Mock FRCPath Part 2 Morphology Paper March 2022

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SUGGESTED ANSWERS

Answers are based on the real film reports (+/- other pathology reports) for each case. Answers for questions about further investigation / management are purely based on my own thoughts – you may have other equally legitimate answers. This is for practice, not definitive exam truth!

Question 1. A 70-year-old woman presents with a four-month history of progressive lethargy and recurrent cellulitis. Hb 83, WBC 9.8, Plt 76.

a. Report the blood film
Thrombocytopenia
Normal red cells / occasional elliptocytes
Neutropenia
Large granular lymphocytes

b. Immunophenotyping of the peripheral blood identifies a population of cells that are CD2+, CD8+, CD16+, CD38+, CD 56+, CD3-, CD5-, CD25-. What is the diagnosis?
This is an NK cell immunophenotype
(CD16 and CD56 frequently seen on neoplastic NK cells)
NK Cell leukaemia / NK Cell LPD / NK Cell LGL

c. Which additional cell marker would also be useful to test when planning this patient's management, and why?
CD52
Antigen target for Alemtuzumab

Question 2. A 56-year-old man is seen by his GP for intermittent right upper quadrant pain. He is otherwise well. He takes no regular medications.

Hb 130, MCV 90, WBC 5

a. Report the blood film (3 marks)
Normal platelet number and morphology
Red cell spherocytosis
Normal neutrophil morphology

b. State the diagnosis and describe the cause for the abnormality (3 marks)
Hereditary spherocytosis
Defect in the Band 3 – Ankyrin – Protein 4.2 complex causes disruption to the red cell cytoskeleton resulting in the formation of spherocytes. Majority of cases are caused by autosomal dominant mutations.

c. In the absence of a family history, state one diagnostic tests for this condition (2 marks)
Gel electrophoresis (SDA-PAGE)
EMA Binding test
Note: Typical clinical features + family history is sufficient for a diagnosis.

Question 3. An 88-year-old woman presents to the emergency department with a three week history of lethargy and fever. On the day of admission she had developed cough and breathlessness.

Hb 92, WBC 136

a. Report the blood film (3 marks)
Thrombocytopenia
Red cell rouleaux, anisocytosis
Blasts – medium to large mononuclear cells with prominent nucleoli
Neutropenia

b. Immunophenotyping of the peripheral blood was as follows: CD34+, CD13+, CD33+, CD117+, MPO+, HLA-DR+, CD3-, TdT-. What is the diagnosis? (2 marks)
Acute myeloid leukaemia

c. Give three examples of cytogenetic or molecular abnormalities associated with a poor prognosis in this condition. (3 marks)
Complex karyotype, monosomal karyotype
Inv(3)
-5 or Del(5q)
-7 or Del(7p)
-17 or abn(17p)
Wild type NPM1 + high allelic ratio FLT3-ITD
Mutated TP53
Mutated RUNX1
Mutated ASXL1
t(6;0) / DEK-NUP214
KMT2A re-arrangement
t(9;22) / BCR-ABL1

Question 4. A 70-year-old man presents to his GP with four weeks of progressive left hip pain.

Hb 130, WBC 24

a. Report the blood film (3 marks)
Thrombocytopenia
Red cell rouleaux, nucleated red cells
Blasts – medium sized mononuclear cells with prominent nucleoli. Deeply basophilic, vacuolated cytoplasm.
Neutropenia

b. Immunophenotyping of the peripheral blood is as follows: 64% of cells are CD34+, CD19+, CD79a+, CD10+, HLA-DR+, TdT+, MPO-, CD33-. What is the diagnosis? (2 marks)
B-Cell Acute lymphoblastic leukaemia

c. The patient receives intravenous fluids and rasburicase prior to starting treatment. List the laboratory criteria for a diagnosis of tumour lysis syndrome in adults (3 marks)
Urate ≥476 umol/l or 25% increase from baseline
Potassium ≥6.0 mmol/l or 25% increase from baseline
Phosphate ≥1.45 mmol/l or 25% increase from baseline
Calcium ≤1.75 mmol/l or 25% decrease from baseline
(Elevated creatinine is part of the clinical criteria)

Question 5. A 69-year-old is admitted to the haematology ward feeling unwell with cough and breathlessness, twelve days after R-CHOP chemotherapy for high grade B cell lymphoma.

