



# 處理急救病患之十個重點

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新光急診 張志華

*Ten things you must consider in the crashing patient.  
Amal Mattu. GSEM 2007*



# Case 1: 55Y M

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CC: 全身不舒服，躺也不是坐也不是  
沒有痛處、不喘

PE:

- Awake, diaphoretic, look sick
- Afebrile, PR 120, RR 28, BP 85/40, SpO2 96%, F/S 120



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Mx:

- O2 mask, on 2 large-bore IV, on monitors
- ECG: Sinus tachycardia

What's next?



# What's next?

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## The 4 triads

- A-B-C
- O2-IV-Monitor
- Vital signs: BP-PR-RR
- DDx: Hx-PE-Lab



# What's next?

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## The 4 triads

- A-B-C
- O2-IV-Monitor
- Vital signs: BP-PR-RR
- DDx: Hx-PE-Lab

## Give me data... 陷阱！

- CBC+DC, BCS/MAR, CXR, BNP, D-dimer, U/A, ....
- About 1 hour delay
- What should you do in the mean time?



# The Crashing Patients

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## Critical interval between ABC and CBC

- About 1 h, the **golden hour**
- What should be considered?
- 急診醫師的真正考驗！

10 things should be considered in managing a crashing patient (mnemonic):

- AA
- BB
- CC
- DD
- EE



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# A: Aorta

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Meron G et al: Non-traumatic aortic dissection or rupture as cause of cardiac arrest: presentation and outcome. *Resuscitation*. 2004 Feb;60(2):143-50.

**Design:** Retrospective analysis in a tertiary care hospital ED.

**Results:** Over 11.5 years, aortic dissection/rupture was identified as the immediate cause of cardiac arrest in 46 (2.3%) out of 1990 patients with sudden cardiac arrest, primarily affecting the abdominal aorta in 25 and the thoracic aorta in 21 cases. The characteristics of the 46 patients were as follows: male gender (74%), median age 71 years (IQR 59–76), high co-morbidity (89%), previously known aortic aneurysm (33%), **pulseless electric activity (70%)** as initial cardiac rhythm. When performed, **bedside abdominal sonography was almost always diagnostic**. Patients with abdominal aortic dissection/rupture had **abdominal (52%)** and/or flank pain (32%). Patients with thoracic aortic dissection/rupture complained of **chest pain (48%)** or dyspnoea (19%). Return of spontaneous circulation occurred in 12 (26%) of 46 patients, emergency surgery was performed in eight of these patients, 2 (4%) survived to discharge in good neurological condition.

**Conclusions:** Cardiac arrest caused by aortic dissection/rupture is rare, and mortality remains very high, even when circulation can be restored initially. Common features such as previously known aortic aneurysm, old age, male gender and pulseless electrical activity as initial cardiac rhythm should increase suspicion of the condition.





# A: Aorta

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Atypical presentation in half of the time

- **AAA**: 48% have no abdominal pain hx
- Thoracic **AD**: 52% hve no chest pain hx

Cardiac arrest with initial **PEA**

- Always think of **PE**
- Why thrombolytics controversial?
  - disastrous if **AAA** or **AD**

Bedside echo

- Almost always diagnostic
- *Crashing p't = always echo - heart and abdomen !!*



# Back to case 1: 55Y M

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CC: 全身不舒服，躺也不是坐也不是  
沒有痛處、不喘

During portable CXR:

- Conscious loss
- PEA



# Back to case 1: 55Y M

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CC: 全身不舒服，躺也不是坐也不是  
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During portable CXR:

- Conscious loss
- PEA

Mx:

- ABC: ETT, ACLS...
- EUS: large pericardial effusion with tamponade
- Pericardiocentesis ... using CVP kit
- Regained GCS and vital signs - transfer for OP and survived



# IMPORTANT !!

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Always do a bedside echo (heart/belly) when treating

- Crashing patient
- OHCA / IHCA

Regardless whether or not they got pain in the

- chest,
- back, or
- abdomen

Echo findings

- AAA = aneurysm + free fluids
- AD = pericardial effusion causing tamponade



## Case 2: 65Y M

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CC: 因 syncope 就醫，全身不舒服，躺也不是坐也不是  
沒有痛處、不喘

Course:

- Awake, diaphoretic, look sick
- Denied chest/back/belly pain
- Afebrile, SBP 90



## Case 2: 65Y M

---

CC: 因 syncope 就醫，全身不舒服，躺也不是坐也不是  
沒有痛處、不喘

### Course:

- Awake, diaphoretic, look sick
- Denied chest/back/belly pain
- Afebrile, SBP 90
- EUS → AAA (6x7 cm) with free fluid
- Vigorous fluids and emergent transfusion
- Send to OR (SBP 70) without CT...

