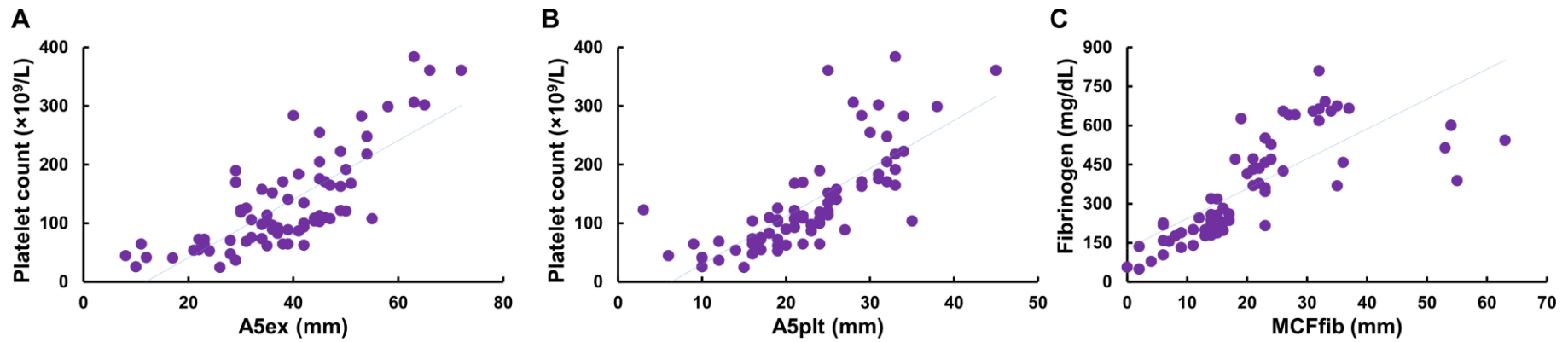


Prediction of Mid-term Platelet Transfusion in Stable Trauma Patients Using Rotational Thromboelastometry

Ha Jin Lim, M.D.¹, Hyunseok Jang, M.D., Ph.D.², Naa Lee, M.D.², Euisung Jeong, M.D.², Yunchul Park, M.D.², Younggoun Jo, M.D., Ph.D.², Jungchul Kim, M.D., Ph.D.², Young Eun Lee, Ph.D.³, Hyun-Jung Choi, M.D., Ph.D.¹, Seung-Jung Kee, M.D., Ph.D.¹, Jong Hee Shin, M.D., Ph.D.¹, and Myung Geun Shin, M.D., Ph.D.³

¹Department of Laboratory Medicine, Chonnam National University Medical School and Chonnam National University Hospital, Gwangju, Korea; ²Division of Trauma, Department of Surgery, Chonnam National University Medical School and Chonnam National University Hospital, Gwangju, Korea; ³Department of Laboratory Medicine, Chonnam National University Medical School and Chonnam National University Hwasun Hospital, Hwasun, Korea



Supplemental Data Fig. S1. Comparison between ROTEM parameters and conventional coagulation tests. (A) EXTEM (A5ex) vs. platelet count, (B) PLTEM (A5plt) vs. platelet count, and (C) FIBTEM (MCFfib) vs. fibrinogen. See Table 1 for the abbreviations related to ROTEM parameters and the conventional coagulation tests.

Supplemental Data Table S1. Performance metrics in predicting mid-term platelet transfusion using ROTEM parameters and conventional coagulation tests

