

JOURNAL READING

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Journal 1

Predictive value of electrocardiogram in diagnosing acute coronary artery lesions among patients with out-of-hospital-cardiac-arrest

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Introduction

- AMI 是OHCA最常見的原因
- 早期做coronary angiograph和percutaneous coronary intervention對於此類病人有較佳的survival rate.
- emergent coronary angiography的indication為:在recovery of spontaneous circulation (ROSC)後, ECG顯示ST-segment elevation or presumed new left bundle-branch block

- 然而,對於沒有ST-elevation的病人,是否要做緊急心導管仍存在爭議
- 本篇研究針對, 是否ROSC後做的ECG,對於造成OHCA的acute or presumed recent coronary artery lesions, 具有診斷力

Methods- Study population

- January 2008 to July 2012
- Retrospective
- Inclusion criteria :
 - age > 18 years,
 - sustained ROSC (defined as > 20 min),
 - absence of any obvious extra-cardiac cause of OHCA

Methods- Study population

Exclusion criteria:

- significant co-morbidities before cardiac arrest
- a low probability for neurologic recovery
 - non-witnessed cardiac
 - arrest with long delays to advanced life support with absence of bystander resuscitation,
 - non-shockable rhythm on the first ECG,
 - very long interval to ROSC

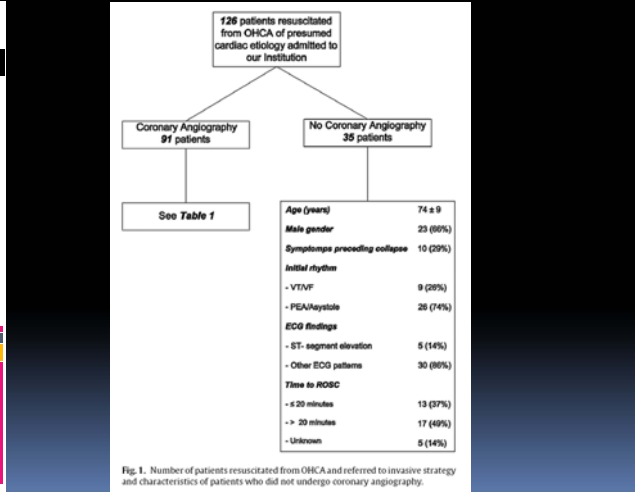


Fig. 1. Number of patients resuscitated from OHCA and referred to invasive strategy and characteristics of patients who did not undergo coronary angiography.

Methods- Study population

- Obstructive coronary artery disease 被定義為: 管徑至少減少 50%
- Acute or presumed recent coronary artery lesions 被定義為: 在angiographic至少可以發現下列其中一項:
 - Acute coronary thrombotic occlusions or irregular eccentric stenoses with a narrow neck,
 - acute angles or thrombotic apposition easily crossed by a guide wire.

Methods- Study population

- acute or presumed recent coronary artery lesion 才會施行Percutaneous coronary intervention (PCI).
- 成功的PCI被定義為
 - residual stenosis < 50% with Thrombolysis in Myocardial Infarction (TIMI) 3 grade flow.

Results

Table 1 Characteristics of patients, cardiac arrest, electrocardiographic findings.

	All patients (n=91)	ST-segment elevation (n=40)	Other ECG patterns (n=51)	p value
Age (years)	64 ± 12	62 ± 11	65 ± 13	0.28
Male gender	69 (76%)	29 (73%)	40 (78%)	0.51
Smoking status	46 (51%)	20 (50%)	26 (51%)	0.93
Hypertension	55 (60%)	21 (53%)	34 (67%)	0.17
Diabetes mellitus	13 (14%)	3 (8%)	10 (20%)	0.10
Hypercholesterolemia	21 (23%)	10 (25%)	11 (22%)	0.70
History of coronary artery disease	23 (25%)	8 (20%)	15 (29%)	0.31
Symptoms preceding collapse	25 (28%)	12 (31%)	8 (16%)	0.004
Comatose at hospital admission	85 (93%)	37 (93%)	48 (94%)	0.81
Initial rhythm				0.70
Ventricular tachycardia or ventricular fibrillation	70 (77%)	30 (75%)	40 (78%)	
Pulseless electrical activity or asystole	21 (23%)	10 (25%)	11 (22%)	
Time to ROSC				0.91
≤ 20 min	46 (50%)	20 (50%)	26 (51%)	
> 20 min	37 (41%)	17 (43%)	20 (39%)	
Unknown	8 (9%)	3 (8%)	5 (10%)	
ECG findings				
ST-segment elevation	40 (44%)	40 (100%)	-	
ST-segment depression	20 (22%)	-	20 (39%)	
Known left bundle branch block	8 (9%)	-	8 (16%)	
Right bundle branch block	4 (4%)	-	4 (8%)	
Pacemaker rhythm	4 (4%)	-	4 (8%)	
Nonspecific changes or normal	15 (16%)	-	15 (29%)	

