Clinical Cases for AMU – Case Four: Limb Weakness

Introduction

These cases are designed to support your learning during your time in Acute and General Medicine. You can use them when you have free time on the ward. They can be done either alone, or in a small group. They use fictional scenarios to demonstrate learning points from common presentations to the Acute Medical Unit (AMU) and on the General Medical wards. As you work through the cases, you will find a mixture of case discussions, practical activities, and practice questions to assess your learning.

If there is a knowledge check or interpretation exercise, the answer can be found on the back of the same page that the question is on.

Case History

A 75-year-old female (Edna) is BIBA (brought in by ambulance) at 10.00 with new speech difficulties and an "inability to lift her right arm". She was found at home by Margaret, a friendly neighbour, this morning at 09.00 when she popped in for a routine social call. Margaret reports that she last saw Edna at 20.00 last night. She was well at that time. Margaret says that Edna has had a few episodes of mild R arm weakness over the past 2 weeks, but "nothing as bad as this". Edna had refused for Margaret to call the doctor, as symptoms spontaneously resolved within 20 minutes and she "didn't want to bother the doctor".

Past Medical History
Hypertension
Hyperlipidaemia
Diabetes
No previous stroke

Drug History
NKDA
Amlodipine 5mg OD
Atorvastatin 20mg OD nocte

Family History
Nil relevant

Social History
Lives at home alone, in a 1 storey bungalow
Independent all ADLs
Mobilises with 1 stick
Leaves house 1x/week to go to the shops
Supported with further shopping, cooking, cleaning by "lovely neighbours"
Lifelong non-smoker
Previous mild alcohol consumption, never drank to excess.

On examination

A	Maintaining own airway with no evidence of obstruction
B	SpO2 94% on room air, Respiratory rate 18 Chest clear
C	HR 105, BP 139/59 mmHg Warm and well perfused peripherally Radial pulse regular HS normal with no additional sounds Central capillary refill time normal
D	Edna is lying in bed, drowsy but rousable to minor stimulation. Edna can follow simple one stage commands She has an expressive aphasia, which is severe (she cannot state her name, age, today's date, nor name objects. Communication is significantly fragmented with inference needed). There is mild dysarthria. Eye movements and visual fields are intact There is no neglect or inattention. Normal facial symmetry RUL: Decreased tone, reduced reflexes. 3/5 power RUL. Over 10 second examination there is R arm motor drift, during which the arm hits the bed. These is ataxia on finger-nose test. There is reduced sensation in her R UL, but she can still sense being touched. LUL: Normal tone. Normal power. Reflexes intact. Sensation intact. Coordination normal. RLL: Normal tone. Normal power. Reflexes intact. Sensation intact. Coordination normal LLL: Normal tone. Normal power. Reflexes intact. Sensation intact. Coordination normal BM 5.9
E	Abdomen soft and non-tender Bowel sounds present Afebrile

Activity One

Complete a comprehensive cranial nerve examination for a patient on the ward. The patient does not necessarily have to have a neurological problem, you may find a happy and willing volunteer!

Knowledge Check One

1. Based on the history and examination findings, what is the most likely diagnosis?
2. What screening tool can be used by paramedics or the public to assess for possible strokes>
3. Do you know of any validated clinical assessment tools used to risk stratify patients according to likelihood of stroke in the Emergency Department?
4. List risk factors for an *ischaemic* stroke

Interpretation One

Calculate the ROSIER score. You will be able to find this on an online calculator.

Knowledge Check One – Answer

1. Stroke is the most likely diagnosis. A stroke is an acute neurological deficit lasting more than 24 hours and caused by cerebrovascular aetiology. It can be ischaemic (caused by vascular occlusion or stenosis) or haemorrhagic (caused by vascular rupture, resulting in intra-parenchymal and/or subarachnoid haemorrhage) in aetiology. Ischaemic stroke accounts for 87% of all stroke cases, haemorrhagic stroke for 10%, and subarachnoid haemorrhage for 3%.

