When Life does not find a singer to sing her heart
she produces a philosopher to speak her mind.

― Khalil Gibran
DISCLOSURES

• I HAVE NO RELEVANT FINANCIAL RELATIONSHIPS WITH THE MANUFACTURER(S) OF ANY COMMERCIAL PRODUCT(S) AND/OR PROVIDER(S) OF COMMERCIAL SERVICES DISCUSSED IN THIS CME ACTIVITY

• I DO NOT INTEND TO DISCUSS AN UNAPPROVED/INVESTIGATIVE USE OF A COMMERCIAL PRODUCT/DEVICE IN MY PRESENTATION
OBJECTIVES

- Review EKG subtleties and nuances which may be overlooked in early chest pain.
- Provide the learner with techniques to better evaluate EKGs and develop management options.
- Have some fun learning.
THE PLAN

• SOME THINGS ARE NOT WHAT THEY APPEAR TO BE
• BE AS OBJECTIVE AS POSSIBLE
• TRY TO REMEMBER YOU ARE HEARING THIS FROM A NOCTURNIST AND MOTHER OF 3 DAUGHTERS....
• AND YOU WILL LEARN FROM MY MISTAKES
THE CASES...LET'S START WITH CASE 1:
THE BROKEN HEARTS CLUB-
THE CASE OF MARIA

• 34Y woman presenting with chest pain
• Began 1h ago while driving
• Just found out sibling in severe accident while coming to visit
• 6d post partum with 4th child
• PMH: Gestational DM, obesity
• VS: 36.8, 110 20 128/84 96%
OOOOHHH! THE DIFFERENTIAL DX...
THE REAL UNFURLING...

- Sign out as a cool case waiting for a bed
- Admitted to cardiology after bedside US with some apical RWMA
- A real broken heart!!
- PPCM V Takotsubo CM
- And of course, NTD...
TIME TO STEAL A COOL TEACHING CASE!

Takotsubo Cardiomyopathy

THE EMT DO TH APPROACH...
THE NEW EKG CHANGES...
THE PATIENT...
THE NEW EKG

TROPOGIN REPEAT 3.2
### AMI-ACS

- **NOT ALL ACS IS DRIVEN BY PLAQUE RUPTURE**
- **NEED TO REMEMBER THE OCCASIONAL ZEBRA**
- **6/100K WOMEN HAVE MI IN PREGNANCY/PERIPARTUM**

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CASE 2:
THE ELEPHANT IN THE ROOM-THE CASE OF JASMINE

- 43y woman presenting with Chest Pain/SOB progressive in the last week
- Present 8mo ago but worse in last day
- Just seen in Cardiology after referral from OSH
- TTE done 3d prior with pericardial effusion, now with sob, increased leg swelling, L chest and back pain, dizziness
- PMH: Htn, DM, obesity
- VS: 36.81 66 20 100/76 98%
INITIAL EKG

10PM
TIME TO ROOM THE PATIENT...1230A
LET THE CODE BEGIN - PEA ARREST
THE H’S AND T’S

- Hypovolemia
- Hypoxia
- Hydrogen ion excess (acidosis)
- Hypoglycemia
- Hypokalemia
- Hyperkalemia
- Hypothermia
- Tension pneumothorax
- Tamponade – Cardiac
- Toxins
- Thrombosis (pulmonary embolus)
- Thrombosis (myocardial infarction)
CARDIOLOGY TO BEDSIDE

• EFFUSION
• NO RV COLLAPSE
• +BOWING INTO L VENTRICLE
• FORMAL CONSULT RECOMMENDS AGAINST DRAINING EFFUSION AS IT IS SUPPORTING THE RV WALL AND PREVENTING RA EXPANSION TO ALLOW MORE FORWARD BLOOD FLOW
• INITIATE 250ML FLUID CHALLENGE
THE WORKUP

• V/Q DONE AND NEG
• GENTLY DIURESED
• PRESSOR SUPPORT TRANSITIONED THROUGH A VARIETY OF MEDS
• RHC DONE TO ASSESS PRESSURES/C0
• ACS R/O DONE

• GRADUALLY WEANED OFF PRESSORS
• TREATED EMPIRICALLY FOR PNA AT ONSET AND DEVELOPED BACTERIAL TRACHEITIS-TREATED
• PHTN THERAPY INITIATED
• ULTIMATELY DISCHARGED
A NOVEL ACS...

