CompariSon of Manual Aspiration with Rheolytic Thrombectomy in Acute Myocardial Infarction: the SMART Primary PCI Trial

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Potential conflicts of interest

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☐ **I do not have any potential conflict of interest**

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Sponsor: Investigators

Background

- *Manual aspiration thrombectomy (MAT) is ineffective in 40% of patients with acute myocardial infarction (AMI) while rheolytic thrombectomy (RT) seems to be more effective in restoring a normal flow and has a more predictable effect also in unfavourable settings (tortuosity, calcification, giant thrombus).*

- *No data exist regarding the comparison between MAT and RT using the optical coherence tomography (OCT) to assess residual thrombus burden after thrombectomy.*

Aim

- **The SMART trial compared by OCT the efficacy of RT and MAT in thrombus removal before infarct artery stenting in patients with AMI.**

- **The study was powered to demonstrate a decrease of the number quadrants containing thrombus from an an expected 55±20% in the manual aspiration group to 40±20% in the RT group (statistical power 91%, based on a maximum sample size of 80 patients randomized in a 1:1 allocation ratio, experimental type I error of 0.05 using a 2-sided hypothesis test).**

- **OCT core lab CRF, New York, NY**

Methods

- **Eighty AMI patients (≤ 6 hours from symptom onset) were randomly allocated (1:1) to RT or MAT.**

- **Primary end point: residual thrombus burden defined as number of coronary quadrants containing thrombus by OCT.**

- **Key secondary end points: post-thrombectomy TIMI thrombus grade, TIMI flow grade, TIMI blush grade, ST-segment elevation resolution.**

Baseline Characteristics

	RT (n = 40)	MAT (n = 40)	P value
Age, years	65±11	64±12	0.698
Male gender	32 (80)	30 (75)	0.592
Smoker	20 (50)	15 (38)	0.260
Hypertension	24 (60)	22 (55)	0.651
Diabetes mellitus	3 (8)	8 (20)	0.105
Anterior infarct location	21 (52)	18 (45)	0.502
Cardiogenic shock	3 (8)	1 (3)	0.305
LV EF, %	43±8	44±11	0.647
Pre-PCI TIMI flow grade 0 - 1	32 (80)	33 (83)	0.775
Number of diseases vessels	1.7±0.7	1.6±0.7	0.529
RVD, mm	3.3±0.5	3.3±0.5	0.891
Pre-PCI thrombus grade	4.27±1.01	4.20±1.04	0.745

Procedural Characteristics and Angiographic and EKG Results

	RT (n =40)	MAT (n = 40)	P value
Lesion crossing failure	0	3 (8)	0.241
Post-Thrombectomy TIMI grade flow	2.8±0.4	2.5±0.7	0.004
Post-Thrombectomy TIMI grade 3 flow	35 (87)	23 (57)	0.003
Post-Thrombectomy TIMI thrombus grade	1.6±0.9	2.4±1.2	0.001
Direct stenting	33 (83)	30 (75)	0.412
Final TIMI flow grade 3	38 (95)	32 (80)	0.043
Final TIMI blush Grade 3	29 (72)	20 (50)	0.039
Early ST-segment resolution	37 (92)	31 (77)	0.060

OCT Results:
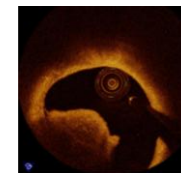
All but 1 patient had residual thrombus after MAT or RT.

	RT (n = 38)	MAT (n = 38)	P value
Number of coronary quadrants containing thrombus	53 [31-83]	65 [33-111]	0.083
Pts with coronary quadrants containing thrombus > the median value	14 (37)	23 (60)	0.039
Quadrants with white thrombus, n	8 [0-29]	8 [0-48]	0.783
Quadrants with red thrombus, n	0 [0-21]	0 [0-17]	0.934
Quadrants with mixed thrombus, n	18 [0-59]	21 [0-59]	0.801
Maximal thrombus area, mm^2	1.7 [0.7-2.6]	2.0 [1.1-3.5]	0.092

Conclusions

➢ *MAT or RT allow only incomplete removal of thrombus.*

➢ *RT as compared to MAT is more effective in thrombus removal and is associated with a better myocardial reperfusion.*