2. The ambulance crew (SA) had assessed the patient in the community using the FAST (Face, Arm, Speech, Time) screening tool. This has a sensitivity of up to 97%, with a specificity from 13-88% (Harbison et al., 2003).

3. The ROSIER (Recognition Of Stroke In the Emergency Room) is used internationally in emergency departments for this purpose. It is a 7-point scoring system comprising information pertaining to GCS, BP, Blood glucose, unilateral weakness, speech or visual disturbance.

4. Risk factors for ischaemic stroke include:
   a. Age ≥55 years
   b. Hx of TIA. – a TIA is a medical emergency, heralding a significant risk of stroke. One or more TIAs may precede a stroke
   c. Hx of ischaemic stroke
   d. FHx stroke, especially at young age
   e. Hypertension
   f. Smoking
   g. Diabetes mellitus
   h. Atrial fibrillation
   i. Comorbid cardiac conditions
   j. Carotid artery stenosis
   k. Sickle cell disease
   l. Dyslipidaemia

Interpretation One - Answer

Loss of consciousness or syncope	No	0
Seizure activity	No	0
Asymmetric facial weakness	No	0
Asymmetric arm weakness	Yes	1
Asymmetric leg weakness	No	0
Speech disturbance	Yes	1
Visual field defect	No	0

ROSIER score 2 – stroke possible

Knowledge Check Two

1. You spend some time considering alternative causes for Edna's presentation. What stroke mimics are you aware of, that should be considered in the differential diagnosis?
2. Do you know of any scoring systems used to quantify stroke severity and help estimate prognosis?

Interpretation Two

Calculate Edna's NIH stroke scale (NIHSS). You will be able to find the parameters for the NIHSS score online.

Investigations

You take a set of blood tests, including FBC, U&Es, LFTs, CRP, coagulation, and serum glucose and you request an urgent ECG.

You aware of the saying "time is brain" and would like to order urgent brain imaging.

Knowledge Check Three

1. What initial imaging would you request?
2. In what circumstances should immediate brain imaging be performed?

You request a non-contrast CT head scan. Fortunately, CT scanning have a slot available and Edna is taken round to the CT department.

Whilst you are waiting for Edna to come back, you complete your documentation. You consider the clinical classification of Edna's stroke.

The Oxford, (or Bamford,) classification is the most commonly used classification system for stroke. This system categorises the stroke based on the initial presenting symptoms and signs. Imaging is not required.

Activity Two

Look up the Oxford (or Bamford) stroke classification online.

Knowledge Check Two - Answer

1. In cases with atypical features, the following stroke mimics may be considered in the differential diagnosis:
   - Recrudescence of old stroke from physiological stress (e.g. metabolic or infective)
   - Todd's paralysis after seizure
   - Complex migraine
   - Psychogenic non epileptic seizure, conversion disorder
   - Hypoglycaemia

2. The National Institutes of Health Stroke Scale (NIHSS) is a systematic, quantitative assessment tool to measure stroke-related neurological deficit. It used to evaluate and document neurological status in acute stroke patients and standardise communication between healthcare practitioners. The NIHSS has been shown to be a good predictor of both short- and long-term outcomes of stroke patients.

Interpretation Two – Answer

1A: Level of consciousness	Arouses to minor stimulation	+1
1B: Ask month and age	Aphasic	+2
1C: 'Blink eyes' & 'squeeze hands'	Performs both tasks	0
2: Horizontal extraocular movements	Normal	0
3: Visual fields	No visual loss	0
4: Facial palsy	Normal symmetry	0
5A: Left arm motor drift	No drift for 10 seconds	0
5B: Right arm motor drift	No drift for 10 seconds	+2
6A: Left leg motor drift	No drift for 5 seconds	0
6B: Right leg motor drift	No drift for 5 seconds	0
7: Limb Ataxia	Ataxia in 1 limb	+1
8: Sensation	Mild-moderate sensation loss	+1
9: Language/aphasia	Severe aphasia: fragmentary expression, inference needed, cannot identify materials	+2
10: Dysarthria	Mild-moderate dysarthria: slurring but can be understood	0
11: Extinction/inattention	No abnormality	0