Coagulation tests	Predicting PC transfusion more than 12 units during 5 days					
	cutoff	AUC (95% CI)	Sens (%)	Spec (%)	PPV (%)	NPV (%)
EXTEM parameters						
A5ex (mm)	≤35	0.896 (0.823 – 0.968)	85.0	80.6	58.6	94.3
A10ex (mm)	≤45	0.891 (0.816 – 0.966)	85.0	82.3	60.7	94.4
A15ex (mm)	≤50	0.892 (0.818 – 0.966)	85.0	82.3	60.7	94.4
MCFex (mm)	≤53	0.878 (0.799 – 0.957)	75.0	87.1	65.2	91.5
FIBTEM parameters						
A5fib (mm)	≤15	0.922 (0.866 – 0.978)	100.0	71.0	52.6	100.0
A10fib (mm)	≤16	0.919 (0.862 – 0.976)	100.0	71.0	52.6	100.0
A15fib (mm)	≤17	0.923 (0.867 – 0.979)	100.0	71.0	52.6	100.0
MCFfib (mm)	≤18	0.915 (0.855 – 0.975)	100.0	69.4	51.3	100.0
PLTEM parameters						
A5plt (mm)	≤19	0.735 (0.600 – 0.870)	65.0	79.0	50.0	87.5
A10plt (mm)	≤25	0.695 (0.548 – 0.841)*	50.0	90.3	62.5	84.8
A15plt (mm)	≤32	0.649 (0.497 – 0.801)*	60.0	69.4	38.7	84.3
MCFplt (mm)	≤36	0.551 (0.396 – 0.706)*,†	50.0	64.5	31.2	80.0
Conventional coagulation tests						
Platelet count ($\times 10^9/L$)	≤76	0.784 (0.667 – 0.901)	65.0	85.5	59.1	88.3
PFA-100 (collagen/epinephrine) closure time per platelet count ($\text{sec} \cdot 10^{-9} \cdot L$)	>2.19	0.788 (0.646 – 0.931)	71.4	81.1	50.0	91.5
PT (sec)	>13.6	0.719 (0.585 – 0.854)	75.0	74.1	50.0	89.6
aPTT (sec)	>32.4	0.681 (0.546 – 0.816)	55.0	82.8	52.4	84.2

Fibrinogen (mg/dL)	≤249.3	0.881 (0.797 – 0.964)	89.5	78.4	60.7	95.2
FDP (μg/mL)	>89.6	0.845 (0.695 – 0.994)	75.0	94.6	81.8	92.1
D-dimer (mg/L FEU)	>22.74	0.817 (0.696 – 0.939)	63.2	93.9	80.0	86.8
Antithrombin III (%)	≤67	0.804 (0.678 – 0.930)	66.7	85.7	58.8	89.4

AUCs > 0.8 are highlighted in bold. ROTEM parameters with P < 0.05 (DeLong's test) are indicated by an asterisk (*) (in the comparison with fibrinogen) or dagger (†) (in the comparison with FDPs, D-dimer, and antithrombin III).

Abbreviations: AUC, area under the ROC curve; PPV, positive predictive value; NPV, negative predictive value; PC, platelet concentrate;

ROTEM, rotational thromboelastometry; CI, confidence interval; sens, sensitivity; spec, specificity. See Table 1 for definitions of the abbreviations related to the ROTEM and conventional coagulation tests.

Supplemental Data Table S2. Transfused PC units per indication for group B

Indication	Transfused PC units according to time points after the ROTEM test, N (%)				Total
	0 – 24 hrs	24 – 48 hrs	48 – 72 hrs	72 hrs – Five days	
Initial resuscitation (massive transfusion)	8 (4.5)	0 (0)	0 (0)	0 (0)	8 (1.6)
Prevention	151 (85.3)	123 (100)	109 (100)	114 (100)	497 (95.0)
Treatment	18 (10.2)	0 (0)	0 (0)	0 (0)	18 (3.4)
Total	177 (100)	123 (100)	109 (100)	114 (100)	523 (100)

Abbreviations: PC, platelet concentrate; ROTEM, rotational thromboelastometry

Supplemental Data Table S3. Transfused PRC and FFP units during 24 hrs and five days between groups

Transfused blood product	Group A: No mid-term platelet transfusion (N = 51)	Group B: Mid-term platelet transfusion (N = 31)	<i>P</i>
PRC for 24 hrs (units)	0.3 ± 0.8	1.9 ± 2.2	< 0.001
FFP for 24 hrs (units)	0.2 ± 0.6	1.6 ± 2.3	< 0.001
PRC for five days (units)	0.7 ± 1.7	4.3 ± 3.2	< 0.001
FFP for five days (units)	0.3 ± 1.0	3.0 ± 4.0	< 0.001

Values are given as mean ± SD.

