



AUSTRALASIAN COLLEGE
FOR EMERGENCY MEDICINE

2016.1B FELLOWSHIP CLINICAL EXAMINATION (OSCE)

STATION 3 ECG TEACHING STATION

1. STATION SUMMARY

ECG showing complete heart block. Further teaching regarding ECG features of other heart blocks. Patient has presented with fever and dyspnoea post AVR – likely diagnosis of aortic root abscess, other causes of bradycardia require consideration. Investigation of this patient/ bradycardia covered.

2. CANDIDATE INSTRUCTIONS

Doctor Jones is a PGY3 junior doctor. They wish to discuss a patient's ECG and their clinical presentation. The history is as follows but Dr Jones is unaware of the examination findings.

At your tertiary referral centre, it is 11 am on a Wednesday.

The patient, John, is a 40 year old man who is currently in Resus having come in following a syncopal episode without head injury. John had an aortic valve replacement 4 weeks ago for aortic stenosis. He has no other past medical history. John describes having had fevers and chills for the last 5 days which is associated with anorexia, lethargy and increasing dyspnoea. His only medication is aspirin.

The patient is currently stable in the resuscitation room under the care of a senior registrar and therefore you have time and/or several minutes to discuss this with Dr Jones.

Your tasks are to:

- Interpret the ECG
- Discuss the potential causes for the patient's presentation
- Explain what investigations would be required

You are **not** required to take a further history.

Management is **not** a focus of this OSCE.

This OSCE will assess the following domains:

- Medical Expertise
- Scholarship & Teaching

3. ROLE-PLAYER INSTRUCTIONS

You will be playing the role of a junior (PGY3) doctor currently working in the ED. You have just seen John, a 40 year-old man who is currently in Resus having come in following a syncopal episode at home. John had an aortic valve replacement 4 weeks ago. John describes having had fevers and chills for the last 5 days which is associated with anorexia, lethargy and increasing SOB.

You have been in the resuscitation room with the senior registrar. You have heard the history and have just seen his initial ECG. The patient is stable and in good hands with the senior registrar, who is going about an examination and further assessment. You are seeking guidance about the ECG interpretation in this setting. You are also wondering what could cause this, as well as how to further investigate.

As a junior doctor you recognise that there is a bradycardia but are having trouble working out the exact rhythm and what to look for on the ECG in this presentation.

The Candidate will Walk into the Room:

'Hi I'm Dr Jones, Thanks for helping me with this case' ... Sit down and show the ECG to the candidate such that a discussion can begin.

While the candidate starts to look at the ECG, reiterate the history as above:

'I've just seen John, a 40 year-old man who is currently in Resus. He has come in following a syncopal episode at home. John had an aortic valve replacement 4 weeks ago. He describes having had fevers and chills for the last 5 days which is associated with anorexia, lethargy and increasing SOB. I have been in the resuscitation room with Jack, the senior registrar. Jack is sorting it. The patient is stable and in good hands. I was wondering if you could help me interpret this ECG and have a quick chat about the case please'

The candidate will likely firstly ascertain your baseline knowledge about the ECG. The following should be the response:

'Well, there is bradycardia with a rate about 50 but I can't quite work out the rhythm.'

Your base line knowledge includes simple ECG interpretation and a rudimentary differential diagnosis (myocardial ischaemia and drugs). You recognise the left bundle branch pattern, but not the CHB. You recognise that there are p waves on the ECG.

You may be asked about an old ECG but at this point *'I don't have the chart'*.

You need to get the candidate to explore the relevant relative negatives and positives on the ECG. The candidate must describe and explain clearly to you the following points:

1. Complete heart block: p waves independent from QRS
2. Escape rhythm 40/min with LBBB morphology: Rate and morphology suggest coming from infranodal conducting tissue

If necessary, ask *'So what is happening with the QRS?'* and *'Where is it coming from?'*

'What else should I be looking for on the ECG?' They may discuss looking for signs of ischaemia, hyperkalaemia etc.

