

Challenging Complex

Cardiac Pulmonary

Case Studies



Class M180M618

Cheryl Herrmann
CLINICAL CLINICAL NURSE SPECIALIST
 APN, CCRN, CCNS-CSC-CMC
 cherrmann@frontier.com
 www.cherylherrmann.com

MAGNET
RECOGNIZED
 AMERICAN NURSES
 ASSOCIATION

BEACON
AWARD
 EXCELLENCE

UnityPoint Health - Peoria
 Heart of IL AACN - President

Stuck on Escalator

- <https://www.youtube.com/watch?v=Kq65aAYCH0w>



Put on your critical thinking hat!

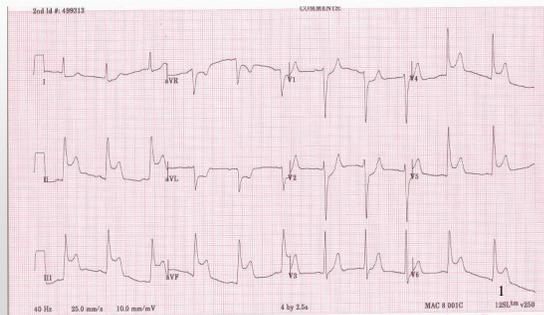
10 Case Studies to conquer!



Case Study # 1



 49 y/o male with crushing chest pain is enroute to your facility via ambulance



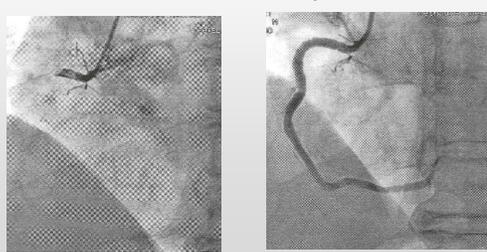
3rd I4 # 498013 COMMENTS

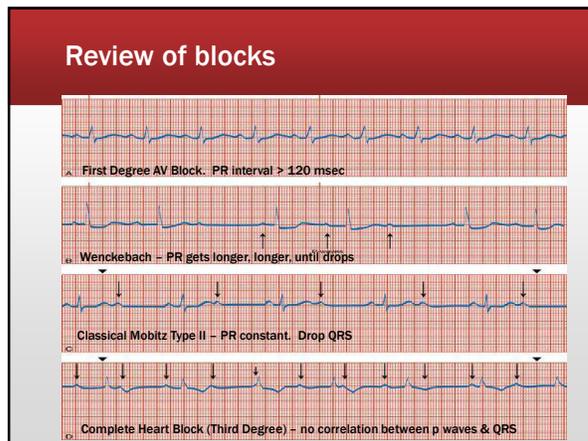
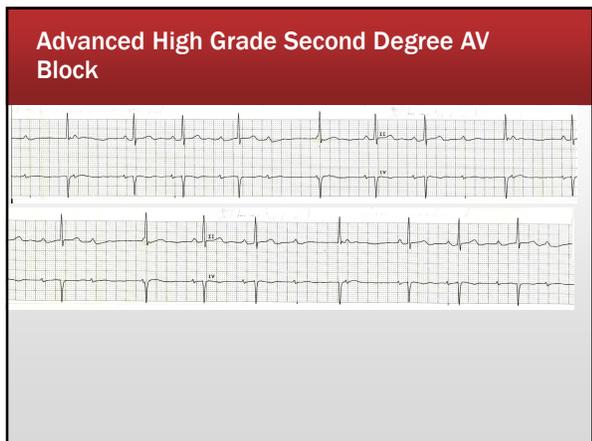
40 Hz 25.0 mm/s 10.0 mm/mV 4 by 2.5s MAC 8 001C 120L/M v200

Time Is Muscle

Door to PCI time = 49 minutes
 Ambulance EKG to PCI time = 66 minutes

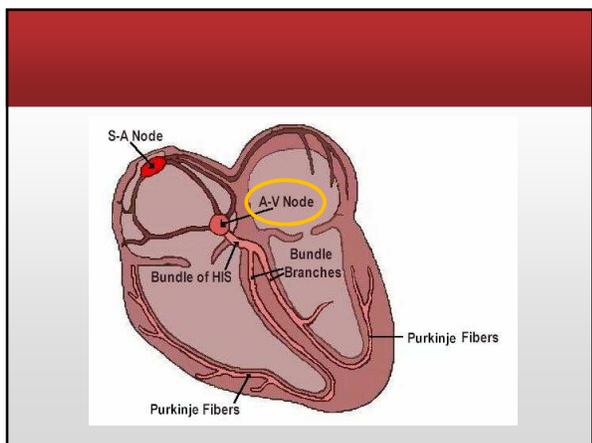
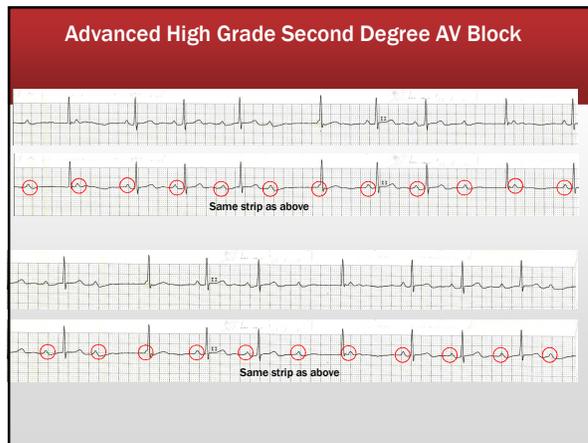
- Occluded RCA
- RCA post stent





Never Forget & Mix Up Blocks Again

- <https://www.youtube.com/watch?v=FgvGblW1rKA>
- You tube..



Cardiology Consult

- Transfer to cardiac unit with external pacemaker readily available
- Echo normal LVEF, no valvular disease
- Etiology of AV block unclear
 - Electrolytes normal, QT not prolonged
 - Lupus can lead to conduction disease
 - Typically complete heart block and prolonged QT
 - ? Secondary to pain medications and sedatives
 - Limit narcotic pain meds & sedatives
 - ? Hypothyroidism as culprit
 - ? Lyme Carditis - check Lyme titer

Lyme Carditis

Occurrence 1% of Lyme Disease patients

- Occurs when Lyme disease bacteria affects the tissues of the heart – interferes with cardiac conduction
- Cardinal clinical manifestation is self limited conduction disease at the level of the AV node
 - May progress from prolonged PR (First Degree) to complete heart block within minutes
 - Temporary pacing needed in about 30% of Lyme Carditis
Rarely permanent pacing needed
 - Complete heart block generally resolves within one week
 - Lesser arrhythmias resolve within 6 weeks
- Oral antibiotics, if mild; IV antibiotics, if severe
- Most recover completely within 1- 6 weeks

Negative Lyme Titer for case study patient

Pacemaker??

