Supplementary

Table S1 Coagulation monitoring items and targets

Coagulation monitor	Target range
Hemoglobin (g/L)	>100
Platelet ($\times 10^9$/L)	>50
Activated clotting time (s)	140–200
Activated partial thromboplastin time (s)	50–80
Anti-factor Xa level* (IU/mL)	0.2–0.4
Antithrombin-III* (%)	>50
Fibrinogen* (g/L)	>1.5
D-Dimer* (μg/mL)	0–0.5
Prothrombin time (s)	11.5–14.5
International normalized ratio (INR)	0.8–1.2
Fibrin/fibrinogen degradation products* (μg/mL)	0–5

*, items were adopted since 2017.

Table S2 Main diagnosis

Diagnosis	CPB-ECMO			Non-CPB-ECMO		
	All (n=96)	Survivors (n=46)	Non-survivors (n=50)	All (n=50)	Survivors (n=19)	Non-survivors (n=31)
TGA	20 (20.8)	10 (21.7)	10 (20.0)	9 (18.0)	4 (21.1)	5 (16.1)
DORV	14 (14.6)	4 (8.7)	10 (20.0)	5 (10.0)	1 (5.3)	4 (12.9)
TOF	15 (15.6)	7 (15.2)	8 (16.0)	10 (20.0)	4 (21.1)	6 (19.4)
RVOTO	6 (6.3)	5 (10.9)	1 (2.0)	3 (6.0)	1 (5.3)	2 (6.5)
VSD	7 (7.3)	3 (6.5)	4 (8.0)	8 (16.0)	2 (10.5)	6 (19.4)
PA	7 (7.3)	3 (6.5)	4 (8.0)	7 (14.0)	3 (15.8)	4 (12.9)
SV	6 (6.3)	2 (4.3)	4 (8.0)	4 (8.0)	1 (5.3)	3 (9.7)
TECD	4 (4.2)	2 (4.3)	2 (4.0)	2 (4.0)	1 (5.3)	1 (3.2)
Supra-aortic stenosis	3 (3.1)	2 (4.3)	1 (2.0)	–	–	–
ALCAPA	4 (4.2)	3 (6.5)	1 (0.0)	–	–	–
Ebstein's anomaly	3 (3.1)	2 (4.3)	1 (2.0)	1 (2.0)	1 (5.3)	–
CoA	2 (2.1)	2 (4.3)	0 (0.0)	1 (2.0)	1 (5.3)	–
HRHS	2 (2.1)	0 (0.0)	2 (4.0)	–	–	–
AS+PS	1 (1.0)	1 (2.2)	0 (0.0)	–	–	–
ASD + atrial mass	1 (1.0)	0 (0.0)	1 (2.0)	–	–	–
HLHS	1 (1.0)	0 (0.0)	1 (2.0)	–	–	–

Categorical data are presented as n (percent). CPB, cardiopulmonary bypass; ECMO, extracorporeal membrane oxygenation; TGA, transposition of great arteries; DORV, double outlet right ventricle; TOF, tetralogy of Fallot; RVOTO, right ventricular outflow tract obstruction; VSD, ventricle septal defect; PA, pulmonary atresia; SV, single ventricle; TECD, total endocardial cushion defect; ALCAPA, anomalous origin of left coronary artery from the pulmonary artery; CoA, coarctation of aorta; HRHS, Hypoplastic right heart syndrome; AS, aortic stenosis; PS, pulmonary stenosis; ASD, atrial septal defect; HLHS, hypoplastic left heart syndrome.