Outcome: Survived without complications



## Case 3: 48 Y Female

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- Conscious disturbance
- Severely dehydrated, Kussmaul respirations (RR 36), BP 90/60, PR 120, afebrile
- F/S: high
- ABGs: pH 7.08, HCO<sub>3</sub>=8, PCO<sub>2</sub>=18



## Case 3: 48 Y Female

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- Conscious disturbance
- Severely dehydrated, Kussmaul respirations (RR 36), BP 90/60, PR 120, afebrile
- F/S: high
- ABGs: pH 7.08, HCO<sub>3</sub>=8, PCO<sub>2</sub>=18
- Mx: Fluid boluses, blood routine, ketone, Osm, ECG, CXR...
  
- 家屬：病人睡著了，RR 12





## Case 3: 48 Y Female (續)

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- 叫不醒，RR 12, lip cyanosis
- On endo (RSI with Etomidate + Rocuronium) and MV
  - A/C mode, RR 14, TV 500, FiO<sub>2</sub> 100%
- Few minutes later...
  - bradycardia followed by asystole
  - 開始 CPR !
  
- What happened ?



# A: Acidosis

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- Severe metabolic acidosis
  - E.g. pH 7.08,  $\text{HCO}_3=8$ ,  $\text{PCO}_2=18$ ; which is normal?
    - RR 36 or
    - RR 14 ?
- Causes of severe acidosis
  - DKA
  - Aspirin overdose – tends not to intubate!
  - Severe sepsis
  - Asthma/COPD



# A: Acidosis

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- Severe acidosis 做 RSI + MV 要注意的重點：
  - RSI 盡可能用 succinylcholine
  - If paralyzed, set RR to that prior to resp fatigue
  - If pt crashed just after MV, check DOPES:
    - D:
    - O:
    - P:
    - E:
    - S:



# A: Acidosis

---

- Severe acidosis 做 RSI + MV 要注意的重點：
  - RSI 盡可能用 succinylcholine
  - If paralyzed, set RR to that prior to resp fatigue
  - If pt crashed just after MV, check DOPES:
    - D: Dislodgement
    - O: Obstruction
    - P: Pneumothorax
    - E: Equipment failure
    - S: Stacked breaths (PEEP)



## Case 4: 25 Y Male

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- MBA with multiple trauma
- E2M4V2, BP 70/40, ascites(+)
- RSI → PEA
  
- What happened ?



## B: Bagging

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- Almost always → bag too fast
  - 非正式統計：56/min for 生手
- Hypovolemia + hyperventilation
  - BP drop
- CPR + hyperventilation
  - Cardiac output decrease



# B: Bagging

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- 重點：

- Ambu bagging → “Slow down... slow down...” if
  - Hypovolemia
  - Cardiac arrest
- Vigorous volume replacement
- Smaller TV (6~8 cc/kg)



## Case 5: 19 Y Female

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- Stool impaction, constipation 3 days
- Stable, abdomen obese and soft
- Fleet enema... 洗手間傳來慘叫聲





## Case 5: 19 Y Female

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- Stool impaction, constipation 3 days
- Stable, abdomen obese and soft
- Fleet enema... 洗手間傳來慘叫聲
  
- 驚見胎頭產出 (6-mo baby)



## B: Baby

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- Child-bearing age female → always EIA
  - Abd / GI complaints
    - Abd cramps, nausea/vomiting...
  - Trauma
  - Need x-rays / CT



## Case 6: 21 Y Female

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- Diarrhea x1, low abd pain then bilateral shoulder pain
- BP 88/40, PR 68, RR 16
- 自訴平常 BP 就 80-90 左右
- Abd: soft, minimal periumbilical tenderness



## Case 6: 21 Y Female

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- Diarrhea x1, low abd pain then bilateral shoulder pain
- BP 88/40, PR 68, RR 16
- 自訴平常 BP 就 80-90 左右
- Abd: soft, minimal periumbilical tenderness
  
- 學長: 病人PR不快, 不會是 ectopic, 只是 AGE 啦, 打支 keto 休息看看, 不痛就 MBD...



## B: Baby

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- Child-bearing age female + shock
  - Always consider ectopic!
  - *Paroxysmal bradycardia* common - due to vagal response, also in
    - Ruptured AAA
    - Traumatic hemoperitoneum
- So, do not rely on tachycardia
  - Always get EIA and echo!