You are an ALS provider and are familiar with the treatment of symptomatic bradyarrhythmias and therefore do not require a discussion on this.

'I am happy with the management of symptomatic bradycardia'

You are also focused on learning about how you differentiate heart blocks.

'How do I differentiate types of heart block?'

The candidate needs to adequately explain the following:

- 2nd degree heart blocks (not all p waves followed by QRS)
 - Type I (Wenkebach) – progressive PR lengthening then block
 - Type II – constant PR then block
- 1st degree heart block – PR > 0.20 msec

Better candidates may discuss looking for conduction disease such as bi-fascicular blocks / tri-fascicular blocks. This is fine if they have time however is not 'required'.

If explanations by the candidate are not clear to you please ask for clarification and/or say *'I don't understand'*.

The interpretation and teaching with the ECG should take around 4 minutes, and you can move on at the 4 minute mark if the ECG interpretation seems adequate or exhausted. Poor candidates may struggle to relay information and take longer. Similarly, good candidates may have a lot of information to relay and start talking about Sgarbossa criteria. If time is running out to 5 minutes, do not use any more prompts or dialogue that would prolong the ECG discussion.

Then the discussion needs to move to possible causes and what investigations might be required.

'What causes do we need to consider in him? How should we investigate for them?'

The candidate may well say to you what do you think the causes could be. In response to this say something like

'ACS perhaps.... I'm not really sure though'

The candidate should outline a number of potential causes

- Post surgical: Endocarditis/ Aortic Root abscess / surgical complication
- Other: Ischaemia (unlikely), Drugs (BBLOCKERS, Amiodarone, CaCB), Degenerative, Cardiac disease (myocarditis / infiltration), Electrolyte (HyperK+)

If they focus on the 'post surgical' aspects only, ask *'Are there other causes of heart block I should think of?'*

If they do not address the post surgical aspect ask *'Could it be related to his operation?'*

The candidate may ask you to consider why the patient could be febrile. Your response should be

'They most likely have an infection, maybe a pneumonia but I am not sure why they have a heart block'

Then proceed to prompting about investigations. If asked, you can suggest some basic investigations such as FBE/ UEG/LFT and Tnl.

A good candidate should recognise the risk for endocarditis and as such recommend multiple blood cultures and Echo. If an echo is not mentioned prompt as follows:

'Are there any other tests that we should get?'

'Should we get the patient to the cath lab for an angiogram?'

If the candidate says an echocardiogram, you should explore the reasons for this if it not already clear:

'What are we looking for with an echocardiogram?'

If time permits also explore the urgency of the echocardiogram. If an aortic valve root abscess is possible this is quite urgent.

4. EXAMINER INSTRUCTIONS

You are to observe the candidate only. You may re-orientate the candidate to the tasks if they get off track.

Up to 5 minutes should be allowed for ECG interpretation and the rest of the time for case base discussion with the RMO about the possible causes and investigations.

This OSCE will assess the following domains:

- Medical Expertise
- Scholarship & Teaching

ECG Interpretation

- CHB –p waves able to be traced out. No fixed relation to QRS –best seen at the end of the rhythm strip. P waves are hidden in the ST/T complexes.
- Rate: 42. Rate suggests nodal/infranodal escape
- LBBB – new/old/indeterminate. While possibly preexisting or escape, cannot rule out acute ACS if new.
- Left axis deviation (LAXD) – goes with LBBB
- Sgarbossa criteria – negative for STEMI i.e. no concordance of ST segments as related to QRS
- T waves prominent and could raise the possibility of hyperkalaemia
- Relevant negative re RCA ACS – no inferior ST elevation
- T wave inversion 1, AVL and V6 (as expected with LBBB pattern)

Causes

Very good candidates will try to relate to recent surgery, fever and bradycardia and consider one cause that will explain all manifestations

