Foundations EKG II



Unit 7 Instructor—Approach to Fascicular Blocks

Timeline:

- Divide learners into 4 groups at different tables (this approach is suggested for groups of 8 or more learners and should be modified to 1 or 2 groups so sites with lower numbers of learners)
- 5 min large group review of the Unit 7 Summary "Approach to Fascicular Blocks"
- Give each group 2 copies of the Unit 7 EKG Challenges Packet (merged challenge EKG content for EKGs 25-28), this allows learner groups to all review content and record their group's answers to the interpretation and questions for each EKG
- Allow 20 minutes for groups to complete the 4 challenges (give updates at 5min increments)
- 20 minutes large group discussion of answers to challenges. May consider asking each group to present their responses to a different EKG

Meeting Resources:

- Notify learners in advance of the session that they need to review the unit summary and challenge EKGs
- Before the session, have a few copies of the unit summary (pages 2-4 of this document) printed to give to learners who forgot their copies/devices and copies of the Unit 7 EKG Challenges Packet to give to groups
- Before the session, make sure to print this document for your own reference during the group discussion
- After the meeting, send out the answer document to learners for independent review

Foundations EKG II

Unit 7 Instructor—Approach to Fascicular Blocks

Unit 7, Case 25—*Patient 1—35yM with no PMHx presenting with palpitations.*

Patient 2—45yM with no PMHx presenting with chest pain.

Challenge Questions: What pattern should you always assess for when patient's present with an EKG like this?

What rule has demonstrated the most sensitivity in assessing for ischemia in patient's with an EKG like this?

Unit 7, Case 26—54 y/o F with no PMH presents for syncope. She is currently asymptomatic.
Challenge Questions: What part of the conduction system Is affected in this EKG?

What is the clinical significance of this EKG finding?

Unit 7, Case 27—54yoF presents for syncope. She is currently asymptomatic Challenge Questions: What part of the conduction system Is affected in this EKG? What is the clinical significance of this EKG finding?

Unit 7, Case 28—72 y/o F with PMH of CAD with ischemic cardiomyopathy and an EF of 45% presents for syncope. On ED arrival she is asymptomatic.

Challenge Question: What unstable cardiac rhythm is this patient at risk of developing? How should this patient be dispositioned and what is the appropriate management of this condition?

HR: 100	BP: 119/64
RR: 12	O2 Sat: 99%

HR: 55	BP: 146/99
RR: 12	O2 Sat: 99%

HR: 70	BP: 127/82
RR: 12	O2 Sat: 98%



HR: 65 BP: 110/70 RR: 22 O2 Sat: 97% HR: 70 BP: 110/70 RR: 22 O2 Sat: 97%



Foundations EKG II - Unit 7 Summary Approach to Fascicular Blocks

Bundle branch blocks distort normal EKG anatomy and can mask the normal signs of ischemia or arrhythmia. Identifying bundle branch blocks by criteria provides information about the electrical functioning of a patient's heart.

Right bundle branch block criteria:

- Wide QRS (>120ms)
- Tall R wave in V1-V3,
- Wide, slurred S wave in lateral leads (V5-V6) Courtesy of Edward Burns of Life in the Fast Lane Creative Commons License





Left bundle branch block criteria:

- Wide QRS (>120ms)
- Dominant S wave in V1
- Broad monophasic R wave in lateral leads (V5-V6)
 Courtesy of Edward Burns of Life in the Fast Lane
 <u>Creative Commons License</u>

High clinical suspicion of AMI based on history and exam in conjunction with EKG changes should guide diagnosis and treatment regardless of presence or absence of these criteria.



Ischemia in LBBB may be recognized using Sgarbossa criteria initially developed by Dr. Elena Sgarbossa:

Score \geq 3 has reported sensitivity of 90% for MI

5 points: Concordant ST elevation >1mm in leads with a positive QRS

3 points: Concordant ST depression >1mm in V1-V3

2 points: Excessively discordant ST elevation > 5 mm in leads with a negative QRS complex

Dr. Steve Smith created the Modified Sgarbossa Criteria (Good explanation by Dr. Salim Rezaie at ALIEM)

The rule is positive if any of the following is present:

 \geq 1 lead with \geq 1 mm of concordant ST elevation

- \geq 1 lead of V1-V3 with \geq 1 mm of concordant ST depression
- ≥ 1 lead anywhere with ≥ 1 mm STE and proportionally excessive discordant STE and STE divided by S-wave depth less than or equal to -0.25

In the example below: III = 3/-20 = -0.15 aVF = -0.21



Courtesy of Dr. Steve Smith of <u>Dr. Smith's ECG Blog</u>

Left Anterior Fascicular Block

- Left axis deviation
- Small q waves with tall R waves in I and aVL
- Small R waves with deep S waves in II, III, & aVF
- Normal QRS duration
- Increased QRS voltage in limb leads



Left Posterior Fascicular Block

- Right axis deviation
- Small Q waves with tall R waves in II, III, and aVF
- Small R waves with deep S waves in I and aVL
- Normal QRS duration
- Increased QRS voltage in the limb leads
- No other cause of right axis deviation



Courtesy of Edward Burns of <u>Life in the Fast Lane</u> <u>Creative Commons License</u>

Note: Any fascicular block associated with 1st degree AV block in a patient with syncope or other symptoms should prompt the consideration of intermittent third degree heart block. This may require pacemaker placement.