External/Transcutaneous

- YES



Permanent

- Possibly – if AV block does not resolve



Rhythm changed to First Degree AV block after minimizing narcotics
No pacer needed

American Heart Association 
Learn and Live.

ACLS Experienced Provider Learning Station 2

Review: Common Toxidromes

© 2004 American Heart Association

What Is a Toxidrome?

- Constellation of signs and symptoms usually observed after exposure to a toxic substance
- Physiologically grouped abnormalities
 - Vital signs
 - Skin and mucous membranes
 - Pupils
 - Cardiovascular system
 - GI and GU system
 - Neurologic findings/mental status

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What Is the Toxidrome?

Opioid

Major Findings

- CNS depression
- Respiratory depression
- Miosis (small pupils)

Examples

- Heroin
- Morphine
- Fentanyl derivatives (China White)

Possible Specific Therapy

- Naloxone
- Supportive care

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CHRONIC PAIN

- Now admits taking hydrocodone more than prescribed to alleviate her symptoms



DO YOU SUFFER FROM CHRONIC PAIN?



Medical Marijuana – Cardiologist

- Don't think it is safe to pursue medical marijuana as it may further slow her heart rate
- In addition, she has the propensity of mixing it with narcotic medication which could lead to serious cardiovascular complications

Discharge Instructions

- Daily aerobic activity at least 15 minutes per day with stretching exercises at least 15 minutes or more.
- Deep breathing techniques
- 8 or more hours of quality sleep nightly
- Pain clinic consult
- 10 Steps from Patient to Person: American Chronic Pain Association
- 12 Steps of Recovery to counteract unhealthy attachments to opiates and other potentially problematic coping mechanisms

Cannabis (Marijuana) Intoxication

- Lethargy & Coma following cannabis ingestion does not respond to naloxone
 - Thus can differentiate from opioid toxicity
- Overlapping clinical features of intoxication with:
 - Cocaine
 - Amphetamines & bath salts
 - LSD, PCP
 - Ecstasy
- Duration of intoxication typically shorter than for other recreational drugs
 - If prolonged symptoms, check for other intoxicants
- Can cause tachycardias or bradycardias- biphasic effect on the autonomic nervous system
 - Low- Moderate doses → ↑ SNS & ↓ parasympathetic activity.
 - Tachycardias – Afib, SVT, hypertension
 - High doses → SNS inhibited & ↑ parasympathetic activity
 - Bradycardia, AV block, hypotension



Two Months follow up

- Functional Stress Test → able to reach target HR 168 bpm without any significant issues
- No chronotropic incompetence was found
- 12 Lead EKG Sinus Rhythm rate 72 with early repolarization
- Echo EF = 55%
- No further follow up needed with cardiology.

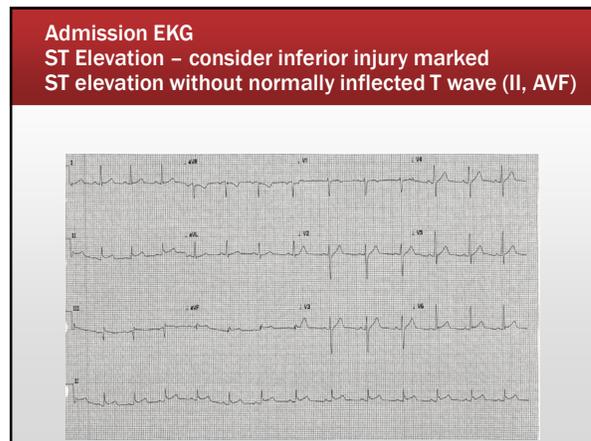
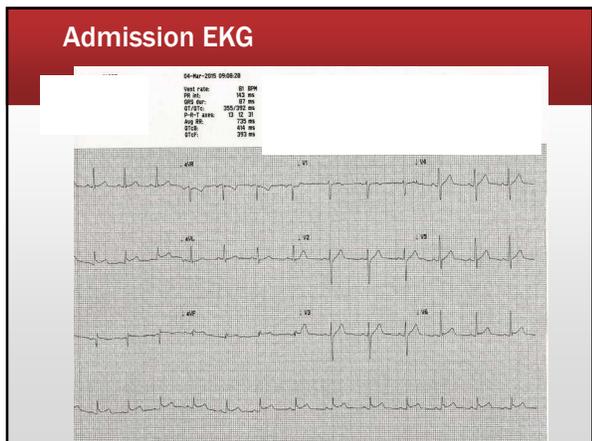
Case Study # 3

MD



Admit to ED for chest pain

- Pressure in the midsternal area with radiating to the right arm. Feels like someone pushing on chest



Nitrates

Isorobide (Imdur)

- Produce a direct, endothelium-independent vasodilatation of the large coronary arteries.
- Reduce preload by dilating venous capacitance vessels, which results in decreased myocardial oxygen consumption.
- Act as an exogenous source of nitric oxide, which causes vascular smooth muscle
- Nitrates and calcium channel blockers are the mainstays of medical therapy for vasospastic angina

Calcium Channel Blockers

- Relax coronary smooth muscle and produce coronary vasodilation, which in turn improves myocardial oxygen delivery

Mega Monster Energy Drink

Caffeine Levels

240mg
CAFFEINE

per 24 fl. oz can

ml fl. oz Custom Size

CAFFEINE LEVEL
VERY HIGH

Compare

Source: <http://www.caffeineinformer.com/caffeine-content/mega-monster-energy-drink>

How does Mega Monster Energy Drink compare?

- Monster Energy Drink, – 24-ounce can – 240 mg of caffeine
- Coca-Cola Classic – 12-ounce can – 34 mg of caffeine

7 times the amount of caffeine as 12 oz can Coca Cola!

TOTAL CAFFEINE (MG)

400
360
320
280
240
200
160
120
80
40
0

Can of **Mega Monster Energy Drink**

Can of **Monster Energy Drink**

Can of **Red Bull**

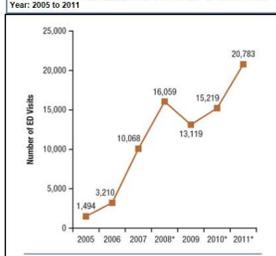
Can of **Coca-Cola Classic**

ED visits involving energy drinks doubled from 2007 to 2011

Large amounts of caffeine can cause adverse effects such as:

- Insomnia
- Nervousness
- Headache
- Tachyarrhythmias
- Seizures
- That are severe enough to require emergency care

Figure 1. Energy Drink-Related Emergency Department (ED) Visits, by Year: 2005 to 2011



* Compared with the number of visits in 2007, the difference was statistically significant at the .05 level. The number of visits in years prior to 2007 were not used in statistical tests because of low numbers; the number of visits in 2004 was not shown because of low statistical precision. Source: 2011 SAMHSA Drug Abuse Warning Network (DAWN).