History of coronary artery disease was defined if at least one of the following was present: a history of angina or acute coronary syndrome, any known significant obstructive coronary disease and prior percutaneous coronary interventions or coronary artery bypass graft surgery.

Results

Table 2 Results of coronary angiography.

	All patients (n=91)	ST-segment elevation (n=40)	Other ECG patterns (n=51)	p
Significant coronary artery disease	78 (86%)	39 (98%)	39 (77%)	0.004
Extent of significant coronary artery disease				0.20
Single vessel disease	21 (27%)	14 (36%)	7 (18%)	
Two vessels disease	22 (28%)	10 (26%)	12 (31%)	
Three vessels disease	35 (45%)	15 (38%)	20 (51%)	
≥ 1 acute or presumed recent coronary lesions	51 (56%)	34 (85%)	17 (33%)	<0.001

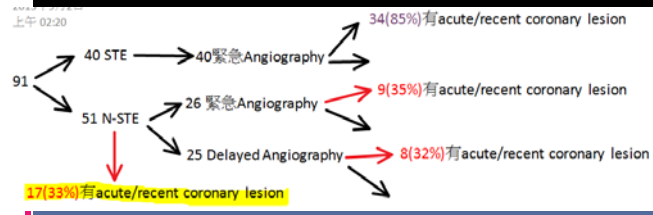
Table 3 Characteristics of acute or presumed recent culprit lesions and results of percutaneous coronary intervention.

	Total acute lesions (n=51)	ST-segment elevation (n=34)	Other ECG patterns (n=17)	p
Location of acute or presumed recent culprit lesion				0.46
Left main coronary artery	5 (10%)	4 (12%)	1 (6%)	
Left anterior descending coronary artery	21 (41%)	16 (47%)	5 (29%)	
Left circumflex coronary artery	15 (29%)	9 (27%)	6 (35%)	
Right coronary artery	10 (20%)	5 (15%)	5 (29%)	
Proximal location of culprit lesion	23 (45%)	15 (44%)	8 (47%)	0.84
Attempted PCI of culprit lesion	41 (80%)	30 (88%)	11 (65%)	0.065
Successful PCI of culprit lesion (when attempted)	38 (93%)	28 (83%)	10 (91%)	1.00

Results

Table 4 Coronary artery disease in patients without ST-segment elevation according to the timing of coronary angiography.

	Emergent coronary angiography (n=26)	Delayed coronary angiography (n=25)	p
Significant coronary artery disease	20 (77%)	19 (76%)	0.94
Extent of significant coronary artery disease			0.30
Single vessel disease	5 (25%)	2 (11%)	
Two vessels disease	7 (35%)	5 (26%)	
Three vessels disease	8 (40%)	12 (63%)	
≥ 1 acute or presumed recent coronary lesions	9 (35%)	8 (32%)	0.84



Results

- STE on post-ROSC ECG 對於診斷病人是否有 acute or presumed recent coronary artery lesions:
 - Good positive predictive value (85%)
 - low negative predictive value (67%)

Discussion

- 在Angiography診斷為 acute or presumed recent coronary artery lesions,有33%的病人為N-STE
- STE對於診斷ROSC的OHCA病人,是否有 acute or presumed recent coronary artery lesions,有較低的sensitivity and negative predictive value

Discussion

- Other study: NPV:83.7%; NPV:42%
- Our study: NPV:67%
- ECG對於left circumflex artery的AMI較無法診斷
- Our study: NSTEMI有LCx急性梗塞(35%)

Discussion

- The absence of STE on post-ROSC ECG should not be considered as a criterion for not performing or delaying emergency coronary angiography in patients resuscitated from OHCA without obvious extra-cardiac cause
- 就算沒有STE,也應該做緊急心導管

Journal 2

Assessment of risk factors for post-rewarming "rebound hyperthermia" in cardiac arrest patients undergoing therapeutic hypothermia[‡]

