VŠEOBECNÁ FAKULTNÍ NEMOCNICE V PRAZE

1. LÉKAŘSKÁ FAKULTA Univerzita Karlova

CARDIAC RHYTHM CONVERSIONS AND THE OUTCOME IN REFRACTORY OHCA. COMPARISON OF EXTRACORPOREAL VS. CONVENTIONAL CPR

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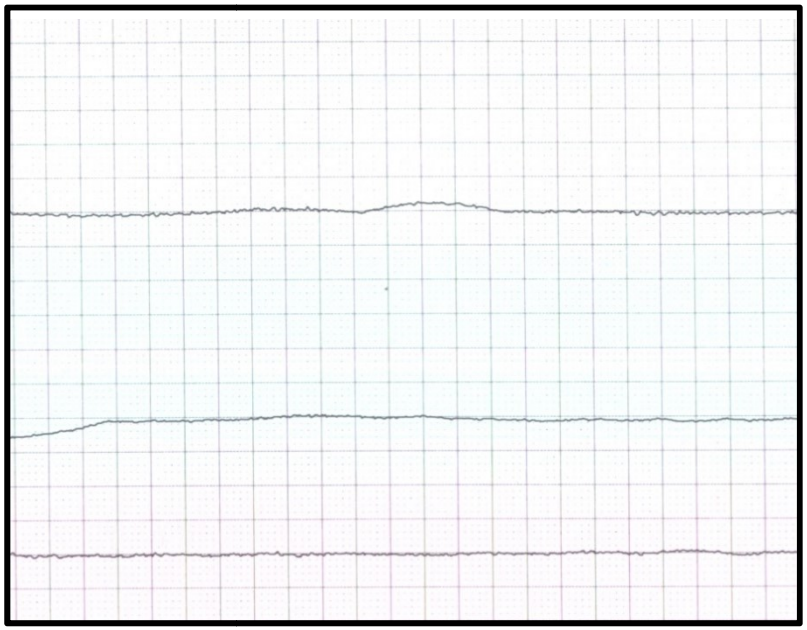
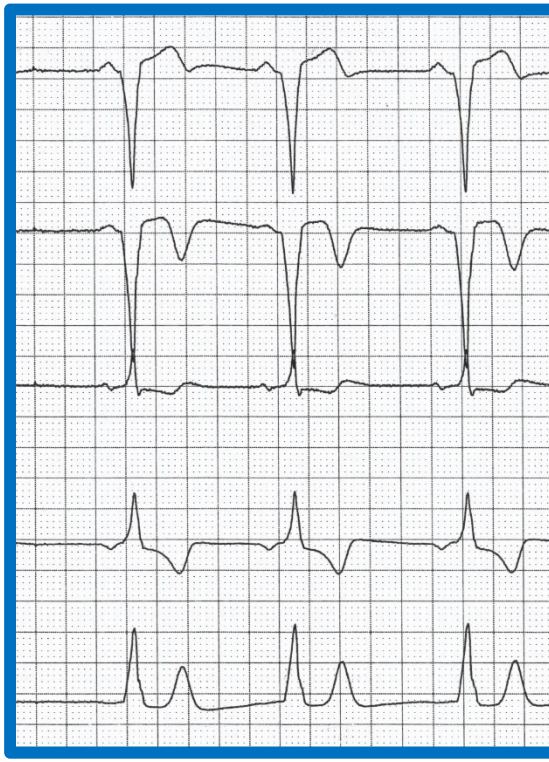
CRID 2024

Shockable and Non-shockable rhythms





Source: Archives 2nd Internal Dpt. 1st Faculty of Medicine, Charles University and General University Hospital in

