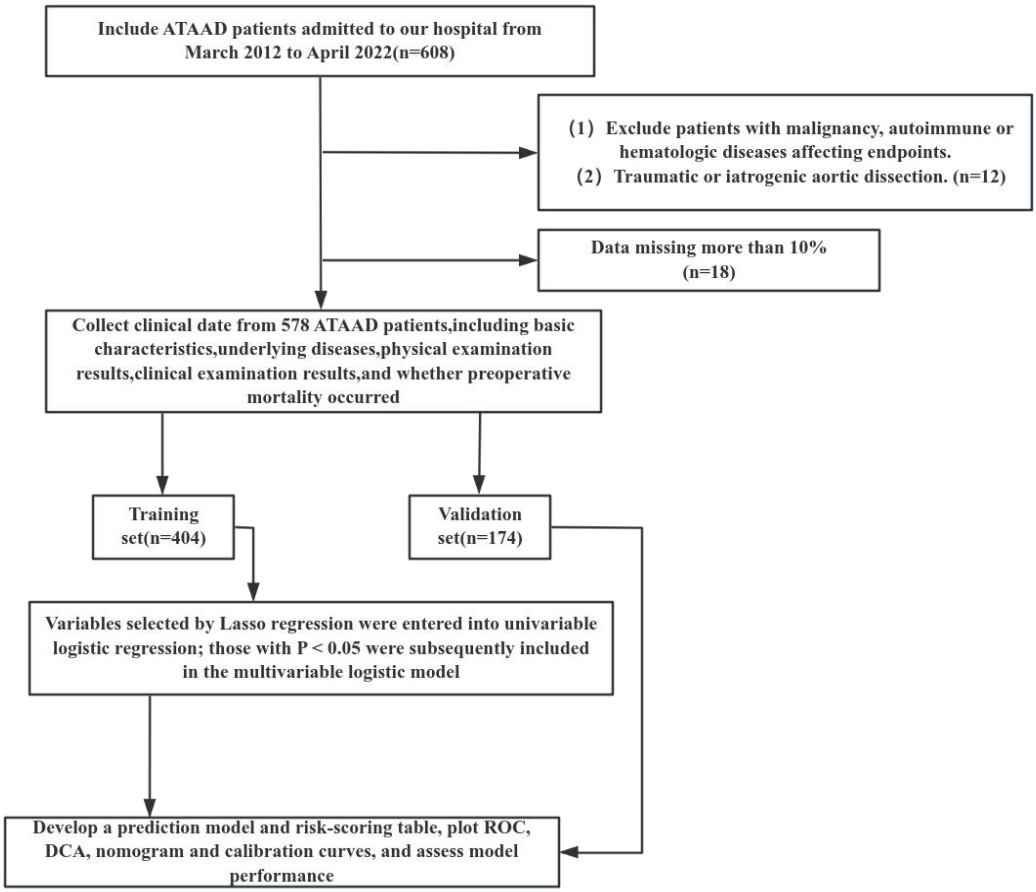
Supplementary Materials

Supplementary Fig. 1 Flowchart outlining the screening process for study subjects.
Supplementary Table 1 Comparison of raw data between the training set and validation set for all ATAAD patients
Supplementary Table 2 Dummy variable assignment table for each variable
Supplementary Table 3 Comparison of data after assignment between training set and validation set for all enrolled ATAAD patients
Supplementary Table 4 Comparison of raw data between the survival and preoperative death groups in the training set.
Supplementary Table 5 Comparison of coded variables between the survival and preoperative death groups in the training set.
Supplementary Table 6 Univariate logistic regression results in the training set.
Supplementary Table 7 Multivariate logistic regression results in the training set.
Supplementary Table 8 Generalized variance inflation factor (GVIF) values for model variables.
Supplementary Table 9 Scoring scheme for the ATAAD Preoperative Mortality Risk Score.
Supplementary Table 10 Mortality and survival rates by risk score in the training and validation sets.



Supplementary Fig. 1. Flowchart outlining the screening process for study subjects.

