Improved Survival on ECMO for Respiratory Failure After Early Extubation or Tracheostomy

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Disclaimer

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Background

- Evolution of ECMO

Hill JD, et al.

Improvements in:

- Device design

- Knowledge of pathophysiology

- Management strategies

- Patient selection

https://www.kansascity.com/news/business/health-care/article206206649.html

Risks of Orotracheal Intubation

INCREASED:

- Analgosedation
- ICU Delirium
- Respiratory Infections
- Sarcopenia
- Subglottic Stenosis
- Laryngeal and Vocal Fold Injury
- Deep Tissue Infections

In context of ECMO, are there data to support earlier extubation or tracheostomy to improve morbidity or mortality?

Methods

- Retrospective cohort, single center, non-randomized
- Inclusion: VV- or VAV-ECMO for at least 24 hours; admitted to our institution for at least 7 days; age greater than 18 years
- Exclusion: VA-ECMO as sole modality
- 105/139 patients met criteria
- Independent variable: Lack of orotracheal intubation at time of decannulation
- Primary endpoint: Survival to hospital discharge
- Logistic regression analysis; non-paired t-tests for continuous data; χ^2 for categorical

Results

	Extubated	Not Extubated	p value
Age (years)	38.96 (1.55)	38.78 (2.95)	0.9536
Male	46 (63%)	26 (81%)	0.0719
Weight (Kg)	103.98 (4.58)	92.31 (4.90)	0.0854
BMI (Kg/m^2)	35.72 (1.58)	31.48 (1.74)	0.0754
SAPSII	57.22 (3.26)	64.23 (3.1)	0.1076
ETT Days	13.30 (1.55)	15.89 (2.43)	0.3734
ETT-Free Days	29.67 (3.86)	14.93 (3.7)	0.0073
Hours on ECMO	473.84 (54.63)	221.25 (52.95)	0.0013
PT Hours	34.94 (6.01)	25.41 (8.09)	0.3484
ICU LOS	33.55 (2.82)	22.23 (3.13)	0.0087
Total LOS	40.96 (3.50)	28.33 (3.63)	0.0141
OE/LOS	108.26 (13.40)	164.97 (28.87)	0.0814
BE/LOS	26.08 (7.64)	25.55 (10.76)	0.9677
Low RASS days	10.73 (1.05)	11.32 (1.98)	0.7922

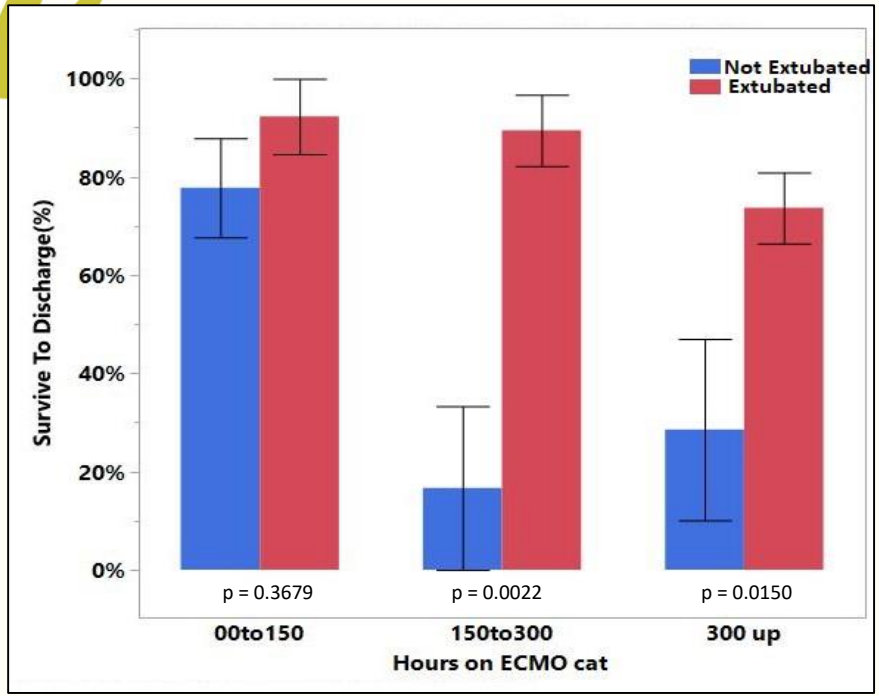
Table 1: Comparison of demographic characteristics and outcomes between patients extubated or receiving tracheostomy while still on ECMO vs. those who were not.

Reported as Mean (SEM) or Number (%)

OE = Opioid equivalents
BE = Benzodiazepine equivalents
LOS = Length of stay

Low RASS days = number of days in which patient had RASS score -3 or worse

Results



	Extubated	Not Extubated	Total
Survive	59	17	76
Not Survive	14	15	29
Total	73	32	105
LR 8.157		p = 0.0043	

Table 2: Result of χ^2 analysis for survival for patients extubated or receiving tracheostomy while still on ECMO vs those who were not.

Figure 1: Survival of patients extubated or receiving tracheostomy while still on ECMO vs those who were/did not. Shown as distribution of total ECMO time into three groups.

Results

	Survive	Not Survive	p value
Age (years)	37.71 (1.44)	42.03 (3.34)	0.1671
Male	47 (67%)	29 (82%)	0.1083
Weight (Kg)	105.37 (4.32)	85.46 (4.77)	0.0028
BMI (Kg/m^2)	36.17 (1.53)	29.24 (1.50)	0.0018
SAPSII	56.59 (2.66)	69.08 (3.84)	0.0138
ETT Days	12.58 (1.18)	17.96 (3.49)	0.1548
ETT-Free Days	32.89 (4.09)	9.84 (2.75)	<0.0001
Hours on ECMO	368.51 (49.44)	479.93 (81.33)	0.2477
PT Hours	37.90 (6.41)	17.32 (2.82)	0.0041
PT Days/LOS	0.49 (0.03)	0.54 (0.06)	0.4196
ICU LOS	33.29 (3.16)	25.51 (2.92)	0.0741
Total LOS	42.51 (3.72)	26.86 (2.89)	0.0013
OE/LOS	113.43 (13.21)	155.41 (32.18)	0.2349
BE/LOS	23.22 (6.48)	33.17 (14.94)	0.5446
Low RASS days	10.41 (1.14)	12.63 (1.66)	0.2740

Table 3: Survival analysis of patient demographics and outcomes.

Reported as Mean (SEM) or Number (%)

OE = Opioid equivalents
BE = Benzodiazepine equivalents
LOS = Length of stay

Low RASS days = number of days in which patient had RASS score -3 or worse

Discussion

- Patient not orotracheally intubated at time of ECMO decannulation for respiratory failure was found to be significantly associated with survival to discharge from the hospital (LR 8.157; p = 0.0043)
- This seems to be mostly associated with ECMO runs > 7 days (>150 hours)
- Significant differences in the demographics between the two groups included: LOS, ICU LOS, hours on ECMO, and ETT-free days
- Although there were no significant differences in SAPSII scores between the two groups, this was not powered sufficiently to rule out as a confounder
- Patient variables independently associated with survival include weight and BMI
- Other variables not surprisingly associated with improved survival include SAPSII score, ETT-free days, PT hours, and total LOS.
- Further investigation needed to further delineate how early extubation or tracheostomy affects patient outcomes

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