HR: 65

HR: 70

BP: 110/70 RR: 22

BP: 110/70 RR: 22



O2 Sat: 97%

O2 Sat: 97%

Patient 1—35yM with no PMHx presenting with palpitations.

Patient 2—45yM with no PMHx presenting with chest pain.

What is your interpretation of EKG 1? What is your interpretation of EKG 2? History/Clinical Picture History/Clinical Picture Rate Rate Rhythm Rhythm Axis Axis P Waves P Waves Q/R/S Waves Q/R/S Waves T Waves T Waves U Waves U Waves PR Interval PR Interval QRS Width QRS Width ST Segment ST Segment **QT** Interval **QT** Interval What dangerous conditions may be associated What rule has demonstrated the most sensitivity in with palpitations? assessing for ischemia in patient's with an EKG like this?

EKG 1—Unit 7, Case 25



EKG courtesy of Shanna Jones, MD



EKG 2—Unit 7, Case 25



EKG courtesy of Shanna Jones, MD



Unit 7, Case 25, EKG 1–Right Bundle Branch Block

What is your interpretation of EKG 1? History/Clinical Picture—Young man with no risk factors and new palpitations Rate—~65 Rhythm—Sinus Axis—Normal P Waves—normal Q, R, S Waves—No Q waves. RSR' in V1-3, III, and aVF, S waves I and aVL T Waves—Inversion in V1-4, T wave flattening V5-6, II, III, and aVF U Waves—None PR Interval—Normal QRS Width—Wide ST Segment—Minimal ST depression V1-3. No ST elevation QT Interval—Normal Diagnosis—Sinus rhythm with a right bundle branch block

What pattern should you always assess for when a patient presents with an EKG like this?

Brugada syndrome can cause a right bundle branch block pattern with atypical morphology however the only EKG abnormality that is currently potentially diagnostic is the "Brugada Sign" which is demonstrated to the right. Regardless, it is a good practice to consider Brugada in any patient with a new RBBB and should trigger a detailed clinical and family history of any of the features listed below.

- Personal or family history of documented polymorphic VT or VF
- Family history of sudden cardiac death before 45 y/o
- Family history of coved-EKG abnormalities

- Syncope
- Pre-syncope
- Nocturnal Agonal Respiration





Unit 7, Case 25, EKG 2—Left Bundle Branch Block

What is your interpretation of EKG 2?

History/Clinical Picture—Middle aged man with no past medical history and new chest pain Rate— ~70 Rhythm—Sinus rhythm Axis—Left axis deviation P Waves—normal Q, R, S Waves— q waves in II and aVF, dominant S wave in V1, broad monophasic R wave in V5 and V6 T Waves—Inversion in I and aVL U Waves—None PR Interval—Normal QRS Width—Wide ST Segment—ST depression V5, V6, I & aVL. ST elevation V1-3 QT Interval—normal Diagnosis—Sinus Rhythm with Left Bundle Branch Block

What rule has demonstrated the most sensitivity in assessing for ischemia when a patient presents with an EKG like this?

Smith Modified Sgarbossa Criteria

Not yet validated but initial results show substantially increased sensitivity (80% vs 19-50% for original rule)

The following criteria apply even when only a single lead is affected unlike normal STEMI criteria

A. Concordant STE > 1mm in one or more leads

B. Concordant STD > 1mm in V1-3 in one or more leads

C. Discordant ST/S Ratio \leq -0.25 in one or more leads (*Therefore any value from -0.25 to -1.0 rules in for MI*)

Study link: http://www.annemergmed.com/article/S0196-0644(12)01368-6/pdf

Resource Links: Life in the Fast Lane

54 y/o F with no PMH presents for syncope. She is currently asymptomatic.

HR: 100	BP: 119/64
RR: 12	O2 Sat: 99%



What is your interpretation of the EKG?

What part of the conduction system Is affected in this EKG?	
	What is the clinical significance of this EKG finding?

Triage EKG—Unit 7, Case 26



EKG courtesy of Shanna Jones, MD

Unit 7, Case 26 - Left Anterior Fascicular Block

What is your interpretation of the EKG?

History/Clinical Picture— middle aged woman presents for syncope, now with stable vitals and asymptomatic Rate— ~100

Rhythm— sinus rhythm Axis— left axis deviation

P Waves— present

Q, R, S Waves— small q-waves (non-pathologic) in I and aVL, very small r waves and very prominent S waves in II, III, and aVF

T Waves— T-wave inversion in I and aVL U Waves—not present PR Interval—normal QRS Width— normal ST Segment— no st elevation or depression

QT Interval – normal

Diagnosis: Left anterior fascicular block

Discussion: The EKG criteria for LAFB are as follows:

- 1. Left axis deviation
- 2. Small q waves with large R waves ("qR complexes") in I and aVL
- 3. Small r waves with large S waves ("rS complexes") in II, III, and aVF
- 4. Normal or slightly prolonged QRS duration (80-110 ms).