Supplementary Table 1 Comparison of raw data between the training set and validation set for all ATAAD patients

Variables	Total (n=578)	Validation set (n=174)	Training set (n=404)	$Z/\chi^2/-$	*P*
Heart rate	84.00 (73.00,96.00)	83.00 (72.00,94.00)	84.00 (74.00,97.00)	-1.12	0.264
Pulse Pressure Difference	60.00 (44.00,72.75)	57.50 (43.00,72.00)	60.00 (45.00,73.00)	-0.54	0.588
pH	7.41 (7.38,7.45)	7.41 (7.38,7.45)	7.41 (7.38,7.45)	-0.06	0.949
PaO2	85.00 (72.00,109.00)	80.00 (71.00,102.75)	86.50 (72.00,110.25)	-1.77	0.077
Lactate	1.70 (1.20,2.80)	1.70 (1.30,2.70)	1.70 (1.20,2.90)	-0.16	0.870
Hemoglobin	139.00 (128.00,149.00)	140.50 (129.25,150.75)	138.00 (127.00,148.00)	-1.67	0.096
Neutrophil count	10.66 (7.91,13.88)	10.55 (8.17,13.59)	10.71 (7.66,13.93)	-0.18	0.858
IL-6	69.37 (36.21,123.12)	66.80 (35.55,115.98)	69.72 (36.30,124.36)	-0.57	0.567
Urea	6.43 (5.10,8.50)	6.38 (5.10,8.20)	6.46 (5.09,8.60)	-0.01	0.989
Creatinine	78.03 (64.65,109.25)	78.30 (67.11,107.65)	78.03 (63.39,109.61)	-0.32	0.746

PT	12.70 (11.90,13.80)	12.70 (11.80,13.90)	12.70 (12.00,13.80)	-0.26	0.793
INR	1.10 (1.03,1.19)	1.10 (1.02,1.20)	1.10 (1.03,1.18)	-0.46	0.646
Cholesterol	3.83 (3.35,4.41)	3.76 (3.33,4.36)	3.85 (3.37,4.43)	-1.03	0.304
NT-proBNP	504.82 (207.25,1242.50)	485.57 (187.48,1324.27)	512.82 (217.07,1146.68)	-0.42	0.678
APACH II score	9.00 (6.00,13.00)	10.00 (7.00,12.00)	9.00 (6.00,13.00)	-1.06	0.291
EuroSCORE	4.00 (3.00,6.00)	4.00 (3.00,6.00)	4.00 (3.00,6.00)	-0.80	0.424
Death				2.54	0.111
No	476(82.35)	150(86.21)	326(80.69)		
Yes	102(17.65)	24(13.79)	78(19.31)		
Syncope				0.00	0.990
No	548(94.81)	165(94.83)	383(94.80)		
Yes	30(5.19)	9(5.17)	21(5.20)		
Coma				0.50	0.479
No	566(97.92)	172(98.85)	394(97.52)		
Yes	12(2.08)	2(1.15)	10(2.48)		
Weak pulse				1.78	0.183
No	571(98.79)	174(100.00)	397(98.27)		
Yes	7(1.21)	0(0.00)	7(1.73)		
Limb ischemia				0.04	0.833
No	553(95.67)	166(95.40)	387(95.79)		
Yes	25(4.33)	8(4.60)	17(4.21)		
Acute renal failure				0.01	0.919
No	554(95.85)	167(95.98)	387(95.79)		
Yes	24(4.15)	7(4.02)	17(4.21)		
Intimal tear				0.90	0.825
aortic arch	134(23.18)	37(21.26)	97(24.01)		
Ascending aorta	343(59.34)	107(61.49)	236(58.42)		
Root of aorta	84(14.53)	24(13.79)	60(14.85)		
Retrograde dissection	17(2.94)	6(3.45)	11(2.72)		
Pericardial effusion				1.77	0.412
No	455(78.72)	142(81.61)	313(77.48)		
Mild	98(16.96)	24(13.79)	74(18.32)		
Moderate to severe	25(4.33)	8(4.60)	17(4.21)		
Bicuspid aortic valve				0.00	1.000
No	571(98.79)	172(98.85)	399(98.76)		
Yes	7(1.21)	2(1.15)	5(1.24)		

Notes: Z=Mann-Whitney test; χ^2=Chi-square test;