NIHSS 10 points

Knowledge Check Three

1. A non-contrast CT of the brain should be performed as soon as possible and within 24hrs of symptom onset in everyone with suspected acute stroke without indications for immediate brain imaging. Refer to Nice guideline 128 for further information.

2. Perform brain imaging immediately with a non-enhanced CT for people with suspected acute stroke if any of the following apply [NG128]:
   - Indications for thrombolysis or thrombectomy
   - On anticoagulant treatment
   - A known bleeding tendency
   - A depressed level of consciousness (Glasgow Coma Score below 13)
   - Unexplained progressive or fluctuating symptoms
   - Papilloedema, neck stiffness or fever
   - Severe headache at onset of stroke symptoms.

Interpretation Three

According to this classification system, what type of stroke has Mary had?

CT result

The CT head scan has been reported as showing no acute intracranial pathology. Haemorrhagic stroke has been excluded.

Knowledge Check Four

1. Does this affect your diagnosis?
2. For consideration of thrombolysis, what three initial criteria must be met?
3. Is this patient a candidate for thrombolysis?

Activity Three

Read about the WAKE-UP, DAWN, or DEFUSE trial(s). Consider how in the future we may be able to offer more individualised acute stroke treatment, informed by advanced imaging, to patients who would not traditionally have been considered as candidates for reperfusion interventions.

Interpretation Three - Answer

Edna has had a partial anterior circulation stroke (PACS), as she has two of the following three criteria:
- ✓ Unilateral weakness (and/or sensory deficit) of the face, arm and leg
- ✓ Higher cerebral dysfunction (dysphasia, visuospatial disorder)
- o Homonymous hemianopia

Knowledge Check Four – Answer

1. No. Ischaemic stroke is a clinical diagnosis based on signs and symptoms; a non-contrast CT head has limited sensitivity in the acute setting and a normal CT scan does not rule out a stroke. Particularly in the first few hours following a stroke, the CT scan can be normal or show very subtle ischaemic changes. Detection depends on the territory, the time of the scan from the onset of symptoms and the interpreting radiologist.
2. The main criteria for thrombolysis are:
   a. Clinical diagnosis of ischaemic stroke causing a measurable neurological deficit
   b. Treatment is started as soon as possible within 4.5 hours of onset of stroke symptoms.
   c. Intracranial haemorrhage has been clearly excluded by brain imaging
3. Under current guidelines, intravenous thrombolysis is used to treat acute stroke only if it can be ascertained that the time since the onset of symptoms is less than 4.5 hours.
   This patient is not a candidate for thrombolysis as she awoke with new neurological deficits and was last seen well >12hrs ago. It is therefore impossible to be sure that the time of symptom onset is <4.5hours.

Interestingly, there have been recent developments in this field, in association with results from the WAKE-UP, DAWN and DEFUSE trials. In population-based studies, approximately 1 out of every 6 patients wakes up with stroke symptoms and has an unclear time of symptom onset. Last seen well is often used as a (poor) surrogate marker for determining eligibility for reperfusion interventions.

Physiological factors mean that many wake-up strokes have happened close to wakening. This means that many wake-up strokes are likely to be in the thrombolysis window if they attend hospital promptly. In the WAKE-UP, DAWN and DEFUSE trials patients with wake-up strokes have had advanced imaging early to help determine the age of the infarct. If the imaging was favourable, they proceeded to have thrombolysis or mechanical thrombectomy. Initial results have suggested improved functional outcomes.