# B: Baby

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## ○ 孕婦 CPR



Whole body tilted  
→ CPR less effective

# B: Baby

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## ○ 孕婦 CPR



Whole body tilted  
→ CPR less effective



Thorax supine  
→ CPR more effective



## B: Baby

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### ○ 孕婦 ACLS

- VT/VF – 避免 Amiodarone, 可選 lidocaine, MgSO<sub>4</sub>...
- Defib/cardioversion – safe for fetus (even in the 3rd trimester) ; 電擊時記得要移除 monitoring devices
- TCP/TVP – safe for fetus





## B: Baby

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### ○ Perimortem C/S

- 較貼切：perimortem fetal extrication
- when CPR > 4 min 仍無 ROSC
- when 20th-23rd week gestation - fundus above umbilicus (20th week)
- maternal survival increase 80%
  - C/S may be needed even if baby nonsalvageable (no fetal heart beat on doppler)
  - Do not attempt C/S if arrest time > 20 min



# C: Compression

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- CPR – why 30:2 and not 15:2 ?
  - OHCA study – no prehospital chest compression 43% of the time
  - IHCA study – many CPR with compression rate < 100/min
    - if >100/min → 75% survival
    - if < 100/min → 42% survival
  - 15:2 ratio – cannot achieve 100/min, only ~60/min (26 s hands-off time)
- 結論：“Push hard, push fast!”



# C: Cooling

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- Best indication
  - Adult OHCA patients due to VF
  - ROSC and unconscious on arrival



# C: Cooling

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- Hypothermic therapy
  - 32°C to 34°C for 12 to 24 hours
  - Ice packs to groins, neck and axillae – will drop BT 1 degree/hour
  - If shivering → intubate and paralysis



## D: Decline

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- Trendelenberg position - myth
  - Not effective for CPR - increases regurgitation and airway problems, causes the brain to swell, increases breathing difficulty, decreases CO
  - Supine is OK for CPR



## D: Decline

---

- Trendelenberg position - myth
  - Not effective for CPR - increases regurgitation and airway problems, causes the brain to swell, increases breathing difficulty, decreases CO
  - Supine is OK for CPR
- Trendelenberg position is OK during neck / subclavian CVP insertion



## D: Defibrillation

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- Biphasic waveform – myth
  - ACLS 2000 – recommended
  - AHA 2005 – though lower current, but not better than monophasic



# D: Defibrillation

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- If VF > 4-5 min
  - CPR 2 min before defib
  - Avoid stacked shocks, shock only once with 360J (max energy if biphasic)
  - CPR 2 min just after defib before pulse check





# E: Effusion and Embolism

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- Pericardial effusion and pulmonary embolism – many in common
  - SOB
  - Shock
  - PEA
  - Clear breath sounds
  - Distended neck veins
  - Risk: malignancy, pregnancy



# E: Effusion and Embolism

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## Effusion

## Embolism

CXR

ABGs

Echo

ECG

Fluid

ETT

TPA

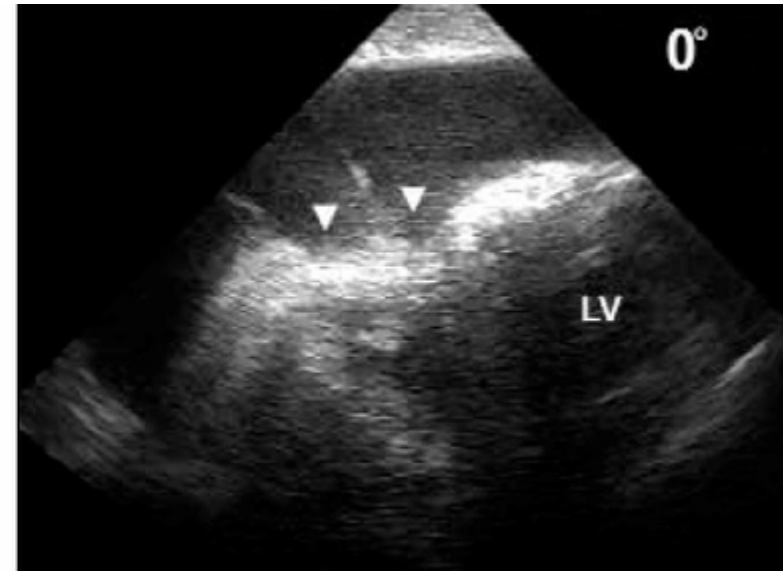
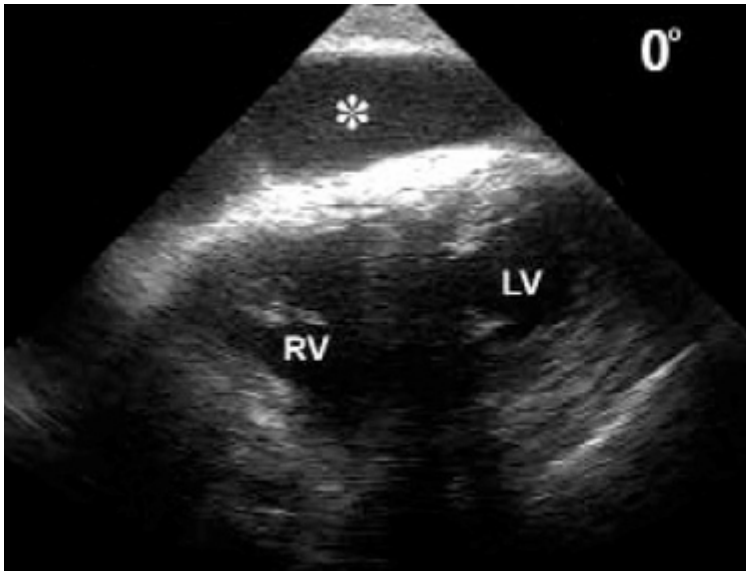


