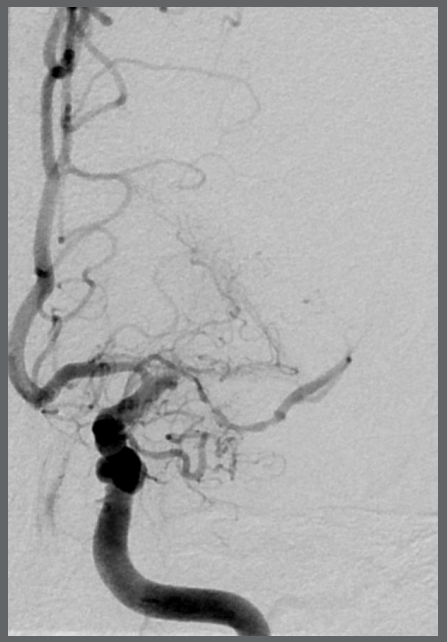
Findings/Discussion

- One case showing a large core volume did not fulfill the selection criteria for EVT, but intervention still proceeded
- Successful thrombectomy with recanalization of the right MCA (TICI 3)

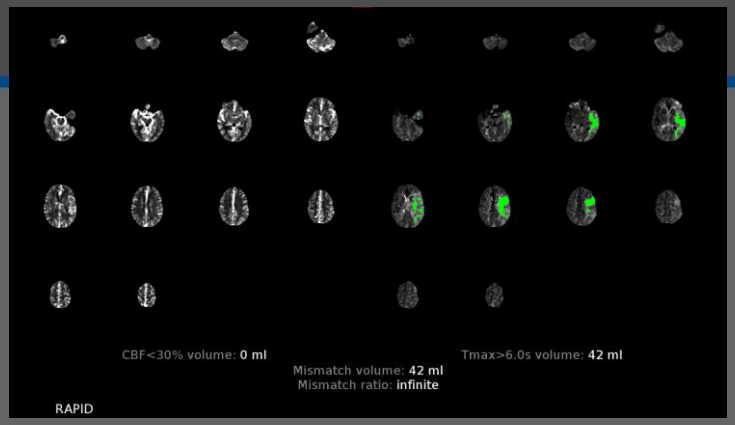


F/u CT

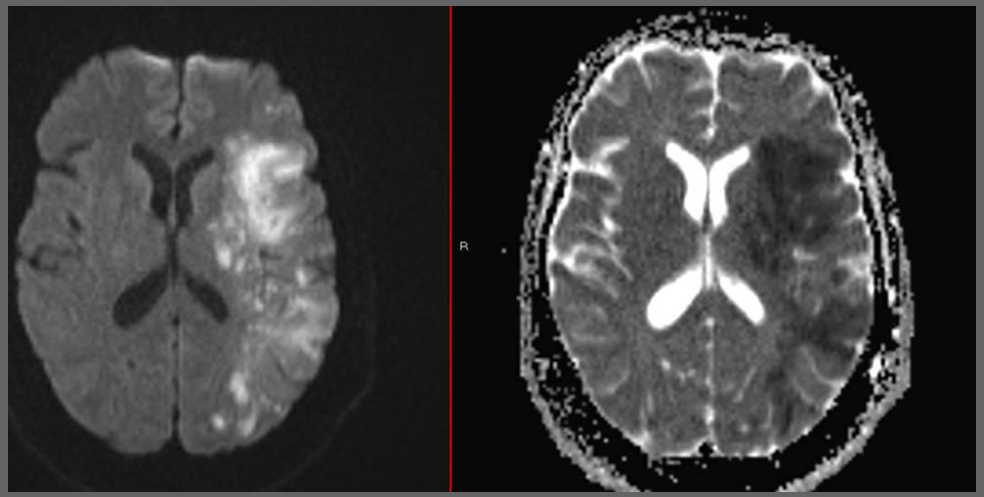
Findings/Discussion



- One case failed EVT (TICI0, procedure aborted after 5 passes)



F/u MRI



Findings/Discussion

- The remaining cases achieved reperfusion TICI 2A (1/9 cases), TICI 2B (2/9) and 3 (5/9). 4/5 cases with TICI 3 showed a stable final infarct volume. However, nearly 50% of the cases (4/9) demonstrated substantial subsequent enlargement of infarct.

TICI Score	
Grade 0	no perfusion
Grade 1	penetration with minimal perfusion
Grade 2	partial perfusion
Grade 2A	only partial filling (less than two-thirds) of the entire vascular territory is visualized
Grade 2B	complete filling of all of the expected vascular territory is visualized but the filling is slower than normal
Grade 3	complete perfusion

Summary/Conclusion:

- The utilization of CT Perfusion and automated analysis software has facilitated clinical decision of endovascular treatment for acute ischemic stroke in an expanded therapeutic window

- While the output perfusion metrics showed variable differences depending on the software used, there was generally good agreement and concordance correlation between the analyses based on RAPID and Syngo.via

- Among the limited cases triaged to EVT intervention, arrest of infarct volume growth was best achieved following successful reperfusion. Further study is warranted to determine the predictors of infarct growth despite reperfusion.

Reference:

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