Risk factors for coagulopathy after Stanford type A acute aortic dissection repair

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BACKGROUND

The Stanford type A acute aortic dissection (AAD) carries a high risk of mortality and morbidity, and patients undergoing AAD surgery often bleed excessively and require blood products and transfusions

OBJECTIVE

The goal of this study was to identify the risk factors for coagulopathy after ATAAD repair

METHODS

This trial was retrospective analysis, and 95 subjects undergoing Stanford type A AAD repair in Beijing Anzhen hospital from January 2013 to December 2014 were enrolled. Patients with TEG-CI ≤ -3 after surgery were allocated to coagulopathy group (n=17, average age 48.7 years), whereas patients with TEG-CI > -3 after surgery were allocated to control group (n=78, average age 46.6 years). Multivariate analysis was used to identify risk factors for coagulopathy after surgery

RESULTS

perioperative period cruor /fibrinolysis

	Control group	Low coagulate group	P-value
number	78	17	
Preoperation			
TEG-R (min)	4.90 (4.10-5.60)	4.90 (4.40-7.00)	0.301
TEG-K (min)	1.40 (1.20-1.67)	2.10 (1.30-2.30)	0.012
TEG-ANGLE (°)	69.80 (66.82-72.42)	61.10 (58.20-71.20)	0.013
TEG-MA(mm)	66.40 (61.75-71.58)	59.00 (50.60-65.70)	0.009
TEG-CI	1.90 (0.50, 2.98)	0.10 (-1.10, 1.90)	0.011
PT(s)	12.54 $\pm$ 1.16	12.78 $\pm$ 1.62	0.478
PT%	81.40 $\pm$ 13.37	79.18 $\pm$ 14.62	0.543
APTT(s)	31.06 $\pm$ 6.88	32.15 $\pm$ 7.25	0.560
FBG(g/L)	3.78 $\pm$ 1.28	3.16 $\pm$ 1.29	0.070
FDP(mg/L)	9.40 (6.12-14.23)	19.10 (11.10-25.80)	0.003
Postoperation			
TEG-R (min)	6.20 (5.05- 7.20)**	9.50 (7.00-13.20)**	<0.001
TEG-K (min)	1.60 (1.30-1.80)*	3.20 (2.70-4.70)*	<0.001
TEG-ANGLE (°)	66.85 (64.65-70.00)*	48.80 (38.30-53.30)**	<0.001
TEG-MA(mm)	62.00 (57.73-65.72)**	46.60 (44.70-51.40)**	<0.001
TEG-CI	0.00 (-0.98, 1.17)**	-4.40 (-8.60, -3.80)**	<0.001
PT(s)	14.05 $\pm$ 1.98**	14.89 $\pm$ 2.34**	0.130
PT%	73.08 $\pm$ 33.73*	62.94 $\pm$ 21.19*	0.252
APTT(s)	33.99 $\pm$ 5.19**	40.84 $\pm$ 12.31**	<0.001
FBG(g/L)	3.06 $\pm$ 1.01**	2.29 $\pm$ 0.56**	0.003
FDP(mg/L)	15.45 (8.35-20.33)**	22.90 (13.20-29.60)	0.062

*p<0.05, **, p<0.01

Single factor analysisSingle & Logistic Multifactor analysisFactors of postoperation affecting coagulation dysfunction

Exposure	Univariate OR (95% CI) P	Multivariate OR (95% CI) P	
		Uncorrected model	Orthodontic model
APTT of The end of the operation(s)	0.019 (0.009, 0.029) 0.0004	0.012 (0.003, 0.022) 0.0128	0.011 (0.001, 0.021) 0.0355
Amount of erythrocyte transfusion during operation (u)	0.041 (0.012, 0.071) 0.0070	0.021 (-0.010, 0.053) 0.1822	0.023 (-0.008, 0.055) 0.1457
FDP of The end of the operation(mg/L)	0.005 (0.001, 0.008) 0.0059	0.004 (0.001, 0.007) 0.0215	0.004 (0.001, 0.007) 0.0220
Ascending aorta blocking time (min)	0.002 (0.000, 0.004) 0.0337	0.000 (-0.002, 0.002) 0.9062	0.000 (-0.002, 0.002) 0.9818
FBG of The end of the operation(g/L)	-0.119 (-0.195, -0.042) 0.0033	-0.047 (-0.121, 0.028) 0.2230	-0.043 (-0.117, 0.031) 0.2600
GLU of The end of the operation (mg/dL)	-0.001 (-0.003, 0.000) 0.0441	-0.001 (-0.002, 0.001) 0.3162	-0.001 (-0.002, 0.001) 0.3194
PLC of The end of the operation (10 ⁹ /L)	-0.003 (-0.005, -0.002) 0.0001	-0.002 (-0.003, 0.000) 0.0261	-0.002 (-0.003, 0.000) 0.0495

Orthodontic variable: TEG-CI

RESULTS

Smooth curve according to PLC of The end of the operation & Postoperative coagulation dysfunction

Analysis of threshold effect : PLC of The end of the operation & Postoperative coagulation dysfunction

Outcome:	coagulation disorders
Model I	
A linear regression coefficient	-0.003 (-0.005, -0.002) 0.0001
Model II	
break point (K)	137
< K regression coefficient 1	-0.005 (-0.008, -0.003) <0.0001
> K regression coefficient 2	0.000 (-0.003, 0.003) 0.9378
Difference of regression coefficient 2& 1	0.006 (0.001, 0.010) 0.0297
The predicted value of Y at the folding point	-0.009 (-0.134, 0.116)
Log likelihood ratio test	0.027

CONCLUSIONS

1 Postoperative coagulopathy could be related to the clinical and experimental variables

2 In a representative sample of Chinese adults undergoing Stanford type-A AAD surgery, APTT, FDP and platelet count at the end of surgery were independent factors associated with postoperative coagulopathy

3 Adding haemostatic, such as fibrinogen and prothrombinase complex, is good for improving the recovery of coagulation function to reduce bleeding and postoperative blood transfusion, as well as adding platelet, plasma and other coagulation factors after AAD surgery