Supplementary Table 2 Dummy variable assignment table for each variable

Variables	Assignment rules
Syncope	No=0,Yes=1
Coma	No=0,Yes=1
Weak pulse	No=0,Yes=1
Limb ischemia	No=0,Yes=1
Acute renal failure	No=0,Yes=1
Intimal tear	aortic arch = 0; ascending aorta = 1; aortic root = 2; retrograde dissection = 3.
Pericardial effusion	No=0,mild = 1; moderate to severe = 2.
Bicuspid aortic valve	No=0,Yes=1
Heart rate, /min	[60,100]=0,＜60=1,＞100=2
Pulse Pressure Difference, mmHg	[30,50]=0,＜30=1,＞50=2
pH	[7.35,7.45]=0,＜7.35=1,＞7.45=2
PaO_2 , mmHg	[70,100]=0,＜70=1,＞100=2
Lactate, mmol/L	[0.5,1.6]=0,＜0.5=1,＞1.6=2
Hemoglobin, g/L	[115,150]=0,＜115=1,＞150=2
Neutrophil count, 10^9/L	[1.8,6.3]=0,＜1.8=1,＞6.3=2
IL-6, pg/ml	[0,7)=0,≥7=1
Urea, mmol/L	[2.6,7.5]=0,＜2.6=1,＞7.5=2
Creatinine, μmol/L	[53,115]=0,＜53=1,＞115=2
PT, s	[9,15]=0,＜9=1,＞15=2
INR	[0.8,1.3]=0,＜0.8=1,＞1.3=2
Cholesterol, mmol/L	[2.8,5.7]=0,＜2.8=1,＞5.7=2
NT-proBNP, ng/L	[0,125]=0,＞125=1
APACH II score, points	[0,10）=0,[10,20）=1,≥20=2
EuroSCORE, points	[0,2]=0,[3,5]=1,≥6=2

Notes: 1 mg/dL = 88.4 μmol/L; Continuous laboratory variables were categorized into three levels based on the reference ranges provided by our hospital's clinical laboratory: 0 (within the reference range), 1 (below the reference range), and 2 (above the reference range).

Supplementary Table 3 Comparison of data after assignment between training set and validation set for all enrolled ATAAD patients

Variables	Total (n=578)	Validation set (n=174)	Training set (n=404)	χ^2/-	P
Death				2.54	0.111
No	476(82.35)	150(86.21)	326(80.69)		
Yes	102(17.65)	24(13.79)	78(19.31)		
Syncope				0.00	0.990
No	548(94.81)	165(94.83)	383(94.80)		

Yes	30(5.19)	9(5.17)	21(5.20)		
Coma				0.50	0.479
No	566(97.92)	172(98.85)	394(97.52)		
Yes	12(2.08)	2(1.15)	10(2.48)		
Weak pulse				1.78	0.183
No	571(98.79)	174(100.00)	397(98.27)		
Yes	7(1.21)	0(0.00)	7(1.73)		
Limb ischemia				0.04	0.833
No	553(95.67)	166(95.40)	387(95.79)		
Yes	25(4.33)	8(4.60)	17(4.21)		
Acute renal failure				0.01	0.919
No	554(95.85)	167(95.98)	387(95.79)		
Yes	24(4.15)	7(4.02)	17(4.21)		
Intimal tear				0.90	0.825
Aortic arch	134(23.18)	37(21.26)	97(24.01)		
Ascending aorta	343(59.34)	107(61.49)	236(58.42)		
Root of aorta	84(14.53)	24(13.79)	60(14.85)		
Retrograde dissection	17(2.94)	6(3.45)	11(2.72)		
Pericardial effusion				1.77	0.412
No	455(78.72)	142(81.61)	313(77.48)		
Mild	98(16.96)	24(13.79)	74(18.32)		
Moderate to severe	25(4.33)	8(4.60)	17(4.21)		
Bicuspid aortic valve				0.00	1.000
No	571(98.79)	172(98.85)	399(98.76)		
Yes	7(1.21)	2(1.15)	5(1.24)		
Heart rate				1.27	0.529
[60,100]	432(74.74)	134(77.01)	298(73.76)		
＜60	32(5.54)	7(4.02)	25(6.19)		
＞100	114(19.72)	33(18.97)	81(20.05)		
Pulse Pressure Difference				2.12	0.346
[30,50]	181(31.31)	60(34.48)	121(29.95)		
＜30	25(4.33)	5(2.87)	20(4.95)		
＞50	372(64.36)	109(62.64)	263(65.10)		
pH				0.69	0.707
[7.35,7.45]	383(66.26)	111(63.79)	272(67.33)		
＜7.35	67(11.59)	22(12.64)	45(11.14)		
＞7.45	128(22.15)	41(23.56)	87(21.53)		
PaO_2				1.14	0.566
[70,100]	280(48.44)	86(49.43)	194(48.02)		
＜70	122(21.11)	40(22.99)	82(20.30)		
＞100	176(30.45)	48(27.59)	128(31.68)		
Lactate				-	0.949
[0.5,1.6]	253(43.77)	77(44.25)	176(43.56)		
＜0.5	1(0.17)	0(0.00)	1(0.25)		