ntroduction

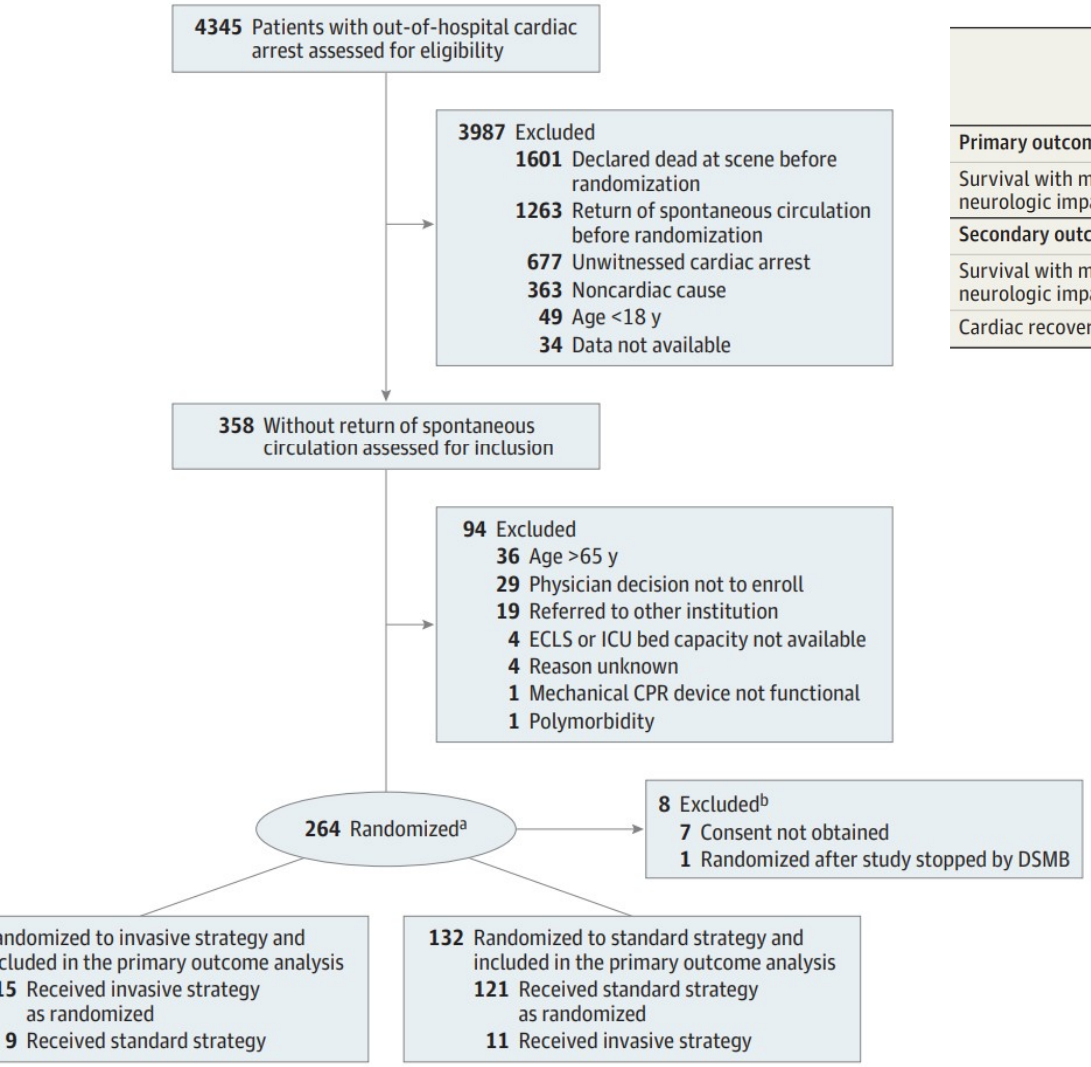
Outcomes and Initial Heart Rhythm

Post-hoc analysis of Prague OHCA trial

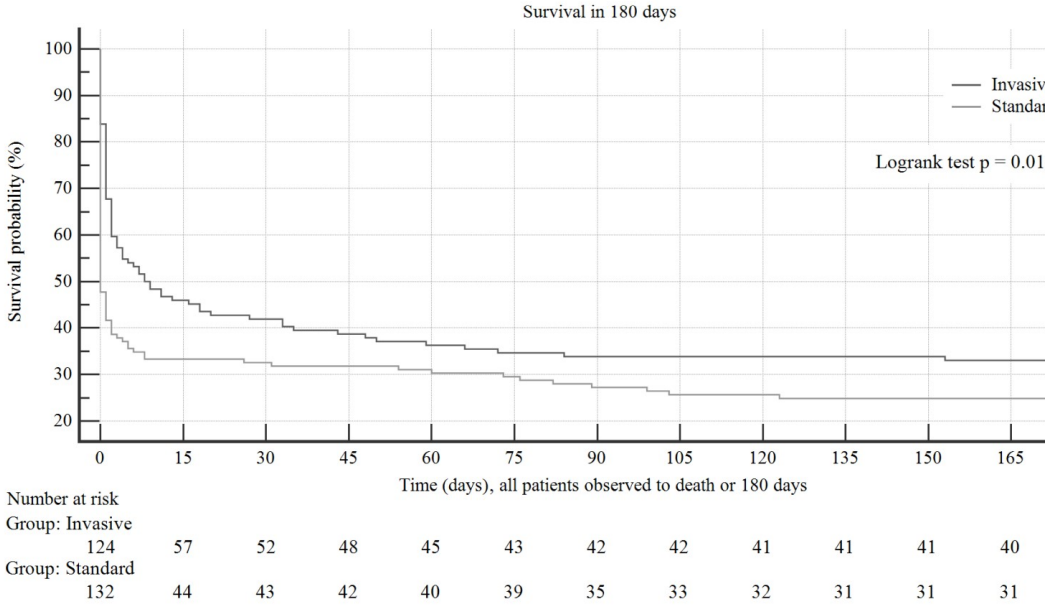
Prague OHCA trial

ractory Out-of-hospital Cardiac Arrest

andard vs. Invasive approach



	No. (%)		
	Invasive strategy (n = 124)	Standard strategy (n = 132)	Absolute difference, % (95% CI)
Primary outcome			
Survival with minimal or no neurologic impairment at 180 d[a]	39 (31.5)	29 (22.0)	9.5 (−1.3 to 20.1)
Secondary outcomes			
Survival with minimal or no neurologic impairment at 30 d[a]	38 (30.6)	24 (18.2)	12.4 (1.9 to 22.7)
Cardiac recovery at 30 d[b]	54 (43.5)	45 (34.1)	9.4 (−2.5 to 21)



Belohlavek J., et al. JAMA 2022;32

Baseline clinical and demographical data

rhythm	VF (n = 156)	PEA (n = 45)	Asystole (n = 55)	P
ears)	56 (45-64)	62 (54; 66)	58 (47; 69)	0.07
er (Male)	141 (90 %)	31 (69 %)	40 (73 %)	0.0003
nder CPR	154 (99 %)	44 (98 %)	54 (98 %)	0.89
tcher assisted CPR	133 (85 %)	24 (53 %)	46 (84 %)	<0.000
omized to				
ndard	84 (54 %)	24 (53 %)	24 (44 %)	0.41
asive	72 (46 %)	21 (47 %)	31 (56 %)	
of CPR (time to ROSC or ECLS) (min)	54 (33; 69)	50 (42; 68)	56 (37; 67)	0.62
red death	33 (21 %)	20 (44 %)	22 (40 %)	0.0015
hospital	20/33 (61 %)	12/20 (60 %)	14/22 (64 %)	0.009