Source: Update on ED visits involving Energy Drinks. Jan 2013. Drug Abuse Warning Network <http://pubs.nca.samhsa.gov/data/2k13/DAWN126/w126-energy-drinks-use.htm>

Caffeine

- Is a diuretic and causes a loss of fluid
- Then add cardiovascular workout and sweating
- Lose electrolytes also
- Leads to arrhythmias

- American Academy of Pediatrics recommends no more than 100 mg per day
- The American Heart Association says that moderate coffee (caffeine) drinking (one or two cups per day) does not seem to be harmful for most people. (up to 250 mg caffeine)
- Half Life of Caffeine is 6 hours
- Lethal dose of caffeine is 200 – 400mg/kg

Source: Sports drinks and energy drinks for children and adolescents: Are they appropriate? Pediatrics, 127(6), 1182-1189.

What Is the Toxidrome?

Sympathomimetic

Major Findings

- Tachycardia
- Arrhythmias
- Agitation
- Diaphoresis
- Mydriasis (large pupils)
- Hypertension
- Hyperthermia

Examples

- Amphetamine
- Cocaine
- Ephedrine
- Bitter orange

Possible Specific Therapy

- Benzodiazepines
- Cooling

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Cocaine Induced Chest Pain/AMI

- 56 – 85 % abnormal EKG
- Early repolarization patterns (32%)
- Left ventricular hypertrophy pattern (16%)
- Typically ST segment Elevation MI (2%)
- Acute ischemia changes (6%)

ST Elevation Patterns

ST segment elevation for STEMI



Early Repolarization ST Elevation



ECG 10: Early Repolarization

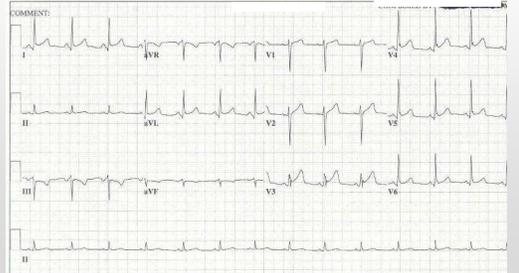


- Elevated take-off of ST segment at the j point
- Concave upward ST elevation ending with a symmetrical upright T wave – often of large amplitude
- Gently upsloping and curving downward or sagging of the ST segment , producing the so called "smiley face"
- Contrasted with the junctional elevation and horizontal or straight ST segment & the curving upward of "sad face" of the STEMI examples
- No reciprocal ST segment depression

Cocaine induced chest pain

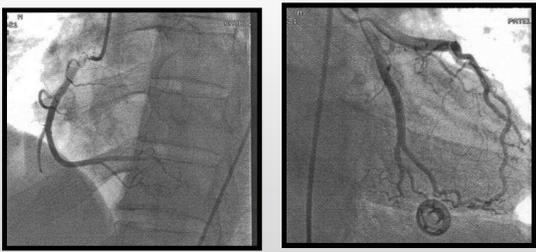
Heart rate	80 BPM	Normal sinus rhythm
PR interval	124 ms	Moderate voltage criteria for LVH
QRS duration	88 ms	Anteriorlateral J ST elevation - Question Early Repolarization
QT/QTc	376/413 ms	Abnormal ECG
P-R-T axes	-17 -13 -18	No previous ECGs available

COMMENT:



Chest pain caused by coronary spasms

- RCA
- LAD & CX



Cocaine induced AMI Therapeutic Strategies Treat as ACS except...

- **Avoid B-blockers acutely** → due to the unopposed alpha-adrenergic effect, which may lead to
 - worsening coronary vasoconstriction
 - increased blood pressure
 - risk of exacerbating coronary spasm. (Class III, C)
- IV NTG, Nitroprusside for persistent hypertension (phentolamine – alternative).

Cocaine induced AMI Therapeutic Strategies Treat as ACS except...

- IV Benzodiazepines to relieve chest pain & lead to beneficial effects on cardiac hemodynamics. Also relieves anxiety. (Class I, B)
- Calcium channel blockers should not be used as first-line therapy but may be considered in patients not responsive to benzodiazepines or NTG. (Class IIb/C)
- Phentolamine decreases coronary vascular resistance and blood pressure after cocaine ingestion, and may be considered in patients not responsive to NTG or calcium channel blockers. (Class IIb,C)

Therapeutic Strategies Treat as ACS except...

- In patients with chest pain of unclear origin, hypertension & tachycardia should be treated conservatively.
- **Cautious use of fibrinolytic therapy for STEMI** → higher rate of cranial hemorrhage with cocaine use.

Case Study # 4

WV

Admit to ED due to SOB and abdominal/back swelling

- Two days ago noticed abdomen and back were swollen. It was difficult to feel his spine as there was so much fluid

Wave	100	0.7	80ms	Normal sinus rhythm
PR	160	0.12	170ms	ST & T wave abnormality, consider anterior ischemia
QRS	100	0.08	80ms	Profoundly abnormal, consider anterior ischemia
QT/QTc	379/409	0.37	409ms	Abnormal ECG
PR-T axis	95.77	14.5		When compared with ECG of 22-JUN-2011 05:32, No significant change was found

12 Lead EKG 101
Learn the Normal so you can detect the abnormal

Hypertrophy

- Complexes larger because takes longer to get through atria or ventricles
- Atrial enlargement = Large p waves
- Ventricular enlargement = Tall R waves

ECG 11-5 Left Ventricular Hypertrophy

S in V1 or V2 + R in V5 or V6 \geq 35 mm.
Or
Any precordial lead is \geq 45 mm
The R wave in aVL is \geq 11mm
The R wave in Lead I is \geq 12 mm
The R wave in lead AVF is \geq 20 mm

ECG 11-7 Left Ventricular Hypertrophy

S in V1 or V2 + R in V5 or V6 \geq 35 mm.
 Or
 Any precordial lead is \geq 45 mm
 The R wave in AVL is \geq 11mm
 The R wave in Lead I is \geq 12 mm
 The R wave in lead AVF is \geq 20 mm

12 Lead EKG 101
 Learn the Normal so you can detect the abnormal

Remember V1 and V2 should be mostly negative

ECG 11-12 Right Ventricular Hypertrophy

- R:S ratio is \geq 1 in leads V1 and/or V2
- R is bigger than S

Back to 25 y/o Case Study.... Possible LVH

Rate	69	HRM	Normal sinus rhythm
PR interval	132	ms	ST & T wave abnormality, consider anterior ischemia
QRS duration	88	ms	Probable QP
QT/QTc	370/409	ms	Abnormal ECG
P-R-T axes	68, 77, 143		When compared with ECG of 22-JUN-2011 05:32, No significant change was found.