- Only real (best) explanation is classic presentation of aortic valve root abscess with endocarditis and conduction system disturbance
- Endocarditis with infected emboli in coronary artery far less likely
- Recognise this as potential surgical emergency which needs echo diagnosis
- Passing candidates should identify a concern for post-surgical endocarditis and a discussion with cardiology/ cardiac surgeon at minimum

Other candidates may consider multiple causes to explain presentation features

- Infection and hyperkalaemia/ARF
- Other Infection and ACS
- Heart block: Ischaemia (unlikely), Drugs (BBBlockers, Amiodarone, CaCB), Degenerative, Cardiac disease (myocarditis/infiltration), Electrolyte (HyperK+)

Poorer candidates are likely to just go through a list-like approach for bradycardia/CHB and a list like approach for fever, rather than relate to this patient. The causes of these are many and well known to examiners.

Investigations

Good candidates should advise the junior doctor of the utility of an early vbg/abg to exclude hyperkalaemia and assess for poor end organ perfusion signs such as metabolic acidosis and raised lactate. The patient is SOB and an arterial blood gas will provide information on gas exchange.

CXR and multiple blood cultures as well as a “standard workup” is important and good candidates will relate the rationale of why a test should be ordered in this situation.

An angiogram in this setting should not be done before an ED transthoracic bedside echocardiogram. An Echo can define endocarditis potentially and can include/exclude an aortic valve root abscess. Although specifically not a task, good candidates may mention the need for collaborative cardiothoracic surgery in investigative approach.

Scholarship & Teaching

As this is a teaching OSCE with the Junior doctor, the candidate will be required to facilitate a case based discussion with the RMO. The candidate should firstly establish the RMO's baseline knowledge. This should include the discussion on the diagnosis of one (1) disease process causing the constellation of findings vs multiple disease processes. The candidate needs to be clear in his explanation and facilitate the discussion through the use of both open and closed ended questions. Clinical reasoning, diagnostic reasoning in relation to investigative reasoning is key to the discussion. Demonstration of the process to define different heart blocks should be logical and specific to the case. Listening and checking understanding may occur throughout. There should be patience and tolerance for the learner. Teaching rules for the diagnosis of different types of heart block and key learning messages for the future should be delivered. At the end of the OSCE, the candidate could recommend that the RMO reflect on the case and follow up with further reading (post experiential reflection).

Aortic Root Abscess and Acute (prosthetic valve endocarditis) PVE

Acute PVE defined as occurring within first 60 days post valve replacement and is a more aggressive disease than subacute infective endocarditis (IE). Not very common and usually caused by skin organisms. High mortality. Clinical features similar to native valve endocarditis with most common symptoms being fever and chills.

Aortic Root Abscess

Complication of Infective Endocarditis. More frequently found in Acute IE, Prosthetic valves and in the aortic valve. High mortality and morbidity requires early diagnosis and invariably surgical repair. Presents with features of IE – Fevers and chills commonly. Increasing PR on ECG or development of heart block are worrying features as conduction system impinged on by abscess.

Medical Expertise

Areas assessed: ECG interpretation, heart blocks, relevant negatives and positives on ECG with heart block, Endocarditis and complications specifically valve ring abscess, emergent investigations in this setting.

Assessment criteria (see mark sheet for essential criteria)

- ECG interpretation
 - Recognise CHB
 - Recognise escape rhythm: rate suggest nodal/infranodal ?old LBBB (relate to old ECGs) with nodal escape or infranodal escape with block
 - Adequate explanation of features of 1st and 2nd degree Heart block
 - Other blocks
- Diagnosis/differential
 - consider endocarditis, relate to cause of CHB, aortic root abscess
 - Cardiac disease: Ischaemia, degenerative, myocarditis, cardiomyopathy (bold + 1 other)
 - Drugs (Amiodarone, BB blocker, CaCB, Dig), Electrolytes (hyperkalaemia ?AKI) (2 drugs to pass)
- Investigations
 - VBG/ABG with correct rationale (K+, acidosis)
 - Endocarditis: Echocardiogram + multiple blood cultures (min 3 sets)
 - CXR
- FBE/ UEG/LFT/ INR if warfarin, other
- No significant errors or omissions with regard to patient ECG interpretation, differential diagnosis, investigations



Scholarship & Teaching

Establishing knowledge, check learning needs, responding to needs, clarity of communication, specific and relevant, depth and breadth, reasoning and logic, listening, manner with learner, checking understanding, correcting misconceptions, reinforcing correct knowledge, suggesting post experiential reflection and learning.