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Table S3 Main procedure

Procedure	CPB-ECMO			Non-CPB-ECMO		
	All (n=96)	Survivors (n=46)	Non-survivors (n=50)	All (n=50)	Survivors (n=19)	Non-survivors (n=31)
Arterial switch operation	25 (26.0)	9 (19.6)	16 (32.0)	12 (24.0)	4 (21.1)	8 (25.8)
Rastelli procedure	6 (6.3)	3 (6.5)	3 (6.0)	–	–	–
DRT	4 (4.2)	1 (2.2)	3 (6.0)	1 (2.0)	–	1 (3.2)
TOF complete surgical repair	15 (15.6)	7 (15.2)	8 (16.0)	10 (20.0)	4 (21.1)	6 (19.4)
VOTO repair	6 (6.3)	5 (10.9)	1 (2.0)	4 (8.0)	2 (10.5)	2 (6.5)
VSD closure	7 (7.3)	3 (6.5)	4 (8.0)	8 (16.0)	2 (10.5)	6 (19.4)
PA complete surgical repair	4 (4.2)	3 (6.5)	1 (2.0)	4 (8.0)	2 (10.5)	2 (6.5)
Modified Blalock-Taussig shunt	1 (1.0)	0 (0.0)	1 (2.0)	1 (2.0)	–	1 (3.2)
Sano shunt	1 (1.0)	1 (2.2)	0 (0.0)	1 (2.0)	1 (5.3)	–
Fontan procedure	5 (5.2)	2 (4.3)	3 (6.0)	3 (6.0)	1 (5.3)	2 (6.5)
TECD repair	4 (4.2)	2 (4.3)	2 (4.0)	2 (4.0)	1 (5.3)	1 (3.2)
Supra-aortic stenosis repair	3 (3.1)	2 (4.3)	1 (2.0)	–	–	–
ALCAPA repair	4 (4.2)	3 (6.5)	1 (0.0)	–	–	–
Ebstein's anomaly repair	3 (3.5)	2 (4.3)	1 (2.0)	1 (2.0)	1 (5.3)	
Glenn procedure	3 (3.1)	0 (0.0)	3 (4.0)	2 (4.0)	–	2 (6.5)
CoA repair	2 (2.1)	2 (4.3)	0 (0.0)	1 (2.0)	1 (5.3)	–
Bentall +Konno procedure	1 (1.0)	1 (2.2)	0 (0.0)	–	–	–
ASD closure + atrial mass resection	1 (1.0)	0 (0.0)	1 (2.0)	–	–	–
Norwood I procedure	1 (1.0)	0 (0.0)	1 (2.0)	–	–	–

Categorical data are presented as n (percent). CPB, cardiopulmonary bypass; ECMO, extracorporeal membrane oxygenation; DRT, double root translocation; TOF, tetralogy of Fallot; VOTO, ventricular outflow tract obstruction; VSD, ventricle septal defect; PA, pulmonary atresia; TECD, total endocardial cushion defect; ALCAPA, anomalous origin of left coronary artery from the pulmonary artery; CoA, coarctation of aorta; ASD, atrial septal defect.

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Table S4 Patient characteristics and clinical outcomes in the non-CPB-ECMO group