Case Study # 5
 BB-LV

32 y/o male

- Jan 16 – playing basketball & got hit in chest

1-19- 1335 Clinic

PR 134
 TR 150
 QRS 160
 ST 164
 ... AXES ...
 100 44



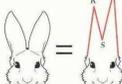
What type of bundle branch block is it?

1. Left
2. Right

BBB = QRS > 0.12 second or 120 msec

- LBBB = QRS > 0.12 sec, Negative QRS in V1 (carrot)
 - New? Send to Cath lab
- RBBB = QRS > 0.12 sec; Positive QRS in V1 (rabbit ears)



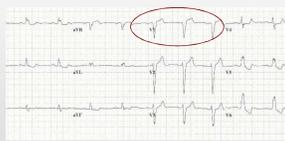




What should be done?

Case Study pt with RBBB



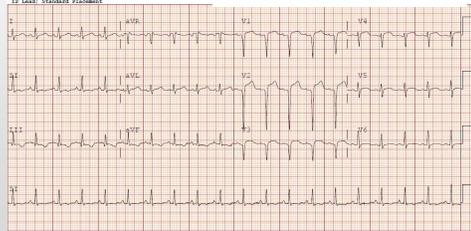
LBBB Example



1. Send to ED
2. Get Echocardiogram
3. Cardiology consult as outpatient

1-22 ED Anteroseptal infarct – sent urgently to cath lab

RR 117 - Sinus tachycardia
 PR 130 - Anteroseptal infarct, possibly acute
 QRS 97 - Lateral leads are also involved
 ST 100
 ... AXES ...
 100 45
 T 42



SmitCo Personal Defibrillator

https://www.youtube.com/watch?v=TwP55lgBZ3



LifeVest




- The LifeVest is worn outside the body rather than implanted in the chest.
- This device continuously monitors the patient's heart with dry, non-adhesive sensing electrodes to detect life-threatening abnormal heart rhythms.
- If a life-threatening rhythm is detected, the device alerts the patient prior to delivering a treatment shock, and thus allows a conscious patient to delay the treatment shock.
- If the patient becomes unconscious, the device releases a Blue™ gel over the therapy electrodes and delivers an electrical shock to restore normal rhythm.

Source: <http://lifest.zoll.com>

- 32 seconds to first shock
- 150 joules
- Delivers shock within 60 seconds
- Time between shocks is 60 seconds
- Can deliver at least 5 shocks of 150 joules
- Leave vest on in ambulance and ED until cardiologist sees the patient

1 1/2 hours after ED arrival,

- 30 sec V Tach, unresponsive,
- Vest shocked within 27 seconds
- Pt woke up



Case Study # 6

Heart rate	85	BPM
PR interval	192	ms
QRS duration	96	ms
QT/QTc	348/423	ms
P-R-T axes	30 -39 -38	

Heart rate	85	BPM	Normal sinus rhythm
PR interval	192	ms	Possible Left atrial enlargement
QRS duration	96	ms	Left axis deviation
QT/QTc	348/423	ms	Incomplete right bundle branch block
P-R-T axes	30 -39 -38		Non-specific T wave abnormality
			Abnormal ECG

Note S1, Q3
And S waves in V3 and V4
Axis = -36 LAD

Pulmonary Embolus

10-APB-287 (ST 4)	View: auto	75 BPM	Normal sinus rhythm
Male	HR: manual	150 ms	Right bundle branch block
Room: 710C	QRS duration	124 ms	Left anterior fascicular block
Lead I	P-R-T axis	454-549 ms	Left posterior fascicular block
	PR: 212	36 - 107	Left main coronary artery stenosis with QRS widening
			Coronary artery disease (CAD) on or before 21-NOV-2009
			Generalized ECG
			When compared with ECG of 21-NOV-2009 10:56:
			No significant change was found

- S1, Q3 or S1,Q3, T3 (inverted T)
- RBBB
- Inverted T waves secondary to RV strain may be seen in the right precordial leads and can last for months

In Memory Arthur Greenbank, RN, BSN

c/o SOB??
ASK if traveled anywhere recently!

Misc Pulmonary EKGs

Normal QRS complex – The Q wave

- Q wave is the first negative deflection after the p wave
- Always first may or may not be there.
- Comes first in the alphabet
- There are normal and abnormal Q waves

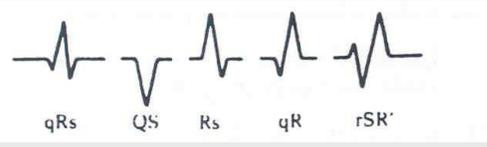
Normal QRS complex – The R wave

- R wave is the first positive deflection after the p wave
- Always *Rising* above

Normal QRS complex – The S wave

- S wave is the second negative deflection after the R wave
- *Slipping* down
- Always after R wave like in the alphabet

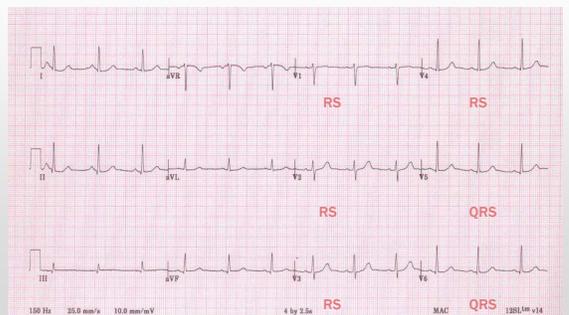
Review of Normal QRS complex



- Q wave is the first negative deflection after the p wave
- R wave is the first positive deflection after the p wave
- S wave is the second negative deflection after the R wave

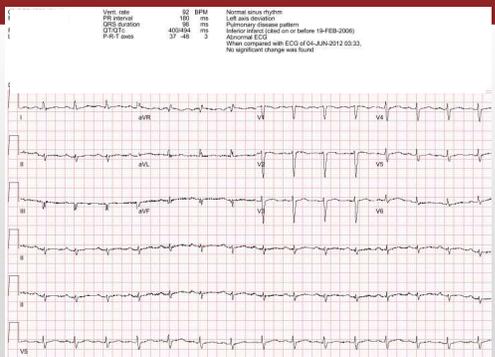
12 Lead EKG 101

Learn the Normal so you can detect the abnormal



Pulmonary Disease Pattern

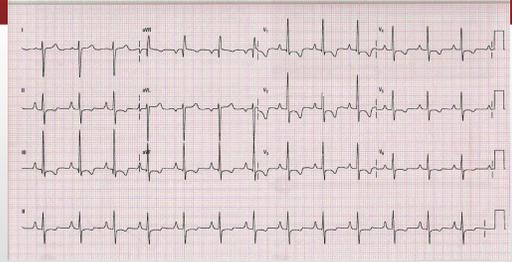
Noted by poor R Waves and deep S waves in V leads.