hin 1 hour of admission	13/33 (39 %)	8/20 (40 %)	8/22 (36 %)	0.15
mplanted	57 (37 %)	17 (38 %)	18 (33 %)	0.85
atory values on admission				
	7.00 (6.87-7.17)	6.85 (6.75; 6.97)	6.85 (6.77; 6.99)	<0.000
tate (mmol/L)	10.7 (7.8-13.8)	13.1 (11.1; 17.0)	13.9 (8.9; 18.0)	0.001
of cardiac arrest (including autopsy findings)				
te coronary syndrome	89 (57 %)	15 (33 %)	23 (42 %)	<0.000
onic coronary artery disease	29 (19 %)	1 (2 %)	2 (4 %)	
monary embolism	1 (1 %)	15 (33 %)	8 (15 %)	
onic heart failure	8 (5 %)	2 (4 %)	4 (7 %)	
diomyopathy	7 (5 %)	1 (2 %)	1 (2 %)	
known	6 (4 %)	3 (7 %)	6 (11 %)	

Havranek S., et al. Resuscitation 2022;18

Primary and secondary endpoints

Initial rhythm	INVASIVE			STANDARD / CONVENTIONA		
	Shockable (N = 72)	Non-shockable (N = 52)	P	Shockable (N = 84)	Non-shockable (N = 48)	P
rimary outcome						
urvival with CPC at 180 days						
1 or 2	35 (49 %)	4 (8 %)	<0.001	28 (33 %)	1 (2 %)	<0.00
≥3	37 (51 %)	48 (92 %)		56 (67 %)	47 (98 %)	
econdary outcomes						
ardiac recovery at 30 days						
Yes	43 (60 %)	11 (21 %)	<0.001	41 (49 %)	4 (8 %)	<0.00
No	29 (40 %)	41 (79 %)		43 (51 %)	44 (92 %)	
euro recovery at 30d days						
Yes	34 (47 %)	4 (8 %)	<0.001	24 (29 %)	0 (0 %)	<0.00
No	38 (53 %)	48 (92 %)		60 (17 %)	48 (100 %)	

