



**ThinkAskLearn**  
Health Professional Education

**Chest Pain Management: More  
than you thought...**

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[www.thinkasklearn.com.au](http://www.thinkasklearn.com.au)



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**Not all what is it seems**

- 38 year old male
- Presents at 0300hrs with “Rt sided chest pain, non radiating, with associated L leg numbness, Nil SOB with same”
- Onset 2 hrs ago, Finished work at 2300hrs
- Nil previous Hx
- “dull ache in his chest and epigastrium and RUQ
- Also noticed that his left leg felt weak and tingling” med notes...



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**Triage Category**

- P 80, BP 130/76, RR 18, T 36.4 Sats 98% RA, GCS 15,
- ATS 3
- Given Panadiene Forte, Ketoralac IM,
- ECG undertaken
- Placed in WR



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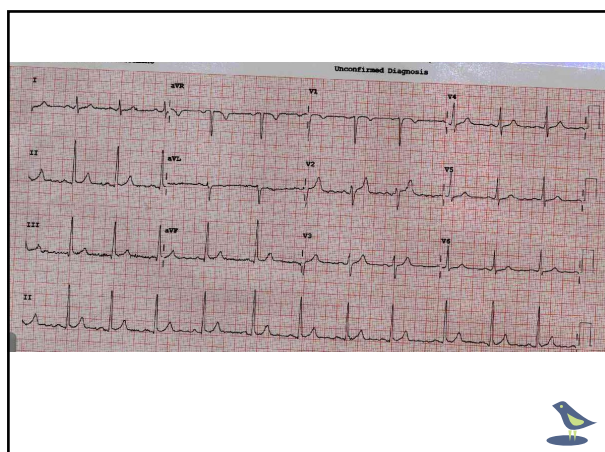
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### Seen By ED Medic

- Waited in WR for 6+ hrs SB DR 0900hrs,
- Social Hx
  - Non smoker
  - Denies Etoh
  - Denies illicit drugs
  - Works in fast food restaurant
  - Usually fit and well

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### Clinical Assessment

- Neuro:
  - Left leg 4/5 power
  - Right leg 5/5 power
  - Sensation of lower limb intact
- CVS:
  - Cap refill < 2 seconds
  - Dual heart tones - diastolic murmur
  - Poor right pulse radial compared to bounding left radial pulse
- BP right arm 80/50, left arm 133/80

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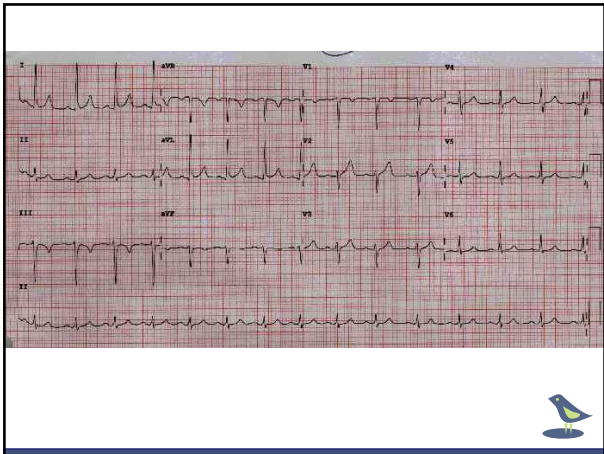
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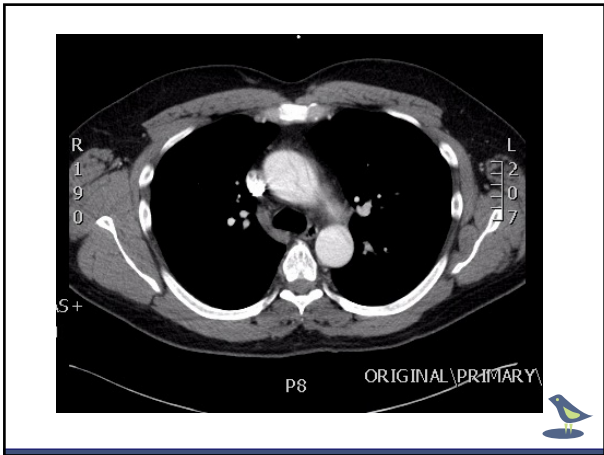
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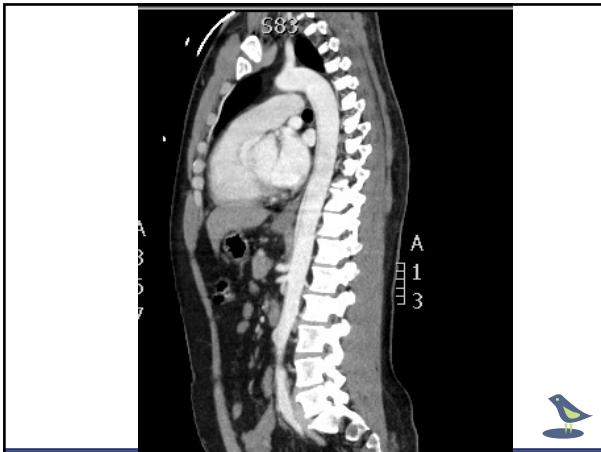
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### Aortic dissection