ECG parameters:
 Heart rate: 82 BPM
 PR interval: 160 ms
 QRS duration: 86 ms
 QT/QTc: 404/404 ms
 P-R-T axis: 37°/48°/3°

Normal sinus rhythm
 Left axis deviation
 Pulmonary disease pattern
 Abnormal RST pattern on or before 18-FEB-2006
 Normal ECG
 When compared with ECG of 04-JAN-2012 09:33,
 No significant change was found.

Pulmonary Hypertension



- P - Pulmonale (RAE) — Tall P waves
- Right axis deviation - Lead I negative, AVF Positive
- Increased R:S ratio in V1 to V2
- RVH strain pattern
- S1, Q3, T3 pattern

Right Ventricular Strain Pattern

- Increased R:S ratio (RVH)
- Concave downward ST segment that is depressed
- Flipped symmetrical T wave

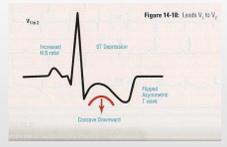
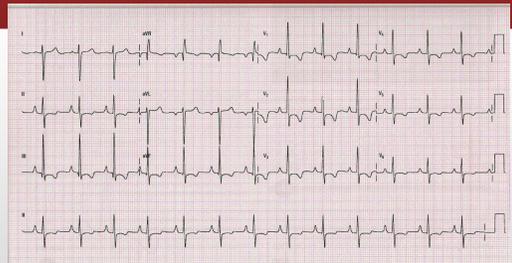


Figure 14-18: Leads V1 to V2

Pulmonary Hypertension

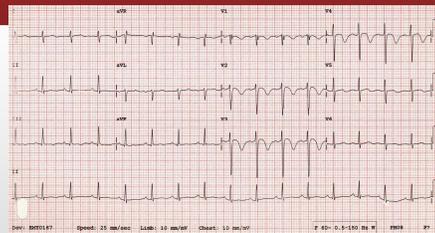


- P - Pulmonale (RAE) — Tall P waves
- Right axis deviation - Lead I negative, AVF Positive
- Increased R:S ratio in V1 to V2
- RVH strain pattern
- S1, Q3, T3 pattern

Warning signs – won't do well in surgery

- RBBB and RVH → think pulmonary hypertension
- Peaked p waves → think atrial enlargement
- Inverted t waves → think right ventricular strain

Wellens' Syndrome



- Characterized by symmetrical, often deep (>2 mm), T wave inversions in the anterior precordial leads
- Warning of critical stenosis of LAD

Case Study # 7

SP

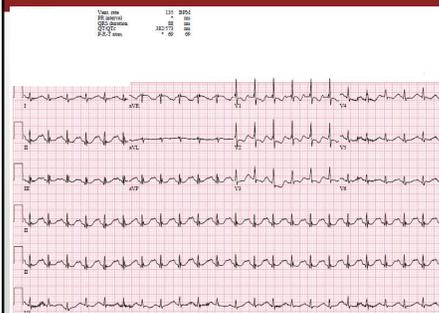


Admit to ED with SOB and left sided chest pain for the past hour

What is Antiphospholipid syndrome ?

- An autoimmune disease
- "Antiphospholipid antibodies" react against proteins that bind to anionic phospholipids on plasma membranes.
- The exact cause is not known, but activation of the system of coagulation is evident.
- Clinically important: antiphospholipid antibodies are associated with thrombosis and vascular disease.

EKG 12-2 at 2200 in ED What diagnosis might you be thinking?



1. NSTEMI
2. Pulmonary Embolus
3. COPD exacerbation
4. Pleurisy
5. Right Ventricular strain
6. Other

EKG 12-2 at 2200 in ED
What diagnosis might you be thinking?

Vmax 100mm
 PR 160ms
 QRS 88ms
 QT 352ms
 QTc 387ms
 P-R-T axis
 P: 61.0 deg
 QRS: 21.0 deg
 T: 101.0 deg

Right ventricular hypertrophy
with repolarization pattern
RV strain pattern
Nonspecific ST abnormalities

CXR 12-2 in ED
What do you see?

1. Normal
2. Hypertrophy
3. Pneumonia
4. Pneumothorax

CXR 12-2 in ED

Pneumothorax Review

- No lung markings
- With large pneumothorax, side of chest with pneumothorax will be larger and blacker

Back to Case Study
DX: Spontaneous pneumothorax on 12 - 2
CT scan view post chest tube insertion

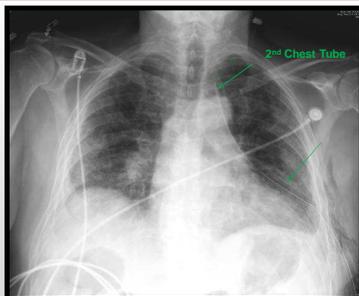
- BP 101/65
- HR 113, regular
- RR 20
- SpO₂ 100% on 1.5 liters nonrebreather
- Pain 2/10

Chest Tube

CXR 9 hours post chest tube insertion at 0800
Is the pneumothorax resolved?
Pt is admitted to progressive care - what assessments would you do during your shift?