Havranek S., et al. Resuscitation 2022;18

Heart rhythm could change.
Prognostic Impact of Heart Rhythm Conversions

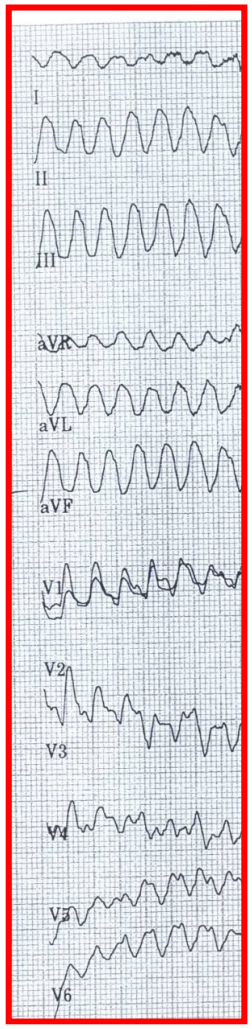
Shockable → Non-shockable

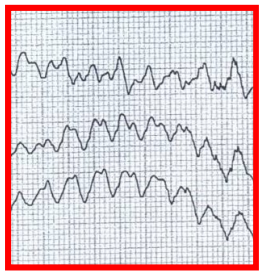
Non-shockable → Shockable

Shockable → Non-shockable Rhythm

Prague OHCA trial data

Ventricular fibrillation (n = 156)

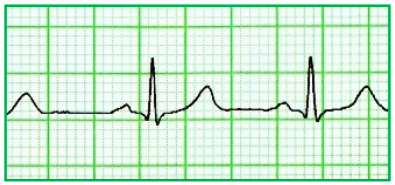




Last rhythm VF

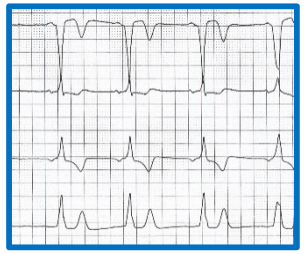
Outcome CPC 1,2

13/41 (32 %)



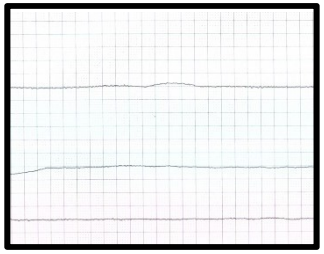
ROSC on admission

45/69 (65 %)



Pulseless electrical activity on admission

5/22 (23 %)



Asystole on admission

0/24 (0 %)