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Introduction

- Therapeutic hypothermia (TH)從2002年始
- ROSC的OHCA病人若有VT/VF, 建議cooled to a core body temperature between 32 °C and 34 °C for 12–24 h
- TH對於pulseless electrical activity (PEA) and asystole可能也有助益

Introduction

- TH complications:
 - increased infection risk,
 - electrolyte disturbances
 - impaired drug metabolism
 - cold diuresis
 - Hypovolemia
 - mild coagulopathy
 - insulin resistance

Introduction

- rebound hyperthermia(RH),定義為: 在停止低溫療法後24小時內,中心體溫大於等於38.5 °C
- 有研究顯示RH有higher risk for mortality and neurologic morbidity, 然而未有研究提出那些病人易有RH

Methods - Study design

- retrospective, observational study
- January 1, 2007 to January 1, 2011
- 4 hospital
- ICD9, cardiac arrest, 427.5
- Inclusion criteria : OHCA and completion of the TH protocol.
- Exclusion criteria : trauma-induced cardiac arrest and 住院小於三天**

Methods - Therapeutic hypothermia protocol

- Absolute contraindications:
 - 小於18 years old,
 - pregnancy,
 - presenting temperature of less than 30 °C.
- Relative contraindication :
 - persistent hypotension despite the use of vasopressor/inotropic support due to any cause of shock

Methods - Therapeutic hypothermia protocol

- infusing a bolus of 4 °C N/S, administering rectal acetaminophen
- be cooled until a core body temperature of 32–34 °C was achieved,
- maintained for a goal of 24 h, than start to passively re-warm

Methods - Study outcomes

- primary outcome: presence of a body temperature greater than 38.5 °C during the first 24 h of the re-warming process.
- Secondary outcomes
 - in-hospital mortality due to any cause,
 - length of stay (LOS),
 - neurologic morbidity at discharge using a modified Rankin scale

Methods - Study outcomes

Table 14. Modified Rankin Scale (MRS)

- 0 No symptoms
- 1 No significant disability, despite symptoms; able to perform all usual duties and activities
- 2 Slight disability; unable to perform all previous activities but able to look after own affairs without assistance
- 3 Moderate disability; requires some help, but able to walk without assistance
- 4 Moderately severe disability; unable to walk without assistance and unable to attend to own bodily needs without assistance
- 5 Severe disability; bedridden, incontinent, and requires constant nursing care and attention
- 6 Death

Results

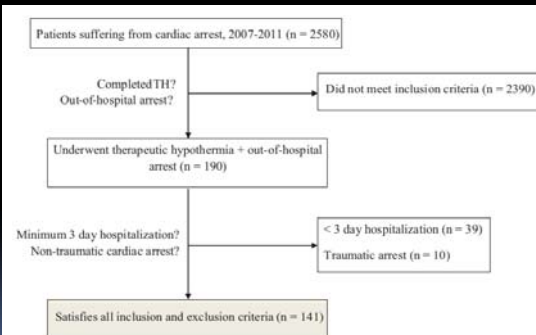


Fig. 1. Methodology flow diagram.

Table 1
Patient baseline demographics.