Chest Tube

CXR on 12 - 3 at 1215
after 2nd chest tube inserted

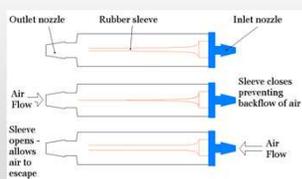


- Patient did not go to surgery for decortication due to pulmonary hypertension – poor surgical candidate
- Sent home with Heimlich valve

Heimlich Valve



- One way valve
- Can be discharged
- Call 911 if sudden sharp chest pain and severe shortness of breathe



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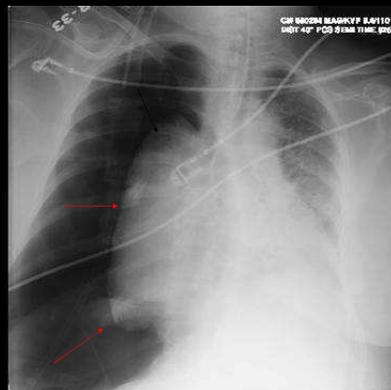
Classifications of air leak syndromes CCRN, CSC, CMC test plan

1. Primary pneumothorax
2. Secondary pneumothorax
3. Iatrogenic pneumothorax
4. Pneumomediastinum
5. Pneumopericardium
6. Hydropneumothorax

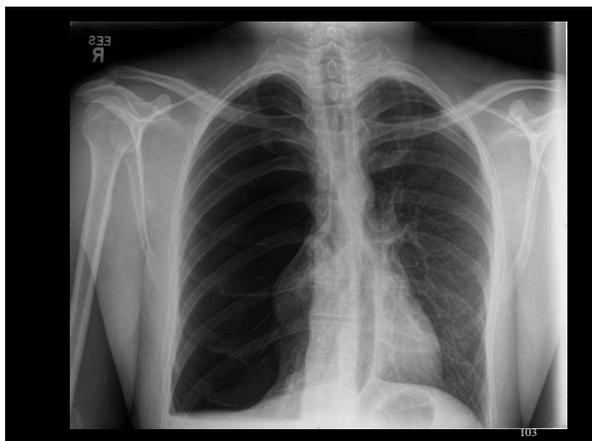
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Pneumothorax Clinical Presentation

- Diminished or absent lung sounds over the affected lung
- Subcutaneous emphysema
- Black area over lung field with no lung markings on CXR
- Dyspnea
- Tachypnea
- Acute pain on affected side of the chest
- Decreased SpO₂ & pO₂

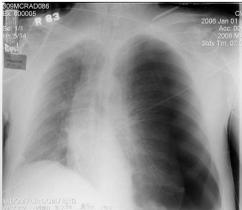


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Pneumothorax

- **Initial Treatment:**
 - Chest tube insertion if greater than 10 - 15 %
 - If tension pneumothorax — it is a medical **EMERGENCY** and needs **Immediate** needle decompression



Primary Spontaneous Pneumothorax (PSP)

- Occurs without a precipitating event in a person who does not have lung disease
- Most individuals with PSP have unrecognized lung disease

Secondary Spontaneous Pneumothorax (SSP)

- A pneumothorax that occurs as a complication of an underlying lung disease
- Can be a complication of any lung disease. Most often occurs with:
 - COPD
 - Pneumocystis jirovecii infection
 - Cystic fibrosis
 - Tuberculosis

SSP Clinical Presentation

- C/O of dyspnea and chest pain on the same side as the pneumothorax
- Symptoms more severe than with PSP as SSP patients have less pulmonary reserve due to the underlying lung disease.
- Persistent air leaks are more common and tend to persist longer than PSP

SSP Treatment

- Should be hospitalized: diminished pulmonary reserve increases their risk for adverse outcomes.
- **Initial Treatment**
 - Chest tube insertion
 - Chest tube should remain in place until a procedure if performed to prevent recurrent SSP

SSP: Prevention of recurrence

- Video-Assisted Thoracoscopy (VAT) with stapling of blebs and pleural abrasion.
- Chemical pleurodesis
- Pleural Blood Patch
- Heimlich valve

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Nursing Care of Chest Tubes

- Bubbling in the water seal chamber indicates air leak
- If suction is ordered for PSP or SSP, keep suction going even when ambulating!

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PSP and SSP – high risk activities

- Patients with resolving pneumothorax should be cautioned not to fly until intrapleural air has completely resolved.


- Deep sea diving should be avoided unless thoracotomy or pleurodesis has been performed.



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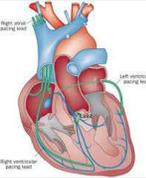
Case Study # 8

SP-BIV



I'm not a Cardiac Nurse!

- Biventricular Pacemaker is used in Stage 4 Heart Failure with Left Bundle Branch Block
 - Three Leads: Third lead paces the left ventricle to provide ventricular synchrony
- During procedure a central line is inserted via the right internal jugular vein and the pacemaker leads via the left subclavian
- Key point — two insertion sites!



Routine Procedures?!?!?

- What are potential complications from central line and/or pacemaker insertion?
- What Diagnostics should occur post procedure?

Potential Post Procedure Complications

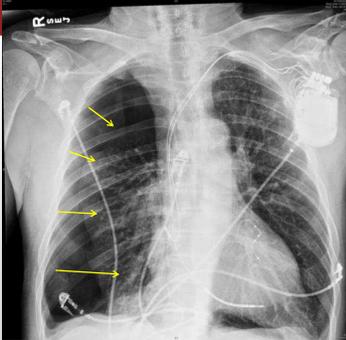
Central Line & Pacemaker Insertion

<p>Immediate</p> <ul style="list-style-type: none"> ▪ Bleeding ▪ Arterial puncture ▪ Arrhythmia ▪ Air Embolism ▪ Pneumothorax ▪ Hemothorax 	<p>Delayed</p> <ul style="list-style-type: none"> • Infection • Venous thrombosis/Pulmonary emboli • Catheter migration • Catheter embolization • Myocardial perforation • Nerve Injury
---	--

What do you see?



1. Normal
2. Lead dislodgement
3. Hypertrophy
4. Pneumothorax



- Significant pneumothorax on right with tension pneumothorax component
- Note shift of heart to left

What actions do you need to do to insert a chest tube?

- Call Rapid Response Team – RRT
- Get chest tube insertion cart

Chest Tube inserted

- Patient now in no distress
- Respirations easy and regular
- Another chest xray ordered

Pneumothorax resolved



Pneumothorax Chest tube Post chest tube insertion

- Note lung re-expanded

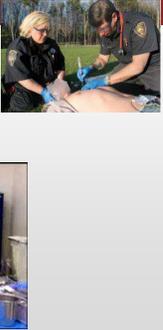
Iatrogenic pneumothorax

- Medical procedure resulting in traumatic pneumothorax
 - Transthoracic needle aspiration procedures
 - Subclavian and supraclavicular needle sticks
 - Thoracentesis
 - Mechanical ventilation related to peak airway pressures
 - Pleural biopsy
 - Transbronchial lung biopsy
 - CPR
 - Tracheostomy

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Iatrogenic & Traumatic Pneumothorax Treatment