- Estimated 3 per 100 000 patients per year
- Many die before presentation
- About 40% are missed on initial presentation
- Tearing type pain suggestive
- Systemic Hypertension +age>70 yrs
- Tear in the inner layer of the aortic wall allowing blood to track between the intima (inner layer) and media (middle layer)



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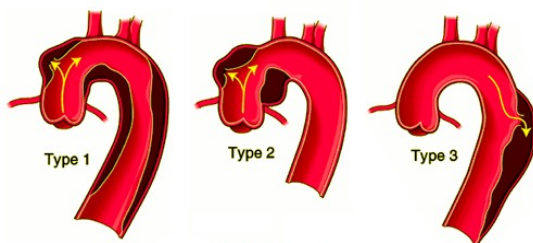
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### Rt Subclavian = BP difference



Aortic Dissection

Less than 50% of patients survive if aorta ruptures



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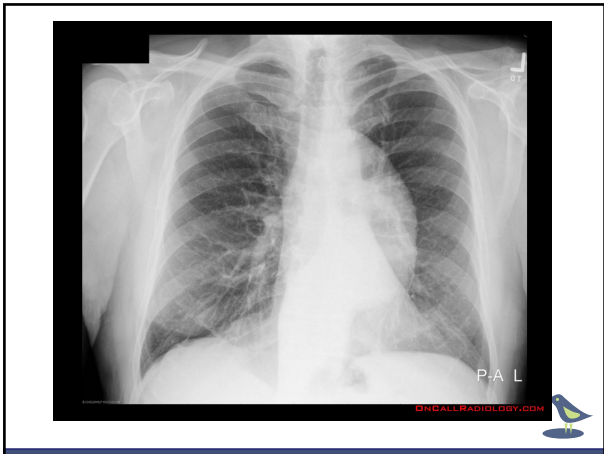
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How old are you to have a thoracic dissection repaired

- Technique developed by DeBakey in 1955.
- Death sentence to treatable disorder
- Dr. DeBakey developed aortic dissection at age 97,
- At age 98 became the oldest patient to survive the surgical procedure he pioneered



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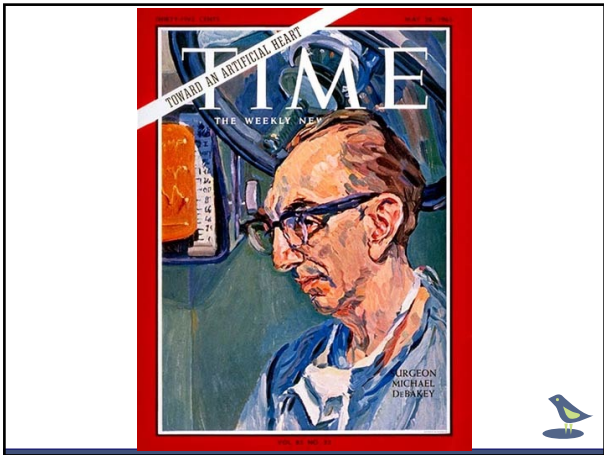
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### Otherwise well lady

- 56 year old lady walks into ED @2215hrs
- Referred by well known 'Home GP'
- No letter
- Collapse at home, hypotensive with GP
- Feels generally unwell
- At triage BP 108/74, P 94, Sats 95% RR 18
- What triage Category?
- Secondary triage undertakes an ECG



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### Secondary Triage/CIN

- Notes Patient looks pale, mottled skin
- Does lying and standing BP – No change
  - Probably should abandon this test for hypovolaemia
- Records pulse now at 121bpm, RR 18
- Does full set of bloods/cannula
  - ELFT, U/E, INR, Ddimer, CRP
- Is placed on bed in ED



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### And then she lived happily ever after...