Abbreviations: PRC, packed red blood cell; FFP, fresh frozen plasma

Supplemental Data Table S4. Performance metrics in predicting platelet transfusion during 24 hrs using ROTEM parameters and conventional coagulation tests

Coagulation tests	Predicting PC transfusion of more than 4 units during 24 hrs					
	Cutoff	AUC (95% CI)	Sens (%)	Spec (%)	PPV (%)	NPV (%)
EXTEM parameters						
A5ex (mm)	≤36	0.854 (0.766 – 0.942)*	77.3	75.0	53.1	90.0
A10ex (mm)	≤45	0.852 (0.763 – 0.940)	77.3	81.7	60.7	90.7
A15ex (mm)	≤50	0.850 (0.760 – 0.940)	77.3	81.7	60.7	90.7
MCFex (mm)	≤54	0.841 (0.744 – 0.938)	72.7	86.7	66.7	89.7
FIBTEM parameters						
A5fib (mm)	≤15	0.835 (0.737 – 0.932)	86.4	68.3	50.0	93.2
A10fib (mm)	≤13	0.833 (0.735 – 0.931)	77.3	81.7	60.7	90.7
A15fib (mm)	≤14	0.828 (0.729 – 0.927)	77.3	78.3	56.7	90.4
MCFfib (mm)	≤15	0.824 (0.723 – 0.925)	77.3	76.7	54.8	90.2
PLTEM parameters						
A5plt (mm)	≤17	0.769 (0.651 – 0.887) [†]	54.5	90.0	66.7	84.4
A10plt (mm)	≤25	0.724 (0.595 – 0.853) [†]	50.0	91.7	68.8	83.3
A15plt (mm)	≤31	0.689 (0.557 – 0.820) ^{†,‡}	59.1	75.0	46.4	83.3
MCFplt (mm)	≤37	0.623 (0.488 – 0.758) ^{†,‡}	68.2	61.7	39.5	84.1
Conventional coagulation tests						
Platelet count (×10 ⁹ /L)	≤108	0.876 (0.796 – 0.957)	90.9	70.0	52.6	95.5
PFA-100 (collagen/epinephrine) closure time per platelet count (sec·10 ⁻⁹ ·L)	>2.19	0.869 (0.774 – 0.964)	71.2	86.3	65.0	93.6
PT (sec)	≤17.5	0.420 (0.438 – 0.722)	95.5	14.3	30.4	88.9
aPTT (sec)	>32.9	0.592 (0.446 – 0.737)	40.9	82.1	47.4	78.0
Fibrinogen (mg/dL)	≤257.4	0.752 (0.620 – 0.884)	76.2	73.5	55.2	87.8
FDP (μg/mL)	>106.5	0.673 (0.484 – 0.863)	45.5	89.5	55.6	85.0
D-dimer (mg/L FEU)	>4.61	0.699 (0.561 – 0.836)	89.5	51.0	41.5	92.6
Antithrombin III (%)	≤90.1	0.715 (0.588 – 0.842)	94.7	51.1	45.0	95.8

*AUCs above 0.800 are highlighted in bold.

†ROTEM parameters with $P < 0.05$ in the comparison of platelet count using DeLong's test.

‡ROTEM parameters with $P < 0.05$ in the comparison of PFA-100 (collagen/epinephrine) closure time per platelet count using DeLong's test.

Abbreviations: AUC, area under the ROC curve; PPV, positive predictive value; NPV, negative predictive value; ROTEM, rotational thromboelastometry; PC, platelet concentrate; CI, confidence interval; sens, sensitivity; spec, specificity. See Table 1 for the abbreviations related to the column of coagulation tests