Variables	All (n=50)	Survivors (n=19)	Non-survivors (n=31)	P value
Male sex	30 (60.0)	12 (63.2)	18 (58.1)	0.774
Age (months)	12.9 (6.4, 35.4)	15.6 (5.4, 47.1)	12.7 (6.5, 31.4)	0.583
Weight (kg)	8.3 (6.4, 11.8)	8.0 (6.8, 13.5)	8.4 (6.2, 11.4)	0.549
Height (cm)	71.5 (64.0, 88.3)	73.0 (64.0, 91.0)	70.0 (63.0, 86.0)	0.465
Redo-cardiac surgery	11 (22.0)	4 (21.1)	7 (22.6)	1.000
Infection before ECMO	4 (8.0)	0 (0.0)	4 (12.9)	0.284
STAT category	3.0 (2.0, 4.0)	3.0 (2.0, 4.0)	4.0 (2.0, 4.0)	0.170
CPB time (min)	185.0 (106.8, 244.0)	162.0 (107.0, 211.0)	190.0 (106.0, 260.0)	0.576
Clamp time (min)	92.0 (54.3, 135.0)	95.0 (64.0, 127.0)	91.0 (52.0, 141.0)	0.818
MAP (mmHg)	52.5 (40.0, 60.0)	54.0 (40.0, 60.0)	50.0 (40.0, 63.0)	0.818
VIS	27.0 (18.0, 48.5)	24.0 (15.0, 45.0)	28.0 (21.0, 51.0)	0.211
Lactate (mmol/L)	9.2 (6.1, 14.6)	6.9 (5.3, 11.0)	11.2 (7.8, 16.9)	0.022
Left heart unloading	35 (70.0)	14 (73.7)	21 (67.7)	0.757
PEP model (%)	53.5 (41.0, 62.3)	44.0 (33.0, 60.0)	55.0 (44.0, 63.0)	0.156
Management				
Median flow rate (mL/min)	600.0 (520.0, 875.0)	660.0 (542.5, 800.0)	600.0 (520.0, 920.0)	0.950
Median pump speed (rpm)	2,760.0 (2,600.0, 2,840.0)	2,737.5 (2,558.8, 2,868.8)	2,765.0 (2,600.0, 2,820.0)	0.884
Chest-tube days (d)	8.0 (4.5, 14.3)	11.0 (5.0, 17.0)	8.0 (3.8, 14.0)	0.308
Chest-tube drainage (mL/kg/d)	15.4 (8.9, 29.8)	21.1 (10.6, 29.7)	13.6 (8.0, 30.1)	0.332
Transfusion				
RBC transfusion (mL/kg/d)	29.7 (18.0, 42.5)	24.6 (16.3, 41.2)	31.7 (20.0, 43.5)	0.631
PLT transfusion (mL/kg/d)	9.5 (3.5, 14.5)	9.2 (4.8, 13.1)	9.7 (2.2, 21.1)	0.667
FFP transfusion (mL/kg/d)	10.1 (4.9, 18.5)	7.7 (6.2, 15.7)	11.4 (4.0, 19.6)	0.276
Hemostatic complications				
Major Bleeding	24 (48.0)	11 (57.9)	13 (41.9)	0.383
Early bleeding	9 (18.0)	3 (15.8)	6 (19.4)	1.000
Late bleeding	15 (30.0)	8 (42.1)	7 (22.6)	0.205
Re-exploration	20 (40.0)	9 (47.4)	11 (35.5)	0.553
Gastrointestinal bleeding	6 (12.0)	4 (21.1)	2 (6.5)	0.184
Pulmonary bleeding	5 (10.0)	1 (5.3)	4 (12.9)	0.637
Intracranial hemorrhage	1 (2.0)	0 (0.0)	1 (3.2)	1.000
Circuit change	13 (26.0)	7 (36.8)	6 (19.4)	0.199
Early change	3 (6.0)	3 (0.0)	0 (0.0)	0.049
Late change	11 (22.0)	4 (21.1)	7 (22.6)	1.000
Change time (h)	82.5 (52.8, 104.5)	55.0 (40.0, 82.0)	92.0 (83.0, 159.0)	0.011
1st ECMO duration (h)	100.0 (77.5, 149.3)	82.0 (55.0, 107.0)	128.0 (83.0, 170.0)	0.013
Hemolysis	27 (54.0)	8 (42.1)	19 (61.3)	0.247
Early hemolysis	13 (26.0)	3 (15.8)	10 (32.3)	0.320
Late hemolysis	14 (28.0)	5 (26.3)	9 (29.0)	1.000
pFHb max	50.0 (30.0, 92.5)	40.0 (20.0, 50.0)	60.0 (30.0, 130.0)	0.060
Thrombocytopenia	19 (38.0)	3 (15.8)	16 (51.6)	0.016
PLT median (×10^9/L)	54.8 (45.3, 77.6)	68.0 (52.0, 78.0)	49.0 (42.5, 77.5)	0.223
PLT nadir (×10^9/L)	28.0 (20.8, 40.0)	29.0 (23.0, 39.0)	27.0 (20.0, 41.0)	0.749
Outcomes				
ECMO duration (h)	128.5 (90.0, 204.8)	99.0 (79.0, 146.0)	145.0 (100.0, 219.0)	0.050
Successfully weaned from ECMO	32 (64.0)	19 (100.0)	13 (41.9)	<0.001
30-day mortality	24 (48.0)	0 (0.0)	24 (77.4)	<0.001
Hospital stay (d)	35.0 (22.0, 56.3)	52.0 (42.0, 77.0)	26.0 (17.0, 44.0)	<0.001
ICU stay (d)	28.0 (12.3, 39.0)	33.0 (28.0, 56.0)	21.0 (8.0, 32.0)	0.147
Ventilation time (h)	442.5 (210.0, 766.8)	598.0 (282.0, 802.0)	386.0 (147.0, 755.0)	0.012

Continuous data are presented as median (interquartile range) and categorical data as n (percent). ECMO, extracorporeal membrane oxygenation; CPB, cardiopulmonary bypass; STAT, Society of Thoracic Surgeons-European Association for Cardio-Thoracic Surgery; MAP, mean arterial pressure; VIS, vasoactive-inotropic score; PEP, Pediatric Extracorporeal Membrane Oxygenation Prediction; RBC, red blood cell; PLT, platelet; FFP, fresh frozen plasma; pFHb, peak free-plasma hemoglobin; ICU, intensive care unit.