- Obs done hourly 12mn, 0100, 0200hrs
  - Remains tachycardic, lowish BP, pale
- 0235hrs – Sudden Cardiac Arrest
- Immediate high quality CPR, Adrenaline, BVM ventilation + intubation
- PEA rhythm – No output
- CPR ceased at 0249hrs



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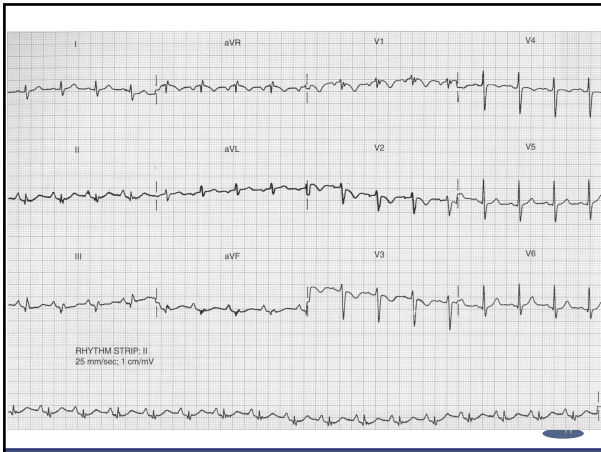
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### Pulmonary embolism

- 1 in 1000 patients per year
- Dislodged venous clot migrates through the right side of the heart
- Becomes lodged at the branch point of the pulmonary arteries (saddle embolus) or more distally
- Chest pain, SOB
- ECG classic signs are a large S wave in lead I, a large Q wave in lead III and an inverted T wave in Lead III – (Up to 20% of large PE's)



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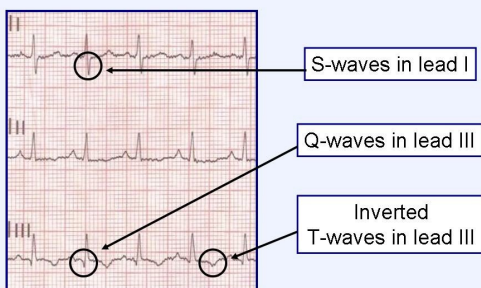
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### S1Q3T3



ems12lead.com



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### D Dimer - To hell and back

- Good test but often misused
- Wells Criteria (Wells et al 2003)
- High pre test probability – No really required
- Moderate pre test probability - Negative can rule out PE, Positive – maybe PE
- Low Probability - ?Why do test
- Probability scoring before test
- False positives- Hey CT's aren't perfect too



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### Massive PE removal



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### Another quick case....

- A 45 year old male,
- Drinking heavily, with wife at friends party
- Wife noticed him to be missing
- Found ALOC on front lawn
- Ambulance found hypoxic, vomiting, initially GCS 3 – woken to GCS 13



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## IN ED

- GCS 13 at best,
- P 96, BP 115/76 Sats 95% Rm air
- 'Decreased air entry Lt side, lying on side'
- Slightly Combative
- Thought to be intoxicated, wake and review and probably home.
- Get CXR to rule aspiration....



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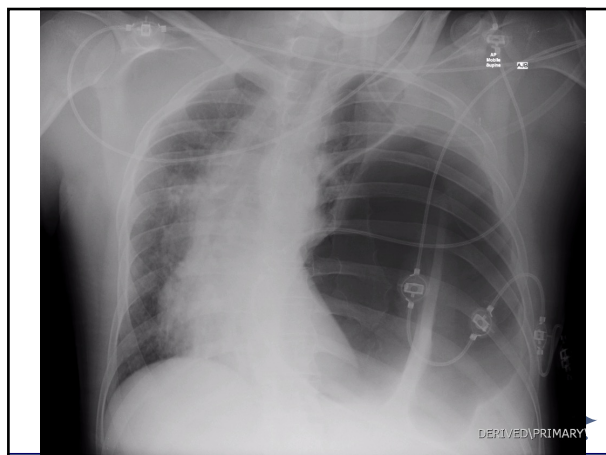
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## Tension Pneumothorax Clinical Signs

- Deviation of the trachea
- Hyper-expanded chest
- Increased percussion note
- Decreased Airway movement
- Central venous pressure is usually raised
- More commonly tachycardia, tachypnoea, and hypoxic



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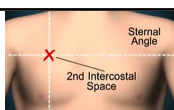
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## Needle Decompression



- To Xray or Not - Clinical diagnosis
- Complications of Needle decompression
  - Lung damage, ineffective, air embolism, kinked,
- It should not be used lightly.
- It should never be used just because we don't hear breath sounds on one side. BUT
- In clear cut cases: shock with distended neck veins, reduced breath sounds, deviated trachea, it could be life saving.



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## Take away messages

- Not all chest pain is cardiac in nature
- Be suspicious of all chest pain
- Changing parameters for cardiac care
- Oxygen is good for you in certain situations



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## Oxygen in Chest Pain

- Meta-analysis from Cabello et al 2010 (Cochrane)
- 387 patients with MI/14 deaths
- Those patients that had oxygen, 3 times more likely to die
- No change in pain scores if oxygen used



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## Arguments against study

- Very small number of patients
- Not sufficiently powered to make conclusive statements
- Deaths could be by chance
- Only focused on MI not routine chest pain
- Studies unblinded, one study used was 34 years old,



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## What is not argued about

- There is very little evidence for the role of oxygen in MI or Chest Pain.
- Large Randomised trial required to clarify the role of oxygen in these patients
- Evidence suggestive of possible harm from the use of oxygen in MI.



