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**TISSUE FACTOR-ACTIVATED THROMBOELASTOGRAMS IN CHILDREN: BASELINE VALUES, COMPARISONS, AND CORRELATIONS**

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**Introduction:** The addition of exogenous tissue factor (TF) to blood activates the coagulation system and can be used to allow the rapid attainment of thromboelastograph (TEG) parameters of clot strength (a angle [a] and maximum amplitude [MA]). Since these parameters correlate with postoperative blood loss in children and adults undergoing cardiac surgery, their rapid attainment is very important in making TEG useful as a point-of-care coagulation monitor in cardiac operating rooms. However, TF activation increases clot strength and, therefore, augments a and MA values compared to those obtained from TEGs on unactivated (native) blood. (1,2) Therefore, if one chooses to use TF-activated TEG data, he must be cognizant of an appropriate set of baseline values. Since previous work has defined native TEG values in age group subsets of children under 2 years old and demonstrated differences among these subsets, (3) we sought to define TF-activated TEG parameters in these same subsets of children.

**Methods:** After IRB approval, 250 children scheduled for elective cardiac surgery and not taking medications with effects on the coagulation system were enrolled to obtain 50 children in each of 5 age groups: <1 month (Group I), 1-3 months (Group II), 3-6 months (Group III), 6-12 months (Group IV), and 12-24 months (Group V). TF-activated TEGs were obtained in the operating room after line placement by mixing 350 mL of whole blood with 10 mL of 1% TF in preheated disposable cups of a Thrombelastograph Coagulation Analyzer (Haemoscope Corp., Skokie, IL). Four parameters were manually measured from the TEG tracings: R, K, a, and MA. Two indices were calculated using these measured parameters: elastic shear modulus [ $G = (5000 \cdot MA) / (100 - MA)$ ] and coagulation index [ $CI = - (0.1227)R + (0.0092)K + (0.1665)MA - (0.0241)a - 5.0020$ ]

(Thrombelastograph Operations Manual and CTEG User's Guide). ANOVA and two-sided t-tests assuming unequal variance with Bonferroni correction for multiple comparisons were used to compare groups. Linear regression analysis was used to determine correlations.

**Results:** Results are compiled in the Table and expressed as mean  $\pm$  SD. No differences were seen among the age groups in time to initiation of clot formation after activation with TF (R, K, and R + K). The a angle of group II was significantly greater than groups I, IV, and V and the MA of group II was significantly larger than that of all other groups. For both calculated indices (G and CI), group II's values were significantly greater than those of groups I, IV, and V. Interestingly, in each group, the a parameter correlated significantly with the MA value of that group ( $p < 0.0001$  in each group).

**Discussion:** The use of TF effectively activates clotting even in the youngest of infants. In agreement with previous data from unactivated TEGs, (3) infants 1 to 3 months of age demonstrate a more coagulable state by TF-activated TEG than do other infants or children between 12 and 24 months of age. The correlation of TF-activated a and MA parameters is unique to this TEG modification and indicates that clot strength can be estimated even earlier if blood is activated with TF prior to beginning the TEG. A set of baseline TF-activated TEG values has been defined for subsets of children less than two years of age.

**References:**

- 1) J Lab Clin Med 1997;130:401-11
- 2) Anesth Analg 2000;90:1324-30
- 3) Anesth Analg 1997;84:745-8

	$\alpha$ (°)	MA (mm)	G (dynes/cm <sup>2</sup> )	CI
<1 month (I)	63.0 $\pm$ 13.6	65.9 $\pm$ 7.8	10,441 $\pm$ 3663	4.18 $\pm$ 1.35
1-3 months (II)	72.0 $\pm$ 8.0*	72.7 $\pm$ 5.4#	14,158 $\pm$ 4393*	5.18 $\pm$ 0.93*
3-6 months (III)	68.6 $\pm$ 9.8	69.0 $\pm$ 7.2	11,950 $\pm$ 3710	4.63 $\pm$ 1.29
6-12 months (IV)	64.3 $\pm$ 11.5	67.2 $\pm$ 8.1	11,166 $\pm$ 4068	4.34 $\pm$ 1.41
12-24 months (V)	66.2 $\pm$ 9.5	68.3 $\pm$ 6.3	11,427 $\pm$ 3601	4.66 $\pm$ 0.88

\*  $p < 0.05$  vs groups I, IV, and V; #  $p < 0.05$  vs groups I, III, IV, and V