＞1.6	324(56.06)	97(55.75)	227(56.19)		
Hemoglobin				3.59	0.166
[115,150]	403(69.72)	118(67.82)	285(70.54)		
＜115	53(9.17)	12(6.90)	41(10.15)		
＞150	122(21.11)	44(25.29)	78(19.31)		
Neutrophil count				-	0.335
[1.8,6.3]	82(14.19)	20(11.49)	62(15.35)		
＜1.8	2(0.35)	0(0.00)	2(0.50)		
＞6.3	494(85.47)	154(88.51)	340(84.16)		
IL-6				0.80	0.372
[0,7)	23(3.98)	5(2.87)	18(4.46)		
≥7	555(96.02)	169(97.13)	386(95.54)		
Urea				-	0.392
[2.6,7.5]	375(64.88)	120(68.97)	255(63.12)		
＜2.6	6(1.04)	1(0.57)	5(1.24)		
＞7.5	197(34.08)	53(30.46)	144(35.64)		
Creatinine				0.01	0.995
[53,115]	386(66.78)	116(66.67)	270(66.83)		
＜53	62(10.73)	19(10.92)	43(10.64)		
＞115	130(22.49)	39(22.41)	91(22.52)		
PT				-	1.000
[9,15]	497(85.99)	150(86.21)	347(85.89)		
＜9	2(0.35)	0(0.00)	2(0.50)		
＞15	79(13.67)	24(13.79)	55(13.61)		
INR				-	0.774
[0.8,1.3]	507(87.72)	155(89.08)	352(87.13)		
＜0.8	1(0.17)	0(0.00)	1(0.25)		
＞1.3	70(12.11)	19(10.92)	51(12.62)		
Cholesterol				0.64	0.727
[2.8,5.7]	495(85.64)	149(85.63)	346(85.64)		
＜2.8	58(10.03)	19(10.92)	39(9.65)		
＞5.7	25(4.33)	6(3.45)	19(4.70)		
NT-proBNP				2.41	0.120
[0,125]	80(13.84)	30(17.24)	50(12.38)		
＞125	498(86.16)	144(82.76)	354(87.62)		
APACH II score				1.58	0.454
[0,10)	297(51.38)	84(48.28)	213(52.72)		
[10,20)	257(44.46)	84(48.28)	173(42.82)		
≥20	24(4.15)	6(3.45)	18(4.46)		
EuroSCORE				-	0.858
[0,2]	7(1.21)	2(1.15)	5(1.24)		
[3,5]	392(67.82)	115(66.09)	277(68.56)		
≥6	179(30.97)	57(32.76)	122(30.20)		

Notes: χ^2=Chi-square test;

Supplementary Table 4 Comparison of raw data between ATAAD patient survival group and preoperative death group in the training set