- Needle Aspiration
- Chest Tube insertion
- Recurrence is not usually a factor



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Case Study # 9

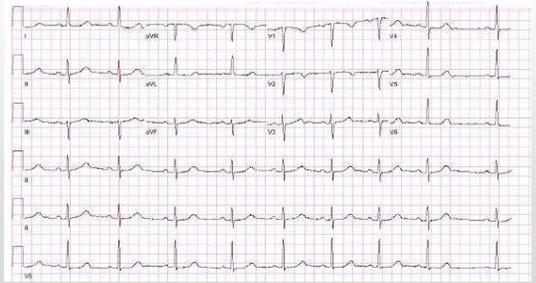
CH-TA



Admit to ED with chest pain

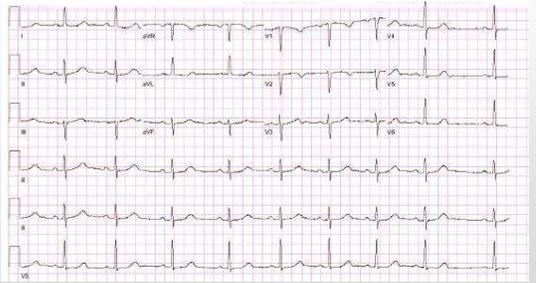
- Chest discomfort that radiated up into her neck and jaw.

Heart rate	65	BPM
PR interval	200	ms
QRS duration	80	ms
QT/QTc	348/124	ms
P-R-T axes	47° -13° 02°	



Prolonged QT

Heart rate	65	BPM
PR interval	200	ms
QRS duration	80	ms
QT/QTc	348/124	ms
P-R-T axes	47° -13° 02°	

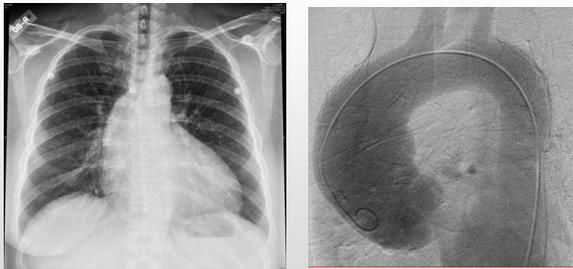




What do you think?

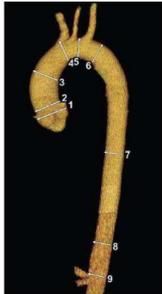
1. Pneumothorax
2. Pulmonary Embolism
3. Cardiomyopathy
4. Thoracic Aneurysm

Thoracic Type A Aneurysm



Normal Size of Aorta

Figure 1. Normal Anatomy of the Thoracoabdominal Aorta.

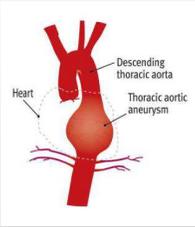


Size In CM	
Root	3.5-3.91
Ascending	2.86
Mid Descending	2.39-2.64
Diaphragmatic	2.43-2.69

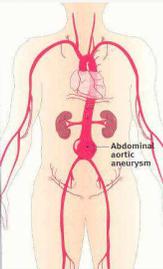
Source: J Vasc Surg 1991;13:452-8 and 2010 Guidelines TAD.

Aortic Aneurysm (AA)

Thoracic TAA



Abdominal AAA



A Silent Disease

- 40% of individuals are asymptomatic at the time of diagnosis
 - Often discovered on a routine CXR or abdominal sonogram
- Only 5% of patients are symptomatic before an acute aortic event.
 - The other 95%, the first symptom is often death

AA Dissection Symptoms "The Great Imitator"

- S/S depend where the dissection occurs and what area is not getting oxygen
- Confused with:
 - Kidney stones
 - Gallstones
 - Paralysis - think neuro diagnosis
 - Myocardial infarction

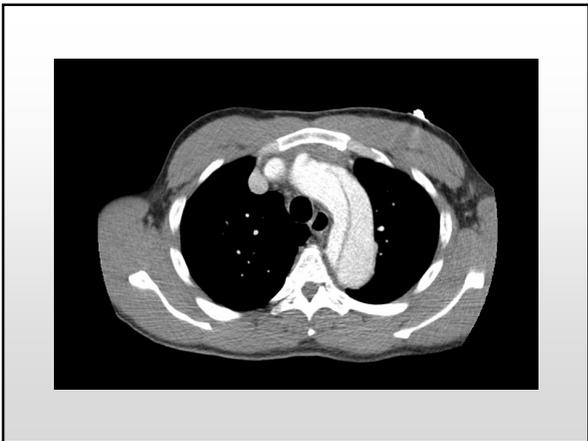
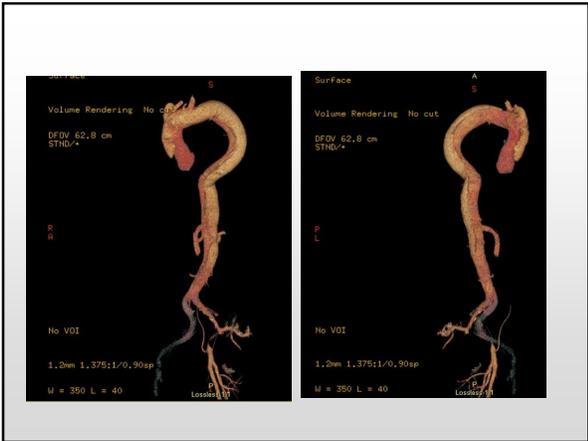
AA Symptoms

- Abrupt onset of excruciating pain in chest, back, or abdomen
 - Ascending Dissection
 - Retrosternal pain that is not exertional in nature
 - Descending Dissection
 - Interscapular chest pain
 - Severe flank pain
 - Epigastric pain
- Ripping, tearing, stabbing and or sharp quality of pain

Aortic Dissection Classification: DeBakey and Stanford Classifications

The diagram shows three types of aortic dissection:

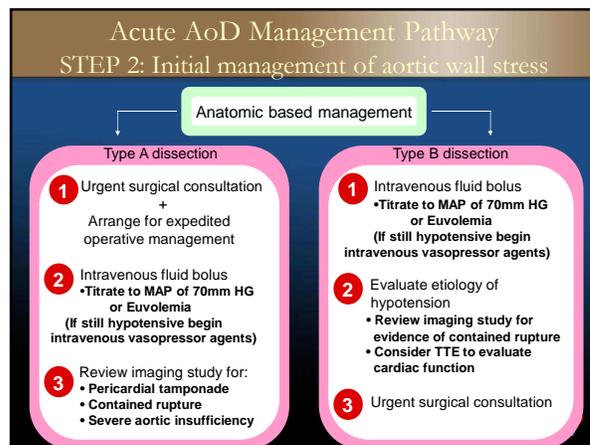
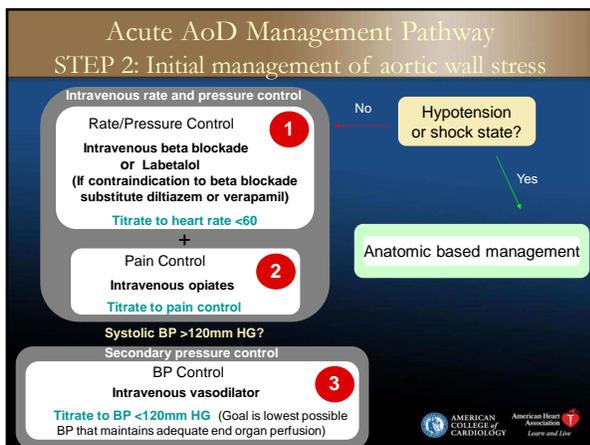
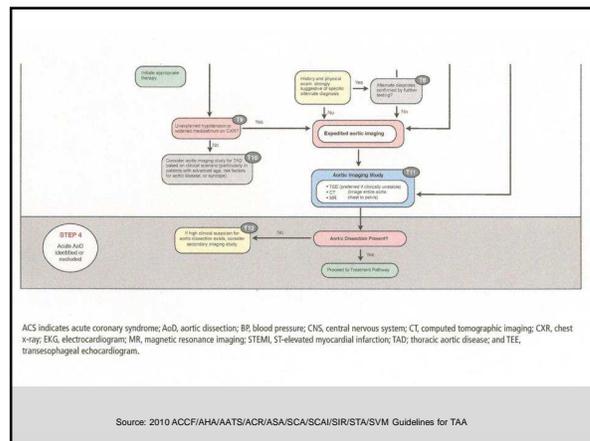
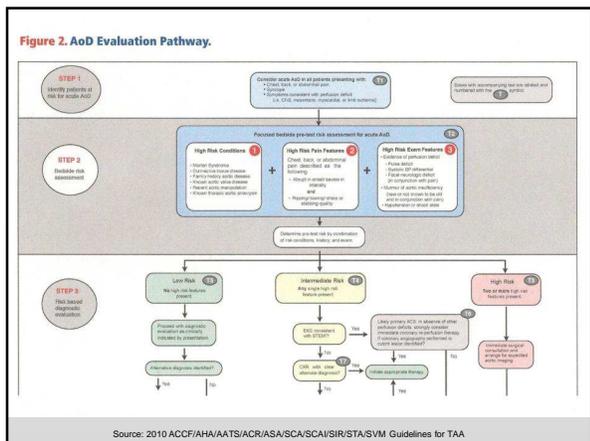
- Proximal DeBakey I and II (Stanford A):** Involves the ascending aorta.
- Proximal Stanford B:** Involves the aortic arch and descending aorta.
- Distal DeBakey IIIa and IIIb (Stanford B):** Involves the descending aorta, with IIIa starting at the subclavian artery and IIIb starting at the renal artery.



2010 ACCF/AHA/AATS/ACR/ASA/SCA/SCAI/SIR/STS/SVM Guidelines for the Diagnosis and Management of Patients with Thoracic Aortic Disease

Developed in partnership with the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines, American Association for Thoracic Surgery, American College of Radiology, American Stroke Association, Society of Cardiovascular Anesthesiologists, Society for Cardiovascular Angiography and Interventions, Society of Interventional Radiology, Society of Thoracic Surgeons, and Society for Vascular Medicine.

Endorsed by the North American Society for Cardiovascular Imaging.



Case Study # 10

LAST BUT NOT LEAST...
 AZL

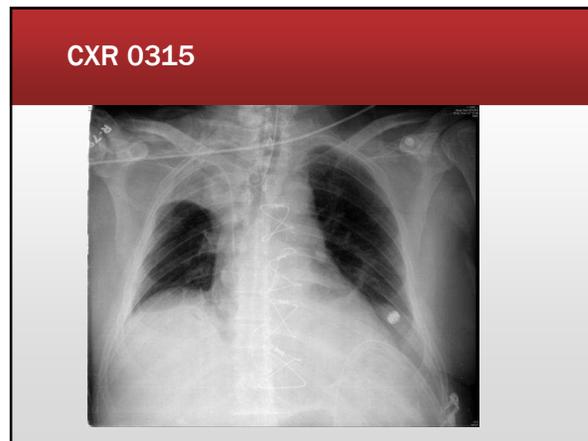
CABG x 1, AVR
MH: Diabetes, CAD, Hyperlipidemia

	Admission 2122
pH	7.33
pCO2	50
pO2	79
TCO2	28
O2 sat	95
BE	0.5
Hemoglobin	11.2
Hematocrit	36
Glucose	125
Potassium	4.8

Based on ABGs and CXR, what do you want to do?

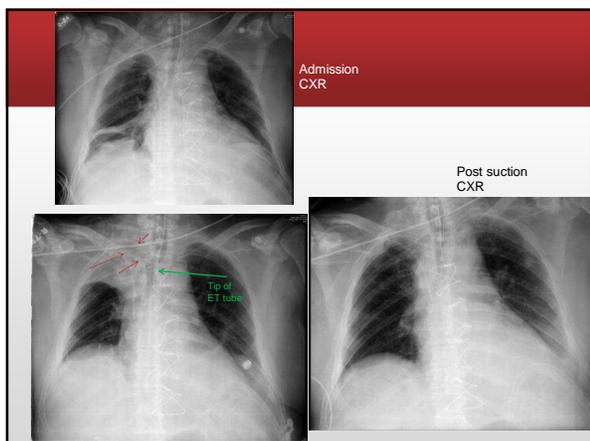
	Admission 2122	0200	0248 Now
pH	7.33	7.47	7.49
pCO2	50	36	36
pO2	79	81	56
TCO2	28	27	29
O2 sat	95	97	91
BE	0.5	2.5	4.1
Hemoglobin	11.2	11.5	10.9
Hematocrit	36	37	35
Glucose	125	147	133
Potassium	4.8	4.6	4.4

Clear bilateral lung sounds except diminished right upper lobe



Azygos Lobe

- Right upper lobe bronchus comes off trachea versus right main bronchus
- A rare congenital variation of the upper lobe of the right lung
- An anatomically separated part of the upper right lobe
- Not associated with any morbidity but can cause technical problems in thoroscopic procedures



ALL chest pain is cardiac until proven otherwise

- Ask Questions to get a good history!
 - Was the chest pain stabbing, knife like?
 - SOB - have you traveled anywhere?
- Call for decreasing oxygen saturations and increasing oxygen needs
- Look for the obvious!