Hb 95, WBC 67.8, Plt 172.

a. Report the blood film (3 marks)
Normal platelets
Red cell normal / mild rouleaux and occasional elliptocytes
Left shifted neutrophil leucocytosis with myelocytes / promyelocytes

b. List your differential diagnosis for the film appearances (2 marks)
GCSF effect
Reactive leucocytosis in infection

c. State your initial impression and management plan for the first 24 hours of this patient's admission (3 marks)
Presumed pneumonia
ABC assessment, observations
Oxygen / IV fluids as needed
Broad spectrum antibiotics
Sputum, blood and urine cultures
Covid & other respiratory virus swabs
Chest X-ray
Stop GCSF

Question 6. A 50-year-old man attends the oncology clinic for follow-up of his previously treated gastric cancer.

Hb 111, Plt 159, WBC 5.4

a. Report the blood film (3 marks)
Normal platelets / small clumps
Red cell oval macrocytosis, howell jolly bodies, contracted cells
Neutropenia

b. What is the most likely explanation for your findings? (2 marks)
Splenectomy + B12 deficiency
(This patient had an oesophagogastrectomy + splenectomy for his gastric cancer)

Less specific answer: Hyposplenism + haematinic deficiency

c. Give an example of an optional secondary / confirmatory test for this condition and the expected result. (2 marks)
Secondary tests for B12:
Plasma Methymelonic Acid (MMA) – elevated level
Plasma total homocysteine (tHcy) – elevated level
Holotranscobalamin (HoloTc) – reduced level

Question 7. A 75-year-old man presents with a three-month history of worsening lethargy and night sweats. On examination there is massive hepatosplenomegaly.

Hb 80, WBC 350, Plt 80. Lethargy. Massive hepatosplenomegaly.

a. Report the blood film (3 marks)
Thrombocytopenia with platelet anisocytosis and giant platelets
Red cell rouleaux
Leukocytosis, predominantly neutrophils
Dysplastic neutrophils - hypolobated, hypogranular
Occasional myelocytes
Occasional blasts

b. Report the bone marrow aspirate (3 marks)
Markedly hypercellular for age
Particulate marrow
(Megas not included in this picture)
Greatly reduced erythroid precursors
Greatly increased granulopoeisis.
Granulocytic and megakaryocytic dysplasia.
Blasts present (in full slide blasts were 5%)

c. Provide a differential diagnosis, with a very brief justification for your preferred diagnosis (2 marks)
MDS/MPN Overlap Syndrome – CMML, atypical CML
Myeloproliferative neoplasm
Chronic myeloid leukaemia

This case was atypical CML. There is myeloid proliferation with marked dysplasia in the absence of a particularly prominent monocytosis.

Question 8. A 28-year-old pregnant woman presents at 30 weeks gestation with widespread, minor bruising and petechial rash to shins and ankles. She has no headache, fever, jaundice or oedema.

Hb 130, WBC 4.5, normal renal function, normal liver function, normal clotting screen.

a. Report the blood film (3 marks)
Severe thrombocytopenia
Normal red cells
Normal white cells

b. State the diagnosis (1 mark)
Immune thrombocytopenia

c. Outline your management for this patient (5 marks)
Exclude secondary causes – e.g. HIV, Hep C, H pylori, immunoglobulin profile
Joint care with obstetrics / fetomaternal medicine
Antenatal – start prednisolone (0.25-1mg/kg), gastroprotection
Delivery – target plt count >50, >80 if neuroaxial anaesthesia planned. IVIg if needed.
Delivery – mode of delivery to be determined by obstetric considerations
Delivery – no fetal scalp monitoring, cord blood FBC and hold Vit K until result known. If cord FBC normal, repeat on day 4.
Postpartum – Increased risk of VTE, ensure thromboprophylaxis

Question 9. A 30-year-old woman presents to A&E with fever. Four weeks previously she has been noted to be neutropenic for the first time by her GP. On admission she is started on broad spectrum antibiotics and GCSF. Five days later her blood film is repeated.