Variables	Total (n=404)	Survival (n=326)	Death (n=78)	Z/χ^2/-	P
Heart rate	84.00 (74.00,97.00)	85.00 (75.00,97.00)	80.50 (71.25,94.25)	-1.69	0.090
Pulse Pressure Difference	60.00 (45.00,73.00)	62.00 (46.00,74.00)	55.50 (39.25,65.75)	-3.02	0.003
pH	7.41 (7.38,7.45)	7.42 (7.38,7.45)	7.40 (7.36,7.43)	-2.77	0.006
PaO_2	86.50 (72.00,110.25)	87.50 (73.25,112.00)	84.50 (70.00,103.00)	-1.36	0.173
Lactate	1.70 (1.20,2.90)	1.70 (1.20,2.60)	2.25 (1.50,3.65)	-3.53	<0.001
Hemoglobin	138.00 (127.00,148.00)	138.00 (128.00,148.00)	138.50 (118.75,147.00)	-1.09	0.275
Neutrophil count	10.71 (7.66,13.93)	10.30 (7.43,13.54)	11.48 (8.82,15.20)	-2.40	0.016
IL-6	69.72 (36.30,124.36)	64.39 (33.65,120.25)	87.49 (51.66,140.43)	-2.81	0.005
Urea	6.46 (5.09,8.60)	6.17 (5.00,8.14)	7.96 (6.10,10.33)	-4.20	<0.001
Creatinine	78.03 (63.39,109.61)	77.00 (62.00,102.81)	98.97 (69.09,146.03)	-3.39	<0.001
PT	12.70 (12.00,13.80)	12.70 (12.00,13.60)	12.75 (12.03,14.28)	-0.82	0.413
INR	1.10 (1.03,1.18)	1.10 (1.03,1.18)	1.11 (1.03,1.24)	-0.98	0.327
Cholesterol	3.85 (3.37,4.43)	3.88 (3.40,4.41)	3.80 (3.16,4.55)	-0.34	0.734
NT-proBNP	512.82 (217.07,1146.68)	462.58 (209.50,1050.00)	701.50 (236.67,1924.00)	-1.93	0.053
APACH II score	9.00 (6.00,13.00)	9.00 (6.00,12.00)	10.00 (6.00,14.00)	-0.66	0.511
EuroSCORE	4.00 (3.00,6.00)	3.00 (3.00,5.75)	6.00 (3.00,7.00)	-4.45	<0.001
Syncope				0.00	1.000
No	383(94.80)	309(94.79)	74(94.87)		
Yes	21(5.20)	17(5.21)	4(5.13)		
Coma				13.74	<0.001
No	394(97.52)	323(99.08)	71(91.03)		
Yes	10(2.48)	3(0.92)	7(8.97)		
Weak pulse				1.23	0.267
No	397(98.27)	322(98.77)	75(96.15)		
Yes	7(1.73)	4(1.23)	3(3.85)		
Limb ischemia				1.94	0.164
No	387(95.79)	315(96.63)	72(92.31)		
Yes	17(4.21)	11(3.37)	6(7.69)		
Acute renal failure				7.01	0.008
No	387(95.79)	317(97.24)	70(89.74)		

Yes	17(4.21)	9(2.76)	8(10.26)		
Intimal tear				24.35	<0.001
Aortic arch	97(24.01)	93(28.53)	4(5.13)		
Ascending aorta	236(58.42)	180(55.21)	56(71.79)		
Root of aorta	60(14.85)	42(12.88)	18(23.08)		
Retrograde dissection	11(2.72)	11(3.37)	0(0.00)		
Pericardial effusion				2.73	0.256
No	313(77.48)	258(79.14)	55(70.51)		
Mild	74(18.32)	55(16.87)	19(24.36)		
Moderate to severe	17(4.21)	13(3.99)	4(5.13)		
Bicuspid aortic valve				-	0.248
No	399(98.76)	323(99.08)	76(97.44)		
Yes	5(1.24)	3(0.92)	2(2.56)		

Notes: Z=Mann-Whitney test; χ^2=Chi-square test;

Supplementary Table 5 Comparison of Assigned variables between ATAAD Patient Survival Group and Preoperative Death Group in the Training Set