- PULMONARY ARTERY ENLARGEMENT
- EXTRINSIC COMPRESSION OF LEFT CORONARY ARTERY
- NOT FOR OUR PATIENT, BUT KEEP IN MIND
CASE 3:
A PRESSING ISSUE—THE CASE OF LISA

• 62Y WOMAN PRESENTING IN ACUTE CARDIAC ARREST AFTER RETURNING FROM SCUBA DIVING

• DOING SOME CASUAL SCUBA EXPLORATION, HUSBAND REPORTS PT DID A RAPID ASCENT AS SHE WASN’T FEELING WELL. RETURNED TO MAIN SHIP, SHOWERED AND DECIDED TO GO SEE SHIP DOC, BUT COLLAPSED AFTER GETTING BACK ON MAIN BOAT EN ROUTE TO MEDICAL STATION.

• CPR PERFORMED AND AED ON BOARD ADVISED SHOCK, FIRST UNSUCCESSFUL, EPI GIVEN, SECOND SHOCK WITH ROSC.

• PMH: HTN

• POST RESUSCITATION VS: 36.3 155 26 84/48 92%
THE INITIAL EKG...
BTW, PT MOANING IN PAIN NOW...
POST CARDIOVERSION
CALL THE MAINLAND...TO A HOSPITAL!

• VS POST CONVERSION 96, 20, 122/74, 96%
• REPEAT EKG IN 15MIN UNCHANGED
• PT C/O NAUSEA, DYSPNEA AND CHEST PAIN NOW THAT SHE IS TALKING
POST CARDIOVERSION T+15MIN
MAY BE WORTH A CALL AHEAD...

- EKG SUSPICIOUS FOR SIGNIFICANT CAD
- LMCA, PROXIMAL LAD OR TRIPLE VESSEL DISEASE
- A HEADS UP MIGHT BE WORTHWHILE
CASE 4:
THE MASQUERADER IN THE RHEUM-THE CASE OF DIANA

- 32Y WOMAN PRESENTS WITH C/O MALAISE AND DOE PROGRESSIVE OVER THE WEEKEND. CHRONIC BLE SWELLING INCREASED IN LAST 2 DAYS AND MISSED 1 HD SESSION DUE TO ILLNESS
- H/O SLE, HTN, ESRD
- VS: 37.4 142 20 152/84 95%
YUP, THIS ONE MIGHT BE LUPUS...
THE EKG

- WELL THAT’S HARDLY A HELP...
THE PATIENT...
THE BLOODWORK

- Troponin 1.2
- BNP 420
- C3, C4 low
- ESR 42
- CRP 2.3
A WORD ON SLE...

- IT IS THE GREAT MIMICKER
- ENDOCARDITIS, MYOCARDITIS AND PERICARDITIS CAN PRESENT WITH EKG FINDINGS CONCERNING FOR ACS
- PROFOUND ANEMIA CAN GENERATE DEMAND THAT SHOWS THE SAME EKG CHANGES
- PE CAN PRESENT WITH FINDINGS SUGGESTIVE OF ACS
CASE 5:
LET’S HAVE A SPOT OF T, SHALL WE?-THE CASE OF PATSY

• 45 YO WOMAN PRESENTS ON REFERRAL FROM PCP OFFICE FOR EVALUATION OF ABNORMAL EKG.

• SHE HAD BEEN OUT ON THE GOLF COURSE OVER THE WEEKEND AND HAD A NEAR SYNCOPEAL EVENT WHILE OUT WALKING THE COURSE

• SCHEDULED AN APPT AND WAS SENT TO THE ED AFTER OFFICE EKG DONE.

• PT NOTES SOME BLE SWELLING AND ORTHOPNEA WITH MILD DOE WORSE IN LAST COUPLE WEEKS

• PMH: HTN, PRIOR SMOKER

• VS: 37.0 101 18 148/92 97%
THE EKG

CLEARLY SOMETHING IS JUST NOT RIGHT...
SOMETIMES THE FAST RETRIEVAL JUST DOESN'T WORK
THAT EKG!

