

Clinical efficacy of high-flow oxygen therapy through nasal cannula in acute heart failure

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Background/Aims: High-flow oxygen therapy through nasal cannula (HFNC) could reduce intubation rate and mortality rate among patients with acute respiratory failure. We evaluated the physiological responses and clinical outcomes of high-flow oxygen therapy through nasal cannula (HFNC) in patients with acute heart failure (AHF). **Methods:** A retrospective cohort analysis was performed in single medical tertiary center. Patients with AHF who had a progressive hypoxemia after oxygenation via facemask were divided into intubation group and HFNC group. We analyzed the physiological responses and in-hospital clinical outcomes between two groups. **Results:** 73 patients of intubation group and 76 patients of HFNC group were included. Baseline characteristics were well-balanced between two groups. There were no differences in changes of mean arterial pressure, heart rate, and pulse oxygen saturation during the first 6 hours (Figure 1). Among HFNC group, 66 of 76 patients (86.8%) were successfully recovered from progressive hypoxemia without endotracheal intubation, and there were no differences in in-hospital clinical outcomes between two groups (Table 1). **Conclusions:** This study showed HFNC group in patients with AHF had a similar results of improvement of oxygen saturation and in-hospital clinical outcomes compared with intubation group. Present study supported HFNC could be considered as initial choice of oxygen therapy in management of AHF in selected patients.

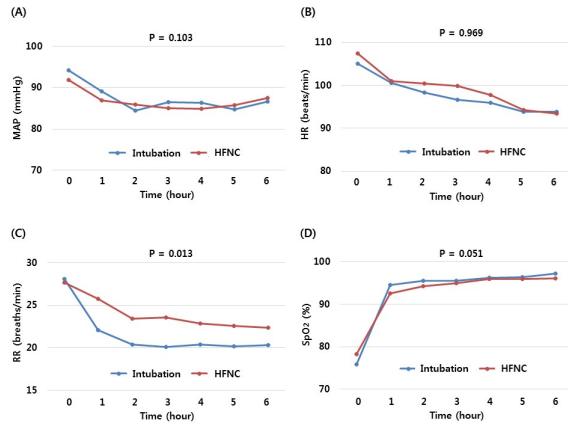


Table 1. In-hospital clinical outcomes

Variables	Total (n=149)	Intubation group (n=73)	HFNC group (n=76)	p value
Hospital stay (day)	9 (6-14)	9 (7-16)	9 (6-14)	0.353
Vasopressor use	88 (59.1)	30 (41.1)	20 (26.3)	0.051
Renal replacement therapy	13 (8.7)	6 (8.2)	7 (9.2)	0.830
Sustained ventricular arrhythmia	13 (8.7)	8 (11.0)	5 (6.6)	0.344
Hospital acquired pneumonia	17 (11.4)	10 (13.7)	7 (9.2)	0.389
All-cause death	11 (7.4)	7 (9.6)	4 (5.3)	0.313
Cardiac death	9 (6.0)	6 (8.2)	3 (3.9)	0.274
Requiring intubation*	-	-	10 (13.2)	-

Continuous variables are presented as median (interquartile range) and categorical variables are expressed as a number (%).

* Data of HFNC group

HFNC, high-flow oxygen therapy through nasal cannula

Simultaneous Distal Perfusion as a Preventive Strategy of Limb Ischemia Undergoing ECMO

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Background/Aims: Limited data are available regarding prevention of limb ischemia in femorally cannulated patients on venoarterial extracorporeal membrane oxygenation (ECMO). **Methods:** We evaluated 230 patients who received venoarterial ECMO via femoral cannulation from two tertiary hospitals between August 2014 and July 2017. Patients were divided into two groups according to distal perfusion catheter (DPC) insertion strategy: patients who underwent DPC insertion at the time of primary cannulation (simultaneous DPC group, n=96) and patients who were provisionally treated with DPC (provisional DPC group, n=134). The primary outcome was limb ischemia. **Results:** Of the 96 patients in the simultaneous DPC group, 61 (63.5%) underwent insertion under fluoroscopic guidance. The simultaneous DPC group had a significantly lower incidence of limb ischemia (2.1% vs. 8.2%, p=0.047) and a lower tendency of in-hospital mortality (38.5% vs. 50.7%, p=0.067) than the provisional DPC group. However, there were no significant differences in rate of major bleeding (8.3% vs. 4.5%, p=0.228), thrombotic event (5.2% vs. 9.7%, p=0.211), and composite catheter-related complication (24.0% vs. 19.4%, p=0.405) between the two groups. On multivariable analysis, fluoroscopy-guided simultaneous insertion of DPC (odds ratio 0.44; 95% confidence interval 0.13-0.97; p=0.043) was significant predictor for a reduction of limb ischemia. **Conclusions:** Simultaneous insertion of DPC, particularly under guidance of fluoroscopy, should be considered as a preventive strategy for limb ischemia in femorally cannulated patients on venoarterial ECMO.