Variables	Total (n=404)	Survival (n=326)	Death (n=78)	χ^2/-	P
Heart rate				0.57	0.752
[60,100]	298(73.76)	240(73.62)	58(74.36)		
＜60	25(6.19)	19(5.83)	6(7.69)		
＞100	81(20.05)	67(20.55)	14(17.95)		
Pulse Pressure Difference				7.68	0.022
[30,50]	121(29.95)	94(28.83)	27(34.62)		
＜30	20(4.95)	12(3.68)	8(10.26)		
＞50	263(65.10)	220(67.48)	43(55.13)		
pH				9.47	0.009
[7.35,7.45]	272(67.33)	222(68.10)	50(64.10)		
＜7.35	45(11.14)	29(8.90)	16(20.51)		
＞7.45	87(21.53)	75(23.01)	12(15.38)		
PaO_2				1.98	0.372
[70,100]	194(48.02)	155(47.55)	39(50.00)		
＜70	82(20.30)	63(19.33)	19(24.36)		
＞100	128(31.68)	108(33.13)	20(25.64)		
Lactate				-	0.004
[0.5,1.6]	176(43.56)	154(47.24)	22(28.21)		
＜0.5	1(0.25)	1(0.31)	0(0.00)		
＞1.6	227(56.19)	171(52.45)	56(71.79)		

Hemoglobin				4.60	0.100
[115,150]	285(70.54)	233(71.47)	52(66.67)		
＜115	41(10.15)	28(8.59)	13(16.67)		
＞150	78(19.31)	65(19.94)	13(16.67)		
Neutrophil count				-	0.096
[1.8,6.3]	62(15.35)	55(16.87)	7(8.97)		
＜1.8	2(0.50)	1(0.31)	1(1.28)		
＞6.3	340(84.16)	270(82.82)	70(89.74)		
IL-6				0.00	0.988
[0,7)	18(4.46)	14(4.29)	4(5.13)		
≥7	386(95.54)	312(95.71)	74(94.87)		
Urea				-	0.002
[2.6,7.5]	255(63.12)	219(67.18)	36(46.15)		
＜2.6	5(1.24)	4(1.23)	1(1.28)		
＞7.5	144(35.64)	103(31.60)	41(52.56)		
Creatinine				21.92	<0.001
[53,115]	270(66.83)	230(70.55)	40(51.28)		
＜53	43(10.64)	38(11.66)	5(6.41)		
＞115	91(22.52)	58(17.79)	33(42.31)		
PT				-	0.122
[9,15]	347(85.89)	285(87.42)	62(79.49)		
＜9	2(0.50)	2(0.61)	0(0.00)		
＞15	55(13.61)	39(11.96)	16(20.51)		
INR				-	0.017
[0.8,1.3]	352(87.13)	291(89.26)	61(78.21)		
＜0.8	1(0.25)	1(0.31)	0(0.00)		
＞1.3	51(12.62)	34(10.43)	17(21.79)		
Cholesterol				4.44	0.108
[2.8,5.7]	346(85.64)	285(87.42)	61(78.21)		
＜2.8	39(9.65)	28(8.59)	11(14.10)		
＞5.7	19(4.70)	13(3.99)	6(7.69)		
NT-proBNP				0.06	0.802
[0,125]	50(12.38)	41(12.58)	9(11.54)		
＞125	354(87.62)	285(87.42)	69(88.46)		
APACH II score				2.88	0.237

[0,10）	213(52.72)	176(53.99)	37(47.44)	
[10,20）	173(42.82)	138(42.33)	35(44.87)	
≥20	18(4.46)	12(3.68)	6(7.69)	
EuroSCORE			-	<0.001
[0,2]	5(1.24)	5(1.53)	0(0.00)	
[3,5]	277(68.56)	239(73.31)	38(48.72)	
≥6	122(30.20)	82(25.15)	40(51.28)	

Notes: χ^2=Chi-square test; Comparisons for Syncope, Coma, Weak pulse, Limb ischemia, Acute renal failure, Intimal tear, Pericardial effusion, and Bicuspid aortic valve are identical to those presented in Table S4.