WHAT AM I FORGETTING??
T WAVE CHANGES...

• ODD APPEARANCE IN PRECORDIAL LEADS

• FEW THINGS ARE MEANT TO TRIGGER IMMEDIATE SENSE OF IMPENDING DOOM...

Figure 2. Electrocardiograms Showing ST-Segment Elevation in Various Conditions.
Tracing 1 is from a patient with left ventricular hypertrophy, and tracing 2 is from a patient with left bundle-branch block. Tracing 3, from a patient with acute pericarditis, is the only tracing with ST-segment elevation in both precordial leads and lead II and PR-segment depression. Tracing 4 shows a pseudoinfarction pattern in a patient with hyperkalemia. The T wave in V5 is tall, narrow, pointed, and tented. Tracing 5 is from a patient with acute anteroseptal infarction. The distinctive features of tracing 6, from a patient with acute anteroseptal infarction and right bundle-branch block, include the remaining R' wave and the distinct transition between the downstroke of R' and the beginning of the ST segment. Tracing 7, from a patient with the Brugada syndrome, shows rSR' and ST-segment elevation limited to V1 and V2. The ST segment begins from the top of the R' and is downsloping.
DON'T FORGET THIS ONE

- WELLEN'S SYNDROME
- HISTORY OF CHEST PAIN
- NORMAL OR SLIGHTLY-ELEVATED CARDIAC ENZYMES
- NO PRECORDIAL Q-WAVES
- ISOELECTRIC OR <1MM ST-SEGMENT ELEVATION
- PATTERN PRESENT IN PAIN-FREE STATE LEADS V2, V3
- NOT IN A PATIENT WITH LVH

https://wikem.org/wiki/Wellens%27_syndrome
THE PATIENT...

K=1.2

Cr=8.9

Cr=8.9
CASE 6:
ARE YOU KIDDING ME? - THE CASE OF CAROL

• 52Y WOMAN PRESENTS FOR EVALUATION OF ACUTE CHEST PAIN.
• BEGAN 1H PTA, SHARP, LEFT SIDED, NO ASSOCIATED SYMPTOMS
• PMH: HTN, CAD WITH MULTIPLE PRIOR MI, SMOKING, OBESITY
• VS: 36.9 54 14 124/70 98%
• EATING CHEETOS AND PEPSI ON ARRIVAL
THE PATIENT...
HELLO, CARDIOLOGY?
20 MINUTES LATER...
HOSPITAL HOPPING
**LV ANEURYSM-ANTERIOR**

- **Rule 1:** Acute STEMI is predicted if:
  
  \[
  \frac{\text{sum of } T \text{ wave amplitudes } V1 + V2 + V3 + V4}{\text{sum of } QRS \text{ amplitudes } V1 + V2 + V3 + V4} > 0.22
  \]

- **Rule 2:** Acute STEMI is predicted if:
  
  \[
  \frac{T \text{ wave amplitude}}{QRS \text{ amplitude}} \text{ in any lead } V1, V2, V3 \text{ or } V4 \geq 0.36
  \]

- **Per Dr. Stephen Smith** this equation may help to differentiate LV aneurysm from persistent ST elevation

- **http://hqmeded-ecg.blogspot.com/2015/09/is-this-stemi-no-it-is-one-of-most.html**
IN A PINCH, MUST REACT

- Ventricular aneurysms may be dangerous and should be carefully managed.
- Given time constraints, may not reliably be able to rule out an acute process.
- Need to have repetitive experiences with these findings to foster confidence.
- When in doubt, phone a friend, particularly a cardiologist!

- Phyllis, think fast!
IN THE END...

- Acute coronary syndromes are more common than the mimics
- Must remain vigilant and proactive in our learning
- Extraordinary resources exist to practice
- Nothing like leaning on a colleague to discuss cases whether peer or consultant
- Treat the whole patient
AND TAKE CARE OF YOU!
QUESTIONS?
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