	All patients (n=141)	Rebound hyperthermia (n=42/29.8%)	No rebound hyperthermia (n=99/70.2%)	p value
Median age ^a , years (range)	57 (19-88)	55 (23-88)	60.5 (19-88)	0.38
Female gender ^b	43 (30.5%)	11 (26.2%)	32 (32.3%)	0.55
Mean BMI, kg/m ² (range)	28.7 (19.4-58.2)	29.1 (19.4-42.1)	28.2 (19.4-58.2)	0.64
Ventricular fibrillation arrest ^b	97 (68.8%)	29 (69.0%)	68 (68.7%)	1.00
PEA arrest ^b	24 (17.0%)	5 (11.9%)	19 (19.2%)	0.34
Asystolic arrest ^b	19 (13.5%)	9 (21.4%)	10 (10.1%)	0.10
Caucasian ^b	121 (85.8%)	35 (83.3%)	86 (86.9%)	0.60
Presence of diabetes mellitus ^b	36 (25.5%)	11 (26.2%)	25 (25.3%)	1.00
Smoker ^b	73 (51.8%)	20 (47.6%)	53 (53.5%)	0.58
Witnessed arrest ^b	100 (70.9%)	29 (69.0%)	71 (71.7%)	0.84
Minimum temperature ^a	32.0 (30.0-33.4)	32.2 (30.0-33.4)	32.0 (30.0-32.9)	0.15
Time spent < 34 (degrees Celsius) ^a	23 (12-38)	22 (12-33)	24 (12-38)	0.23
Admission arterial blood gas values				
pH	7.24 (6.80-7.50)	7.27 (7.04-7.43)	7.23 (6.80-7.50)	0.11
pO ₂ (mmHg) ^a	218 (18-547)	233 (54-563)	209 (18-547)	0.39
pCO ₂ (mmHg) ^a	45 (19-108)	42 (19-81)	49 (20-108)	0.07
Lactate (mg/dL) ^a	5.7 (0.6-18.0)	5.2 (0.6-16.1)	5.9 (1.0-18.0)	0.33
Admission potassium (mg/dL) ^a	4.2 (2.4-8.5)	4.2 (2.6-7.0)	4.3 (2.4-8.5)	0.89
Admission WBC (1000 cells/μL) ^a	13.9 (4.1-33.0)	13.8 (4.7-30.4)	14.0 (4.1-33.0)	0.85
Maximum WBC prior to rewarming (1000 cells/μL) ^a	18.2 (5.7-43.3)	17.5 (5.7-32.7)	18.5 (5.8-43.3)	0.45
Minimum potassium prior to rewarming (mg/dL) ^a	3.1 (2.0-4.6)	3.1 (2.0-4.0)	3.2 (2.1-4.6)	0.75

Data are expressed as n (proportion) or n (range). Abbreviation: BMI: body mass index; PEA: pulseless electrical arrest; WBC: white blood cell count.

^a p values computed with two-sided Student's t-test.

^b p values computed with two-sided Fisher's exact test.

Table 2
Likelihood ratio test results for each independent risk factor for rebound hyperthermia.

Risk factor	df	χ ² score	p > χ ²
Sex	1	0.5233	0.47
Smoker	1	0.4134	0.52
Diabetes mellitus, type 1 or 2	1	0.0933	0.76
Ethnicity ^a	2	0.3075	0.858
Initial arrest rhythm ^b	3	4.1917	0.242
Age	1	0.5102	0.475
BMI	1	0.4297	0.512
Witnessed arrest	1	1.3818	0.24
Tmin	1	0.3783	0.539
Total time spent < 34°C	1	1.3584	0.244
Admission ABG			
pH	1	2.0537	0.152
pO ₂	1	0.5991	0.439
pCO ₂	1	0.6789	0.41
Admission arterial electrolyte			
Potassium	1	0.0176	0.895
WBC	1	0.0013	0.972
Prior to initiation of therapeutic hypothermia			
Maximum WBC	1	0.8327	0.362
Minimum potassium	1	0.0362	0.849

Abbreviations: df: degrees of freedom; χ²: chi square; BMI: body mass index; Tmin: minimum temperature reached during therapeutic hypothermia; ABG: arterial blood gas; WBC: white blood cell count.

^a Caucasian, Hispanic, or Black.

^b Ventricular fibrillation/ventricular tachycardia, asystole, bradycardia, or pulseless electrical arrest.

Table 3
Compilation of results from modified Rankin scale classification.

	Modified Rankin score						
	0	1	2	3	4	5	
No rebound hyperthermia (n=99)	6 (6.06%)	6 (6.06%)	10 (10.1%)	8 (8.08%)	19 (19.2%)	10 (10.1%)	40 (40.4%)
Rebound hyperthermia (n=42)	1 (2.38%)	2 (4.76%)	2 (4.76%)	1 (2.38%)	5 (11.9%)	4 (9.52%)	27 (64.3%)

Data are expressed as n (proportion).

LOS: no significant

P=0.011

Discussion

- (1) no potential risk factors were found to be associated with the development of TH,
- (2) TH is associated with increased risk for in-hospital mortality and neurologic morbidity at discharge,
- (3) TH is not associated with an increased length of stay.

Discussion

- Cause of hyperthermia:
 - Infection
 - Post-resuscitation SIRS
 - physiologic response to the cooling process
- TH initially masks the fever of an infectious process, delaying diagnosis and treatment.

Discussion

- **Limitation:** a multicentre project, four hospitals were located within 60 miles with fairly homogenous patient populations.
- modified Rankin Scale (mRS) is used for stroke
- 選擇只少住院三天以上, 是因TH protocol 至少要2~3天來完成