In isolation, LAFB is not clinically significant. When seen in combination with other conduction system disease (i.e. a right bundle branch block and 1st degree AV block) in the setting of syncope, it may signal intermittent complete heart block. The diseased area of the conduction system is the left anterior fascicle of the interventricular conduction system as shown in the cartoon:

Resource Links: Life in the Fast Lane — great overview





54yoF presents for syncope. She is currently asymptomatic

HR: 55	BP: 146/99
RR: 12	O2 Sat: 99%



What is your interpretation of the EKG?	
History/Clinical Picture	
Rate	What part of the conduction system Is affected in this EKG?
Rhythm	
Axis	
	What is the clinical significance of this EKG finding?
P Waves	
Q/R/S Waves	
T Waves	
U Waves	
PR Interval	
QRS Width	
ST Segment	
QT Interval	

Triage EKG—Unit 7, Case 27



Courtesy of Edward Burns of Life in the Fast Lane

Creative Commons License



Unit 7, Case 27 - Left Posterior Fascicular Block

What is your interpretation of the EKG?

History/Clinical Picture— middle aged woman presents for syncope. Now with bradycardia but otherwise seems well Rate— 55 Rhythm— sinus bradycardia Axis— right axis deviation P Waves— present Q, R, S Waves— small r waves with prominent S-waves in I, aVL, small q-waves with large R waves in II, III, aVF. T Waves— no notable abnormalities U Waves— not present PR Interval— normal QRS Width— ~100 ms ST Segment— normal QT Interval— normal Diagnosis: Sinus bradycardia with left posterior fascicular block

Discussion: The EKG criteria for LPFB are as follows:

- 1. Right axis deviation
- 2. Small q waves with large R waves ("qR complexes") in II, III and aVF
- 3. Small r waves with large S waves ("rS complexes") in I, and aVL
- 4. Normal or slightly prolonged QRS duration (80-110 ms)
- 5. Absence of RVH or other reason for right axis deviation.

In isolation, LPFB is not clinically significant. When seen in combination with other conduction system disease (i.e. a right bundle branch block and 1st degree AV block) in the setting of syncope, it may signal intermittent complete heart block. The diseased area of the conduction system is the left posterior fascicle of the interventricular conduction system as shown in the cartoon:

Resource Links: Life in the Fast Lane — great overview



72 y/o F with PMH of CAD with ischemic cardiomyopathy and an EF of 45% presents for syncope. On ED arrival she is asymptomatic.

HR: 70	BP: 127/82
RR: 12	O2 Sat: 98%



What is your interpretation of the EKG?

History/Clinical Picture	What unstable cardiac rhythm is this patient at risk of developing?
Rate	
Rhythm	
Axis	
P Waves	How should this patient be dispositioned and what is the appropriate management of this condition?
Q/R/S Waves	
T Waves	
U Waves	

PR Interval

QRS Width

ST Segment

QT Interval

Triage EKG—Unit 7, Case 28



Courtesy of Edward Burns of Life in the Fast Lane

Creative Commons License



Unit 7, Case 28 - Bifascicular Block with 1st Degree AV Block



What is your interpretation of the EKG?

History/Clinical Picture— elderly woman with CHF who presents with syncope Rate— 70 Rhythm— Sinus rhythm Axis— left axis deviation P Waves— present Q, R, S Waves— no clear pathologic q waves, S-waves inferiorly and laterally, early R-wave progression T Waves— no clear pathologic q waves, S-waves inferiorly and laterally, early R-wave progression T Waves— not present PR Interval— consistently prolonged at 220 ms consistent with 1st Degree AV Block. No progressive prolongation that would be consistent with 2nd Degree Type I or intermittent dropped beats that would be consistent with 2nd Degree Type II QRS Width— prolonged at just over 120 ms with RBBB and LAFB RBBB: RSR' in V1 and QRS > 120ms LAFB: 1. Left axis deviation 2. Small q waves with large R waves ("qR complexes") in I and aVL

3. Small r waves with large S waves ("rS complexes") in II, III, and aVF

4. Normal or slightly prolonged QRS duration (80-110 ms).

ST Segment— no marked elevation or depression

QT Interval - normal

Diagnosis: Bifascicular block (RBBB + LAFB) with first degree AV block

Management: This EKG shows severe disease of the interventricular conduction system. A right bundle branch block with a left anterior fascicular block (or left posterior fascicular block) in the presence of a 1st degree AV nodal block is sometimes erroneously called a "trifascicular block". Conduction between the atria and the ventricles is reliant on the remaining fascicle, in this case the left posterior fascicle. The long PR suggests that this remaining fascicle is also diseased, and thus the patient is at risk of progressing to complete heart block. While a bifascicular block with concurrent 1st degree AV block is not an indication for a pacemaker on its own, patients with this rhythm who present with syncope should be admitted and evaluated for evidence of intermittent third degree heart block, which would necessitate pacemaker placement.

Resource Links: <u>Life in the Fast Lane</u> — great overview

Dr. Steve Smith's Blog – good case