Based on these trials, there have been some changes to our practice locally. The stoke team will consider intervention, if imaging supports this, with either thrombolysis or thrombectomy in patients who have woken up with a stroke and are within nine hours of the midpoint of their sleep. The midpoint of sleep is determined as the halfway point between when they were last seen well, and when they woke up.

This is a fast-moving area, and it's likely that local guidelines will continue to change. In reality, if you feel that a patient with a wake-up stroke could benefit from intervention, then early involvement of the stroke team is required in case reperfusion treatment is an option.

Knowledge Check Five

1. What initial treatment should the patient receive?
2. Where should this patient be looked after?

A week later…

One week later, close to the end of a night shift, you are called to see Edna, who is an inpatient on the Acute Stroke Unit. The nurses are worried as, after making a good functional improvement, she has become drowsier and has a new oxygen requirement. They report recent concern about her ability to swallow safely. You assess Edna using an A to E approach.

|	
A	Maintaining own airway with no evidence of obstruction
B	SpO2 91% on 2l via nasal cannula, Respiratory rate 22 R basal coarse crepitations Mobile secretions scattered throughout chest.
C	HR 100, BP 114/65 mmHg Fingertips cool CRT 4 secs HS normal with no additional sounds Catheter in situ draining dark, concentrated urine.
D	Edna is difficult to rouse and on wakening she says confused words. GCS E3V4M5 – 12/15 PEARL. No new facial asymmetry Residual power deficit in R arm 4/5. Power in all other limbs normal. Edna is poorly compliant with further neurological examination due to drowsiness, but there is no apparent new focal neurological deficit BM 7.2
E	Abdomen soft No tenderness, suprapubic or otherwise. Temp 37.7

Knowledge Check Five – Answer

1. As the CT scan has excluded an intracranial haemorrhage, a 'one-off' dose of 300mg aspirin should be prescribed. The patient should have a bedside swallow test prior to the administration of aspirin and if the swallow is impaired aspirin can be given PR.

2. Whenever possible, patients with acute stroke should be transferred to a stroke centre for their evaluation and treatment, as the holistic care (medical optimisation, early initiation of physiotherapy and occupational therapy, patient and family education and discharge planning) is associated with improved clinical outcomes. It is believed that recent development in holistic stroke care are largely responsible for improvement in stroke morbidity and mortality.

Activity Four

Perform a respiratory examination for an inpatient on your ward.