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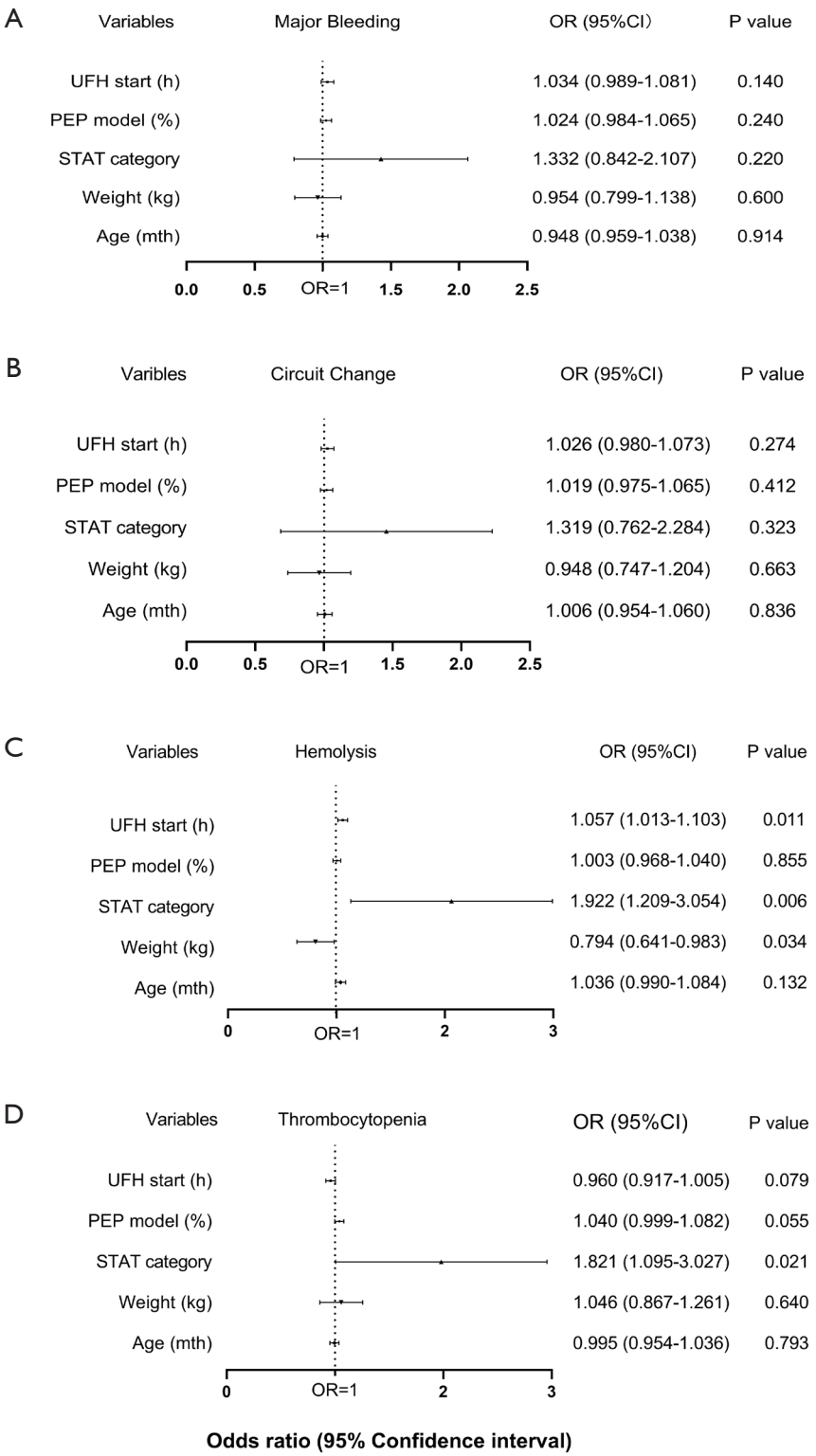

Figure S1 Multivariate logistic regression analysis of major bleeding (A), circuit change (B), hemolysis (C), and thrombocytopenia (D). CI, confidence interval; OR, odds ratio; UFH, unfractionated heparin; PEP, Pediatric Extracorporeal Membrane Oxygenation Prediction; STAT, Society of Thoracic Surgeons-European Association for Cardio-Thoracic Surgery.

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