Hb 80, WBC 35, Plt 80

a. Report the blood film (3 marks)
(I acknowledge photo is of edge of film only)
Thrombocytopenia
Red cell tear drop poikilocytosis
Left shifted myeloid cells with myelocytes, promyelocytes and blasts
Blasts contain multiple auer rods and there are bilobed forms

b. State the typical immunophenotype for this condition (3 marks)
CD45+, MPO+, CD33+, aberrant CD9+
CD34-, HLADR-

(Report in this case - 85% cells gated by weak CD45 and low to intermediate side scatter. CD13+, strong CD33+, Strong CD64+, MPO+, CD9+, CD11b+. Negative for CD117 and HLA-DR.)

c. Ten days later she develops cough, breathlessness and fever. On examination she is hypoxic with dependent oedema to her sacrum and ankles. Chest x-ray reveals bilateral pleural effusions.
State the likely diagnosis and immediate treatment (supportive care measures do not need to be stated) (3 marks)
Differentiation Syndrome
Stop ATRA
Start IV dexamethasone

Question 10. An 80-year-old man is referred to the haematology clinic with lethargy, night sweats and palpable splenomegaly.

Hb 90, WBC 140, Plt 40.

a. Report the blood film (3 marks)
Thrombocytopenia
Red cell anisopoikilocytosis
Lymphocytosis
Small to medium sized, mature lymphoid cells with frequent cytoplasmic blebs and nucleoli.

b. List a differential and indicate your preferred diagnosis (2 marks)
T-cell prolymphocytic leukaemia (T-PLL) – this is the most likely diagnosis based on morphology
Prolymphocytic leukaemia (B or T cell)
Mature lymphoproliferative disorder
CLL
Mantle cell

c. Cytogenetic and molecular work-up identifies an ATM gene mutation (11q22.3). State one other condition is this diagnosis and gene mutation associated with (1 mark)
Ataxic telangiectasia

Other, more common, cytogenetic findings in T-PLL include complex karyotype, chromosome 8 abnormalities, TCL1A/B rearrangements & MTCP1 rearrangements.

Question 11. A blood film is requested for a 60-year-old man attending the haematology clinic for review of his chronic anaemia.

Hb 95, MCV 66, MCH 19, WBC 6, Platelets 150, ferritin 800

a. Report the blood film (3 marks)
Normal platelets
Red cell hypochromia, microcytosis, tear drops, target cells, **pappenheimer bodies**
White cells not present for assessment in this field

b. List three causes of the most distinctive abnormality in this film (3 marks)
Myelodysplasia
Haemolytic anaemia
Hyposplenism
Sickle cell disease
Thalassaemia
Congenital sideroblastic anaemia
Lead poisoning

This is a case of sideroblastic anaemia. The majority of the red cell changes are non-specific but the pappenheimer bodies are the key clue. Pappenheimer bodies are basophilic iron deposits seen within mature sideroblasts that have entered the peripheral blood. They result from iron loading in patients with ineffective erythropoiesis. They may also be seen in haemolysis, lead poisoning and sickle cell disease

Sideroblastic anaemia can be congenital (X-linked mutations, e.g. ALAS2 and SLC25A38) or acquired (myelodysplasia with ring sideroblasts (MDS-RS))

c. List two investigation(s) you might perform next, and why? (2 marks)
Diagnostic Ix - Haemoglobin electrophoresis, BM biopsy, genetics
Management Ix - Iron overload – e.g. MRI liver/heart