102. The Association of Activated Thromboplastin Time Based Clot Waveform Analysis With Acute Myocardial Infarction

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Body

Background: Clot waveform analysis (CWA) is a plasma-based global haemostatic assay which evaluates the kinetics of fibrin clot formation during routine coagulation tests such as activated partial thromboplastin time (aPTT). Elevated aPTT-based CWA parameters have recently been shown to be associated with hypercoagulability in venous thromboembolism and COVID-19 associated coagulopathy, but its role in arterial thrombotic disease is uncertain. This study is the first to explore the application of aPTT-based CWA in assessing the haemostatic profile in arterial thrombotic disease, specifically in acute myocardial infarction (AMI) and its clinical outcomes.

Methods: This is a retrospective case-control study. Patients who presented with AMI requiring emergency cardiac catheterisation from April to December 2018 who had a valid pre-procedure aPTT test were included. Patients on anticoagulation or fibrinolytic treatment, with fever on presentation, active cancer, or ongoing hormonal or chemotherapy prior to collection of aPTT were excluded. The control group were well patients undergoing elective orthopaedic or urologic operations with pre-operative aPTT using the same exclusion criteria. The aPTT and CWA parameters min1, min2 and max2 (denoting maximum velocity, maximum acceleration and minimum acceleration of the clot formation kinetics respectively) of AMI patients were compared against control patients.

Results: 214 AMI patients and 109 controls were included (Table 1). 183 patients with ST elevation myocardial infarction (STEMI) and 31 with high-risk non-STEMI were included with 189 (88.3%) undergoing coronary angioplasty. 14 mortalities were observed in the AMI group.. Compared to controls, AMI patients had significantly shorter aPTT (Table 2a; $p=0.002$) and significantly higher min1, min2 and max 2 values (Table 2; all $p<0.001$). Only min1 showed significant positive correlation to in-hospital mortality (Table 2; $p=0.043$).

Conclusion: Raised aPTT-based CWA parameters are significantly associated with AMI and a longer min1 value was correlated with in-hospital mortality. Future studies are warranted to further characterise the clinical utility of CWA in this area.

	AMI patients (n = 214)	Patient control (n = 109)	P-value
Mean age +/- SD	60.4 +/- 11.0	65.1 +/- 10.8	<0.001
Gender, n (proportion)			
- Male	186 (0.87)	41 (0.38)	<0.001
- Female	28 (0.13)	70 (0.62)	
Race, n (proportion)			
- Chinese	135 (0.63)	95 (0.87)	<0.001
- Non-Chinese	79 (0.37)	14 (0.13)	
Comorbidities and Cardiovascular Risk Factors, n (proportion)			
- Diabetes Mellitus	81 (0.38)	18 (0.17)	<0.001
- Hypertension	120 (0.56)	66 (0.61)	0.476
- Dyslipidaemia	117 (0.55)	64 (0.59)	0.554
- Ex or current smoker	85 (0.40)	21 (0.19)	<0.001
- BMI (kg/m^2)	25.4 +/- 6.8	26.5 +/- 4.9	0.149
- Prior IHD	33 (0.15)	9 (0.08)	0.081
- ESRF on dialysis	5 (0.02)	0	0.172
- Prior cerebrovascular disease	12 (0.06)	2 (0.02)	0.152
- Peripheral artery disease	7 (0.03)	1 (0.01)	0.275
- Chronic lung disease	2 (0.01)	3 (0.03)	0.338
- Atrial fibrillation	5 (0.02)	0	0.173
Myocardial infarction diagnosis, n (proportion)			
- ST-elevated myocardial infarction (STEMI)		183 (0.86)	
- Non-ST-elevated myocardial infarction (NSTEMI)		31 (0.14)	
- Underwent coronary angioplasty		189 (0.88)	

Table 1: Demographic and clinical characteristics of the study and control groups.

	Study Group (n = 214)	Control Group (n = 109)	p-value (Before adjustment)	p-value (Adjusted for age, gender, race, diabetes and smoking)	Spearman's R for in-hospital mortality (n=14)	p-value
aPTT, s	26.70 +/- 3.30	27.90 +/- 1.70	<0.001	0.002	-0.008	0.904
Min1, %/s	6.11 +/- 1.40	5.58 +/- 1.14	<0.001	<0.001	0.138	0.043
Min2, %/s^2	0.98 +/- 0.23	0.90 +/- 0.19	<0.001	<0.001	0.114	0.096
Max2, %/s^2	0.81 +/- 0.20	0.74 +/- 0.16	0.001	<0.001	0.100	0.143

Table 2. Comparison of activated partial thromboplastin time (APTT) and clot waveform analysis parameters between study and control groups and their correlation with in-hospital mortality.

Clinical Implications: explore the role of clot waveform analysis, a plasma-based global hemostatic assay, in arterial thombotic disease, particularly acute myocardial infarction and its outcomes.