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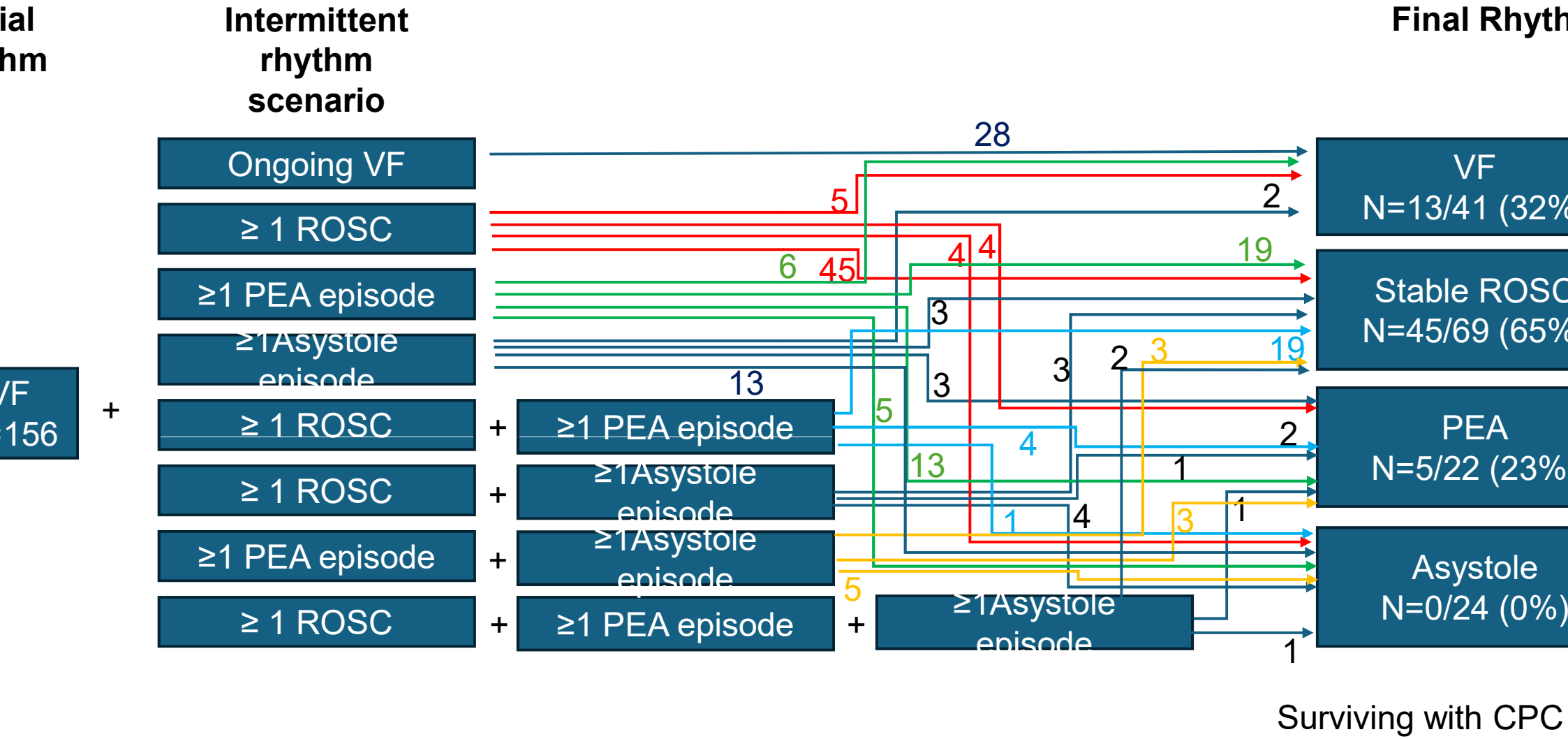
ial
hm
Intermittent rhythm scenario
Final Rhyth
VF
156
+
Ongoing VF
≥ 1 ROSC
≥1 PEA episode
≥1Asystole episode
≥ 1 ROSC + ≥1 PEA episode
≥ 1 ROSC + ≥1Asystole episode
≥1 PEA episode + ≥1Asystole episode
≥ 1 ROSC + ≥1 PEA episode + ≥1Asystole episode
28
5
2
6
45
4
4
19
3
3
2
3
19
13
3
5
2
4
13
1
1
4
3
1
5
1
VF
N=13/41 (32%
Stable ROSC
N=45/69 (65%
PEA
N=5/22 (23%
Asystole
N=0/24 (0%)
Surviving with CPC

Shockable → Non-shockable Rhythm

The role of treatment strategy Invasive / ECPR vs. Standard / Conventional

	Intention to treat			As treated		
Treatment arm	**Invasive (N = 72)**	**Standard (N = 84)**	**P**	**Invasive (N = 80)**	**Standard (N = 76)**	
Ongoing VF (all other rhythms excluded)	7/20 (35 %)	1/8 (13 %)	0.48	8/22 (36 %)	0/6 (0 %)	0
VF + ROSC anytime (non-shockable intermittent rhythms included)	26/34 (76 %)	24/50 (48 %)	0.02	27/36 (75 %)	23/48 (48 %)	0
VF + ROSC anytime (non-shockable intermittent rhythms excluded)	18/20 (86 %)	17/29 (59 %)	0.03	19/21 (91 %)	16/28 (57 %)	0
VF → last rhythm ROSC (non-shockable intermittent rhythms excluded)	15/16 (94 %)	17/28 (61 %)	0.04	16/17 (94 %)	16/27 (59 %)	0
VF + PEA anytime (asystole excluded)	7/16 (44 %)	8/24 (33 %)	0.74	9/19 (47 %)	6/21 (29 %)	0
VF + last rhythm PEA (asystole excluded)	3/6 (50 %)	1/11 (9 %)	0.2	4/8 (50 %)	0/9 (0 %)	0
VF + asystole anytime (PEA included)	3/16 (19 %)	2/23 (9 %)	0.65	4/18 (22 %)	1/21 (5 %)	0
VF + last rhythm asystole (PEA included)	0/7 (0 %)	0/17 (0 %)	x	0/7 (0 %)	0/17 (0 %)	