Table 1. Baseline and Prevalent characteristics

	Simultaneous DPC n=96	Provisional DPC n=134	p value
Age, years	55.2 ± 16.3	56.5 ± 13.7	0.11
Gender (male)	79 (82.3)	89 (66.4)	0.001
Body mass index, kg/m ²	23.6 ± 3.6	23.7 ± 4.0	0.91
Diabetes mellitus	28 (29.1)	46 (34.3)	0.24
Hypertension	51 (53.1)	51 (38.1)	0.04
Dyslipidemia	13 (13.5)	9 (6.7)	0.08
Current smoker	21 (21.9)	29 (21.6)	0.44
Chronic kidney disease	4 (4.2)	11 (8.2)	0.58
Peripheral vascular disease	2 (2.1)	3 (2.2)	0.96
Previous MI	17 (17.7)	29 (21.6)	0.46
Previous PCI	16 (16.7)	30 (22.4)	0.29
Previous CABG	2 (2.1)	9 (6.7)	0.10
Previous CVA	7 (7.3)	19 (14.2)	0.90
Chronic pneumonia	42 (43.8)	58 (43.3)	0.92
Ischemic cardiomyopathy	18 (18.8)	21 (15.7)	0.96
Non-ischemic cardiomyopathy	6 (6.2)	4 (3.0)	0.40
Septic shock	9 (9.4)	4 (3.0)	0.08
Refractory arrhythmia	21 (21.9)	47 (35.1)	0.01
Other cause	11 (11.5)	17 (12.7)	0.92
Purpose of ECMO implantation			
Bridge to recovery	81 (84.4)	127 (94.8)	0.12
Bridge to transplantation	15 (15.6)	7 (5.2)	0.07
Extracorporeal cardiopulmonary resuscitation	41 (42.7)	84 (62.7)	<0.01
Initial ECMO flow, L/min	3.4 ± 0.8	3.4 ± 1.1	0.70
Operating site of ECMO			
Intensive care unit	21 (21.9)	31 (23.1)	0.81
Catheterization laboratory room	36 (37.5)	33 (24.6)	0.01
Emergency room	11 (11.5)	17 (12.7)	0.92
Operating room	4 (4.2)	28 (21.6)	0.04
Others	4 (4.2)	13 (9.7)	0.07
Arterial catheter site, P _i	15.4 ± 0.8	15.7 ± 1.2	0.94
Large arterial cannula	19 (19.8)	41 (30.6)	0.07
Device ECMO support			
Autologous therapy	77 (80.2)	86 (62.7)	<0.01
Left ventricular unloading	39 (39.6)	19 (14.2)	0.01
Distal perfusion	96 (100.0)	21 (15.7)	<0.01
Continuous renal replacement therapy	34 (35.4)	55 (40.3)	0.25
Intra-aortic balloon pump	3 (3.1)	4 (3.0)	0.90
Mechanical ventilation	74 (77.1)	84 (62.7)	0.24
Laboratory findings			
Creatinine, mg/dL (per before ECMO insertion)	1.3 (0.9 - 1.5)	1.3 (0.9 - 1.8)	0.78
Lactate, mmol/L (per before ECMO insertion)	5.3 (2.4 - 9.7)	5.2 (2.3 - 10.0)	0.92
Lactate, mmol/L (at least after ECMO insertion)	1.0 (0.4 - 1.5)	1.1 (0.5 - 1.9)	0.78
Duration of ECMO support, day	3.7 (2.0 - 7.0)	2.0 (0.8 - 6.0)	0.001
Length of ICU stay, day	8.0 (3.0 - 18.0)	5.0 (2.0 - 11.0)	0.01
Length of hospital stay, day	24.0 (9.0 - 42.0)	13.0 (4.0 - 31.0)	0.01

Values are mean ± standard deviation, median (interquartile range) or n (%).

*We considered patient used 15-170 L/min as patient used large arterial catheter.

CABG = coronary artery bypass grafting; CVA = cerebrovascular accident; DPC = distal perfusion catheter; ICU = intensive care unit; MI = myocardial infarction; PCI = percutaneous coronary intervention; ECMO = extracorporeal membrane oxygenation.

Table 2. In-hospital clinical outcomes and complications

	Simultaneous DPC n=96	Provisional DPC n=134	p value
Limb ischemia	2 (2.1)	11 (8.2)	0.047
Major bleeding	8 (8.3)	6 (4.5)	0.23
Thrombotic event	5 (5.2)	13 (9.7)	0.21
Catheter-related complication	23 (24.0)	26 (19.4)	0.43
Successful weaning from ECMO	76 (79.2)	80 (60.0)	0.01
In-hospital mortality	37 (38.5)	68 (50.7)	0.07
Values are n (%).			
Catheter-related complication was defined as a composite of limb ischemia, major bleeding, and thrombotic event.			
DPC = distal perfusion catheter; ECMO = extracorporeal membrane oxygenation			

Table 3. Predictors of lower limb ischemia

	Odds ratio	95% CI	p value
Fluoroscopy-guided simultaneous DPC	0.44	0.13 - 0.97	0.043
Age ≥ 65 years	0.57	0.15 - 2.11	0.40
Male	1.34	0.38 - 5.39	0.63
Duration of ECMO > 5 days	1.71	1.13 - 2.60	0.01
Large arterial cannula	1.08	1.38 - 18.20	0.01

*We considered patient used 15-170 L/min as patient used large arterial catheter.

CI = Confidence interval; DPC = distal perfusion catheter; ECMO = extracorporeal membrane oxygenation.