Supplementary Table 6 Single factor logistic regression results of training set

Variables	β	S.E	Z	*P*	OR(95%CI)
Syncope					
No					1.00(Reference)
Yes	-0.02	0.57	-0.03	0.975	0.98(0.32~3.01)
Coma					
No					1.00(Reference)
Yes	2.36	0.70	3.36	<0.001	10.62(2.68~42.05)
Weak pulse					
No					1.00(Reference)
Yes	1.17	0.77	1.51	0.131	3.22(0.71~14.69)
Limb ischemia					
No					1.00(Reference)
Yes	0.87	0.52	1.66	0.097	2.39(0.85~6.67)
Acute renal failure					
No					1.00(Reference)
Yes	1.39	0.50	2.77	0.006	4.03(1.50~10.80)
Intimal tear					
Aortic arch					1.00(Reference)
Ascending aorta	1.98	0.53	3.71	<0.001	7.23(2.54~20.56)
Root of aorta	2.30	0.58	3.94	<0.001	9.96(3.18~31.25)
Retrograde dissection	-13.42	723.49	-0.02	0.985	0.00(0.00~Inf)
Pericardial effusion					
No					1.00(Reference)
mild	0.48	0.30	1.58	0.113	1.62(0.89~2.94)
Moderate to severe	0.37	0.59	0.62	0.534	1.44(0.45~4.59)
Bicuspid aortic valve					

No					1.00(Reference)
Yes	1.04	0.92	1.13	0.259	2.83(0.47~17.25)
Heart rate					
[60,100]					1.00(Reference)
＜60	0.27	0.49	0.55	0.586	1.31(0.50~3.42)
＞100	-0.15	0.33	-0.44	0.658	0.86(0.45~1.65)
Pulse Pressure Difference					
[30,50]					1.00(Reference)
＜30	0.84	0.51	1.66	0.096	2.32(0.86~6.26)
＞50	-0.38	0.27	-1.40	0.161	0.68(0.40~1.17)
pH					
[7.35,7.45]					1.00(Reference)
＜7.35	0.90	0.35	2.57	0.010	2.45(1.24~4.85)
＞7.45	-0.34	0.35	-0.98	0.326	0.71(0.36~1.41)
PaO_2					
[70,100]					1.00(Reference)
＜70	0.18	0.32	0.57	0.568	1.20(0.64~2.23)
＞100	-0.31	0.30	-1.01	0.310	0.74(0.41~1.33)
Lactate					
[0.5,1.6]					1.00(Reference)
＜0.5	-12.62	882.74	-0.01	0.989	0.00(0.00~Inf)
＞1.6	0.83	0.28	3.02	0.003	2.29(1.34~3.93)
Neutrophil count					
[1.8,6.3]					1.00(Reference)
＜1.8	2.06	1.47	1.40	0.161	7.86(0.44~140.14)
＞6.3	0.71	0.42	1.68	0.093	2.04(0.89~4.67)
Hemoglobin					
[115,150]					1.00(Reference)
＜115	0.73	0.37	1.99	0.047	2.08(1.01~4.29)
＞150	-0.11	0.34	-0.32	0.747	0.90(0.46~1.75)
IL-6					
[0,7)					1.00(Reference)
≥7	-0.19	0.58	-0.32	0.749	0.83(0.27~2.59)
Urea					
[2.6,7.5]					1.00(Reference)
＜2.6	0.42	1.13	0.37	0.711	1.52(0.17~14.00)
＞7.5	0.88	0.26	3.43	<0.001	2.42(1.46~4.01)
Creatinine					
[53,115]					1.00(Reference)
＜53	-0.28	0.51	-0.55	0.581	0.76(0.28~2.04)
＞115	1.19	0.28	4.27	<0.001	3.27(1.90~5.63)

PT					
[9,15]					1.00(Reference)
＜9	-13.04	624.19	-0.02	0.983	0.00(0.00~Inf)
＞15	0.63	0.33	1.93	0.053	1.89(0.99~3.59)
INR					
[0.8,1.3]					1.00(Reference)
＜0.8	-13.00	882.74	-0.01	0.988	0.00(0.00~Inf)
＞1.3	0.87	0.33	2.64	0.008	2.39(1.25~4.54)
Cholesterol					
[2.8,5.7]					1.00(Reference)
＜2.8	0.61	0.38	1.59	0.113	1.84(0.87~3.89)
＞5.7	0.77	0.51	1.50	0.134	2.16(0.79~5.90)
NT-proBNP					
[0,125]					1.00(Reference)
＞125	0.10	0.39	0.25	0.803	1.10(0.51~2.38)
APACH II score					
[0,10）					1.00(Reference)
[10,20）	0.19	0.26	0.72	0.473	1.21(0.72~2.02)
≥20	0.87	0.53	1.63	0.103	2.38(0.84~6.74)
EuroSCORE					
[0,2]					1.00(Reference)
[3,5]	13.73	650.87	0.02	0.983	915468.13(0.00~Inf)
≥6	14.85	650.87	0.02	0.982	2808689.13(0.00~Inf)