Interpretation Four

You turn up Edna's oxygen therapy aiming for saturations of 94%. You take a full set of bloods and cultures and request a CXR. Interpret the following chest radiograph.
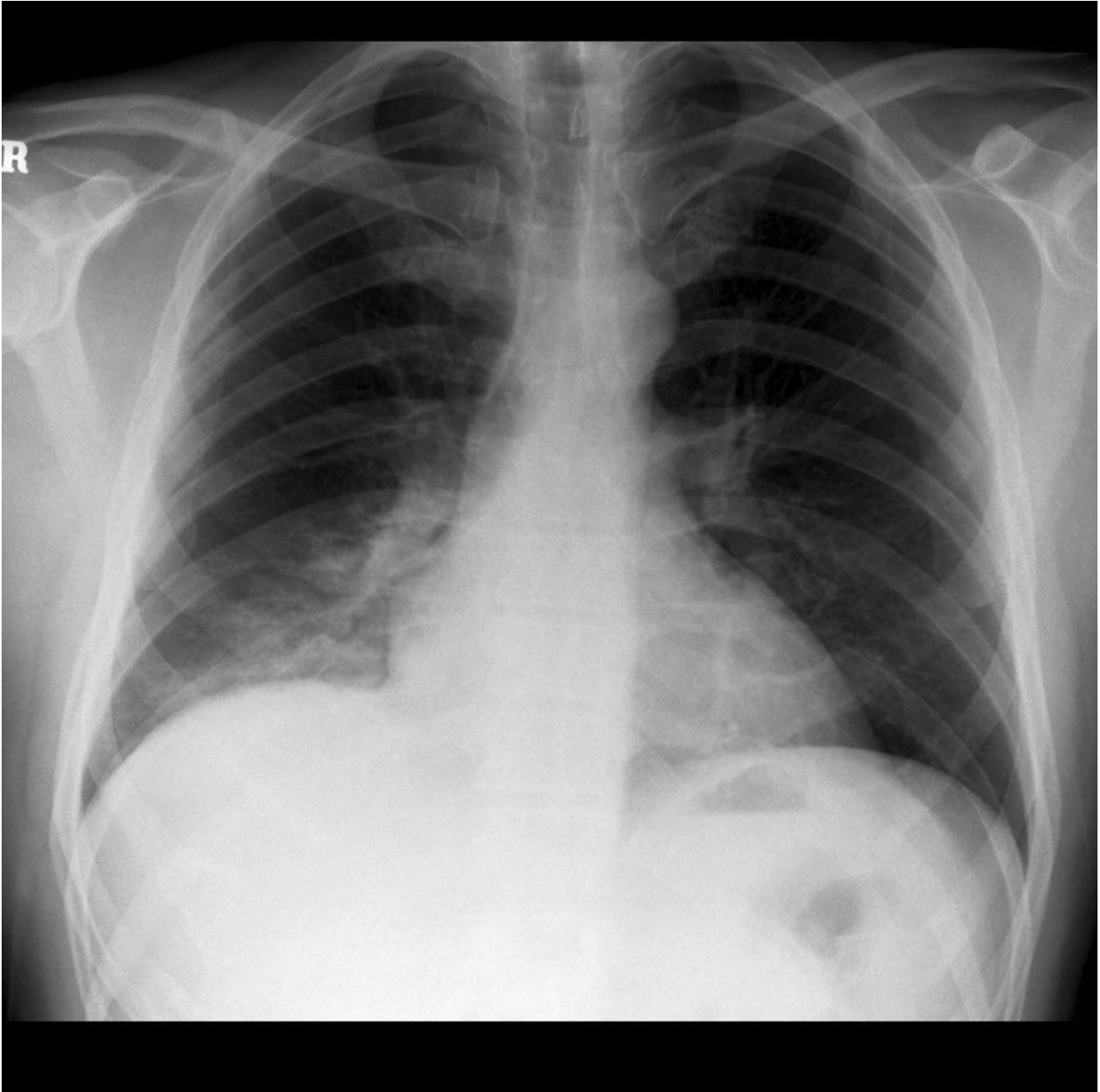
Knowledge Check Six

1. How would you manage this

Interpretation Four – Answer

The radiograph shows patchy opacification in the R lower lobe, appearances consistent with a right lower lobe pneumonia. Note how the right heart border is well defined – in the case of a R mid lobe pneumonia you may see loss of the right heard border (the silhouette sign).

Knowledge Check Six – Answer

Given the history of worsening drowsiness and a new oxygen requirement, taken with examination and imaging signs consistent with R basal consolidation you would treat for a pneumonia. The recent stroke and possibility of stroke-related dysphagia increase risk of aspiration and subsequent chemical pneumonitis or pneumonia. Antibiotics should be given accordingly – refer to local guidelines. Usual supportive care is required, including targeted oxygen therapy to saturations of >94%. You should consider keeping Edna NBM (in reality, this would only mean missing breakfast) and organising a formal swallowing assessment by the SALT (speech and language therapy) team. Some patients require a period of nasogastric feeding.

Conclusion

Well done on completing this case. I hope that you have found it informative. If you have any questions, please contact …

Dr Sophie Horrocks, Sophie.horrocks@nhslothian.scot.nhs.uk

Dr Toby Merriman, Andrew.Merriman@nhs.scot

Thank you for completing this long case. As these cases are new intervention, we would really value your feedback.

We would be very grateful if you could complete the feedback form accessed from the QR code below.