Suggested minimal standard:

- Majority of these elements should be included in the teaching style and examiners should feel comfortable that an adequate teaching experience has occurred in the time frame

ECG



Examiner Mark Sheet

CONFIDENTIAL Examiner Rating: OSCE 3



EXAMINER 1
barcode

CANDIDATE barcode

EXAMINER 2
barcode

COMPONENT ASSESSMENT

For each Domain below, select the ONE option that best represents the candidate's level of performance. The option "Minimum level of competency displayed" represents the level of safe independent practice as a junior FACEM in Australasia.

Very poor
level of
competence
displayed

Well below
minimum
level of
competence
displayed

Below
minimum
level of
competence
displayed

Minimum
level of
competence
displayed

Above
minimum
level of
competence
displayed

High level of
competence
displayed

Very high
level of
competence
displayed

Please rate ALL the following domains:

Medical Expertise ☐ ☐ ☐ ☐ ☐ ☐ ☐

Scholarship and Teaching ☐ ☐ ☐ ☐ ☐ ☐ ☐

Detailed assessment criteria

Please use the following criteria to inform your ratings above

Medical Expertise	- ECG interpretation - CHB - Escape rhythm + LBBB pattern: Nodal + old LBBB or infranodal escape with block - Adequate explanation of features of 1st degree block 2nd degree Heart block: Type I and Type II - Other blocks: LAFB, LPFB, Bifascicular, Trifascicular - Diagnosis/ differential - consider endocarditis, relate to cause of CHB, aortic root abscess - Cardiac disease: Ischaemia, degenerative, myocarditis, cardiomyopathy (bold + 1 other) - Drugs (Amiodarone, BB blocker, CaCB, Dig), Electrolytes (hyperkalemia ?AKI) (2 drugs to pass) - Investigations - VBG/ABG with correct rationale (K⁺, acidosis) - Endocarditis: Echocardiogram + multiple blood cultures (min 3 sets) - CXR - FBE/ UEG/LFT/ other
Scholarship and Teaching	- establish knowledge & respond to learning needs - clarity of communication - specific and relevant, appropriate depth - interaction with learner – rapport, listening, response to questions - checks understanding, corrects misconceptions, reinforces correct knowledge - suggesting post experiential reflection and learning

Examiner Mark Sheet (cont')

CONFIDENTIAL Examiner Rating: OSCE 3



INFORMATION

Station Summary: ECG teaching station. ECG showing complete heart block. Further teaching regarding ECG features of other heart blocks. Patient has presented with fever and dyspnoea post AVR – likely diagnosis of aortic root abscess, other causes of bradycardia require consideration. Investigation of this patient/ bradycardia covered.

EXAMINER NOTES (For examiner reference only)

OSCE 'incident reporting' notes: Please provide details if an issue occurs which may influence this candidate's exam outcome e.g. protocol breach, candidate illness etc.

GLOBAL RATING FOR STANDARD SETTING:

This scale is used in the standard setting process for the OSCE. Please rate the candidate's OVERALL performance in this OSCE. The rating should take into account the entirety of the OSCE, rather than just a sum or average of the individual domain scores. This element MUST be completed for the standard of the examination to be set.

	Well Below Standard	Below Standard	Just at Standard	Above Standard	Well Above Standard
In terms of a safely practising junior emergency physician, select the ONE option that best reflects the candidate's performance in this station:	☐	☐	☐	☐	☐

EXAMINER SIGNATURE:



OSCE 1

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