CPC 1, 2 / all patients

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Non-shockable Rhythms

Prague OHCA trial data

Initial rhythm	PEA (n = 45)	Asystole (n = 55)	p
No rhythm change	15 (33 %)	17 (31 %)	NS
Rhythm change	30 (67 %)	38 (69 %)	
→ Intermittent Rhythm			
ROSC	11 (24 %)	4 (7 %)	0.008
Asystole*	2 (4 %)	38 (100 %)	
VF	8 (18 %)	13 (24 %)	
PEA*	30 (100 %)	2 (4 %)	
→ Last Rhythm			
ROSC	6 (13 %)	16 (29 %)	0.0002
Asystole	12 (27 %)	29 (53 %)	
VF	5 (11 %)	2 (4 %)	
PEA	23 (51 %)	8 (15 %)	

Out of all non-shockable patients, CPC 1, 2 was achieved in 5 cases.

Non-shockable Rhythms

Prague OHCA trial data

ent No	1	2	3	4	5
(years)	35	45	66	58	68
der	Male	Female	Male	Male	Male
ander CPR	Yes	No	No	Yes	Yes
e from collapse to EMS (min)	4	Collapse after EMS arrival	Collapse after EMS arrival	10	9
domized to	Invasive	Invasive	Invasive	Invasive	Standard
e of CPR	50	34	49	49	28
al rhythm	PEA	PEA	PEA	Asystole	Asystole
thm profile	PEA →VF →PEA →ROSC	PEA →ROSC	PEA →**ECLS**	Asystole →VF →ROSC	Asystole →ROSC →BRADY →ROSC
ained ROSC on admission	Yes	Yes	No	Yes	Yes
e to hospital admission (min)	45	34	39	63	61
S implanted	No	No	Yes	No	No
se of cardiac arrest (including opsy findings)	Cardiomyopathy	Pulmonary embolism	Most likely myocardial infarction	Chronic heart failure	Aortic valv stenosis

Prognostic Role of Rhythms – Cox Regression Analyses

Parameters available during CPR

	All patients (n = 256)			Shockable rhythms only (n = 156)		
ariate	HR	95% CI	P	HR	95% CI	P
≥ 65 years	1.09	0.79-1.5	0.61	1.18	0.73-1.9	0.5
= woman	0.92	0.64-1.34	0.68	0.38	0.16-0.88	0.02
ph. assisted bystander CPR = yes	0.91	0.64-1.28	0.58	1.15	0.66-2.0	0.63
C anytime = yes	0.39	0.28-0.53	<0.0001	0.31	0.2-0.5	<0.0001
stole anytime = yes	2.43	1.79-3.3	<0.0001	2.38	1.51-3.76	0.0002

Parameters available after initial in-hospital evaluation

	All patients (n = 142)			Shockable rhythms only (n = 68)		
ariate	HR	95% CI	P	HR	95% CI	P
≥ 65 years	0.94	0.64-1.37	0.76	1.09	0.63-1.88	0.76
= woman	1.19	0.77-1.86	0.43	0.59	0.23-1.49	0.26
ph. assisted bystander CPR = yes	0.84	0.57-1.23	0.37	0.91	0.49-1.66	0.75
gth CPR >45 min = yes	1.85	1.11-3.08	0.02	3.9	1.9-8.0	0.0002
te coronary syndrome = yes	0.92	0.66-1.3	0.65	1.3	0.79-2.16	0.31
tained ROSC on admission = yes	0.55	0.32-0.93	0.02	0.87	0.45-1.69	0.68
stole on admission = yes	2.37	1.53-3.69	0.0001	3.44	1.76-6.74	0.0003

Conclusions

Conclusions

The post-initial rhythm profile could more precisely identify an outcome in refractory OHCA patients.

Deterioration of the initial shockable rhythm to asystole has a poor prognosis, even when ECPR is readily available.

An **ECPR-based approach seems beneficial** in patients with **ongoing VF** and **regular electrical activity**.

An **initial non-shockable rhythm** has an inauspicious prognosis, and a conversion to a shockable rhythm does not seem to improve outcomes.

Thank you!