# E: Effusion and Embolism

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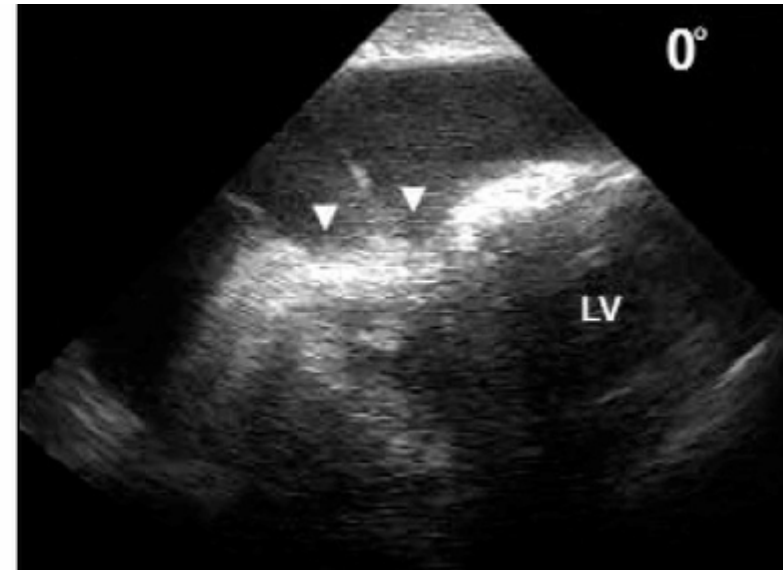
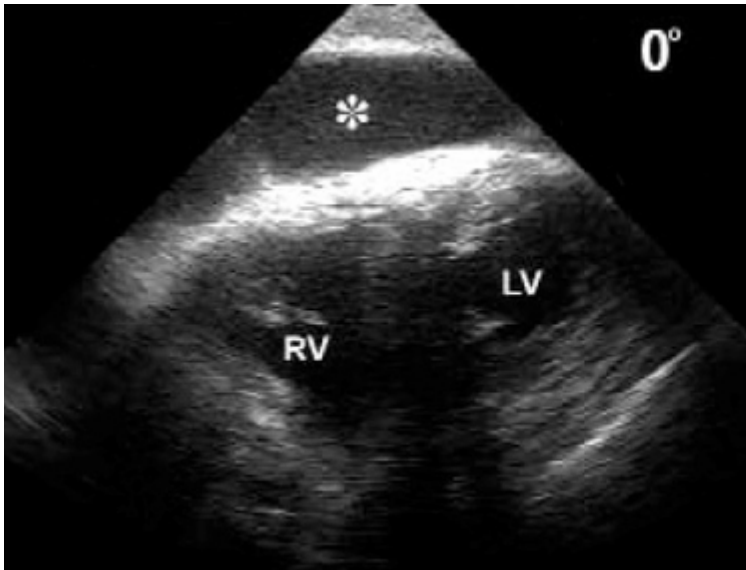
	<b><u>Effusion</u></b>	<b><u>Embolism</u></b>
<b>CXR</b>	cardiomegaly	no cardiomegaly
<b>ABGs</b>	good O2	hypoxemia
<b>Echo</b>	effusions	distended RV
<b>ECG</b>	tachy + low voltage	tachy + S1Q3T3
<b>Fluid</b>	BP up	BP drop
<b>ETT</b>	BP drop	BP up
<b>TPA</b>	No	Yes

# Echo



Pericardial tamponade causes diastolic collapse RV

# Echo



Pericardial tamponade causes diastolic collapse RV



PE: Severely distended RV with septal displacement into LV



# More for cardiac arrest...

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- Deemphasize...
  - Amiodarone
  - Vasopressin



# More for cardiac arrest...

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- Deemphasize...
  - Amiodarone
  - Vasopressin
  
- Avoid...
  - High-dose epinephrine
  - Hyperthermia
  - Hyperglycemia



# Summary

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# 記：AA - BB - CC - DD -EE

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A : Aorta

A : Acidosis

B : Baby

B : Bagging

C : Compression

C : Cooling

D : Decline

D : Defibrillation

E : Effusion

E : Embolism