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## How might oxygen cause harm

- This is not clear
- There might be a number of factors at work:
  - Oxygen free radical pathway that causes further damage
  - Hyperoxia from high concentration oxygen therapy causes a marked reduction in coronary blood flow
  - Excess oxygen is shown to reduce blood flow to the heart, brain or kidney when they have an ischaemic episode unless there is severe hypoxia.

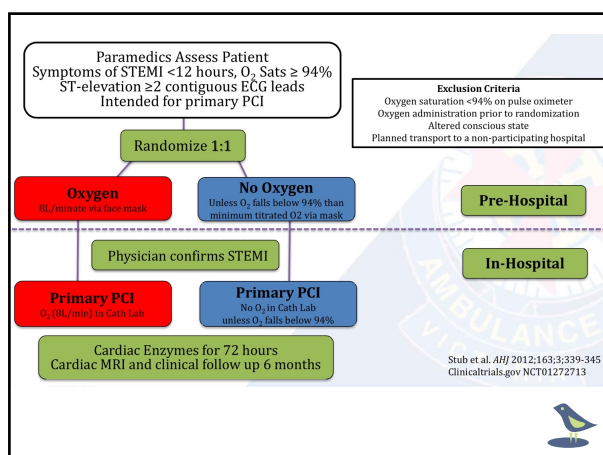


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- Stub, D., Smith, K., Bernard, S., Nehme, Z., Stephenson, M., Bray, J., ... & Kaye, D. (2015). Air versus oxygen in myocardial infarction (AVOID) trial sub-study: time-dependent effect of oxygen administration on myocardial injury. *Heart, Lung and Circulation*, 24, S374.



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**Primary Endpoint**

- Myocardial infarct size on cardiac enzymes
- Mean Peak Creatine Kinase
- Mean Peak Troponin I
- Area under curve of Creatine Kinase and Troponin I

**Pre-specified Clinical Secondary Endpoints**

- ST-segment resolution (12 lead ECG)
- Survival to hospital discharge
- MACCE: Death, MI, Revascularisation, Stroke at 6 months
- Myocardial infarct size on CMR at 6 months



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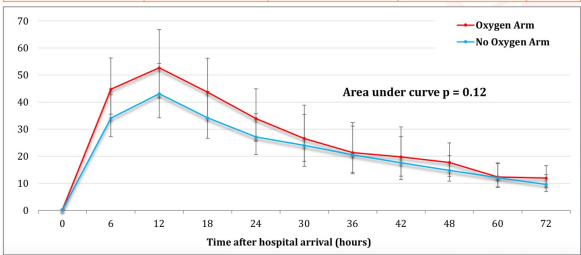
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Troponin I, mcg/L	Oxygen Arm N=200	No Oxygen Arm N=205	Ratio of means (Oxygen/No Oxygen)	P-value
Geometric Mean Peak (95% CI)	57.4 (48.0 – 68.6)	48.0 (39.6 – 58.1)	1.20 (0.92 – 1.55)	0.18
Median Peak (IQR)	65.7 (30.1, 145.1)	62.1 (19.2, 144.0)		0.17



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**Secondary Endpoint**  
**CMR Infarct Size at 6 months**

CMR Infarct Size	Oxygen Arm N=65	No Oxygen Arm N=74	Ratio of means (Oxygen/No Oxygen)	P-value
Median (IQR), grams	20.3 (9.6, 29.6)	13.1 (5.2, 23.6)		0.04



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Values are %	Oxygen Arm N=218	No Oxygen Arm N=223	P-Value
<b>At Hospital Discharge</b>			
Mortality	1.8	4.5	0.11
Recurrent myocardial infarction	5.5	0.9	<0.01
Stroke	1.4	0.4	0.30
Major bleeding	4.1	2.7	0.41
Significant arrhythmia	40.4	31.4	0.05
ECG ST-segment resolution > 70%	62.0	69.6	0.10
<b>At 6 months follow up</b>			
Mortality	3.8	5.9	0.32
Recurrent myocardial infarction	7.6	3.6	0.07
Stroke	2.4	1.4	0.43
Repeat revascularization	11.0	7.2	0.17
MACCE	21.9	15.4	0.08

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### Where does it leave us

- Resuscitate all patients in 100% oxygen (Not Neonates)
- Post resuscitation titrate oxygen down to maintain saturation of 94-96% (ARC guidelines)
- Do not apply oxygen routinely to patients with Chest Pain
- In chest pain, apply oxygen if patient is in respiratory distress, O<sub>2</sub> Sats < 95% or patient is shocked



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### Take away messages

- Not all chest pain is cardiac in nature
- Be suspicious of all chest pain
- Changing parameters for cardiac care
- Oxygen is good for you in certain situations



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