Notes: OR=Odds ratio; CI=confidence interval;

Supplementary Table 7 Results of Multi factor Logistic Regression on Training Set

Variables	β	S.E	Z	P	OR(95%CI)
Intercept	-3.97	0.58	-6.78	<0.001	0.02(0.01~0.06)
Coma					
No					1.00(Reference)
Yes	1.78	0.78	2.29	0.022	5.93(1.29~27.26)
Intimal tear					
Aortic arch					1.00(Reference)
Ascending aorta	1.84	0.55	3.37	<0.001	6.28(2.16~18.32)
Root of aorta	2.37	0.61	3.92	<0.001	10.74(3.28~35.21)
Retrograde dissection	-13.41	686.89	-0.02	0.984	0.00(0.00~Inf)
Lactate					
[0.5,1.6]					1.00(Reference)
＜0.5	-14.44	2399.54	-0.01	0.995	0.00(0.00~Inf)
＞1.6	0.89	0.31	2.86	0.004	2.43(1.32~4.46)

Hemoglobin					
[115,150]					1.00(Reference)
＜115	0.96	0.42	2.30	0.022	2.61(1.15~5.94)
＞150	-0.56	0.39	-1.42	0.155	0.57(0.26~1.24)
Creatinine					
[53,115]					1.00(Reference)
＜53	-0.15	0.54	-0.28	0.780	0.86(0.30~2.48)
＞115	0.96	0.31	3.07	0.002	2.61(1.41~4.83)

Notes: OR=Odds ratio; CI=confidence interval

Supplementary Table 8 GVIF values of each variable

Variables	GVIF	Variance	GVIF^(1/(2*Df))
Coma	1.055	1	1.027
Acute renal failure	1.117	1	1.057
Intimal tear	1.155	3	1.024
pH	1.282	2	1.064
Lactate	1.202	2	1.047
Hemoglobin	1.174	2	1.041
Urea	1.364	2	1.081
Creatinine	1.545	2	1.115
INR	1.104	2	1.025

Notes: GVIF= Generalized variance inflation factor.

Supplementary Table 9 Preoperative mortality risk scoring table for ATAAD patients

Variables	Categories	Points
Lactate	＞1.6mmol/L	1
Hemoglobin	＜115g/L	1
Creatinine	＞115μmol/L	1
Coma	Yes	2
Intimal tear	Ascending aorta	2
	Root of aorta	3

Supplementary Table 10 Mortality and Survival Rates of ATAAD Patients in Training and Validation Sets under Different Scores

Points	Training set				Validation set			
	Survival	Survival rate	Death	Death rate	Survival	Survival rate	Death	Death rate
0	35	100.00%	0	0.00%	16	100.00%	0	0.00%
1	58	96.67%	2	3.33%	17	94.44%	1	5.56%
2	76	90.48%	8	9.52%	48	94.12%	3	5.88%

3	97	77.60%	28	22.40%	45	90.00%	5	10.00%
4	53	65.43%	28	34.57%	16	57.14%	12	42.86%
5	6	50.00%	6	50.00%	8	80.00%	2	20.00%
6	1	20.00%	4	80.00%	0	0.00%	1	100.00%
7	0	0.00%	2	100.00%	-	-	-	-
0-2 (Low risk)	169	94.41%	10	5.59%	81	95.29%	4	4.71%
3-4 (Medium risk)	150	72.82%	56	27.18%	61	78.21%	17	21.79%
5-7 (High risk)	7	36.84%	12	63.16%	8	72.73%	3	27.27%