10.3 Haemodynamic disorders

Name: _____ Class: _____ Date: _____ **Total: 24 marks**

KEY WORDS oedema • infarction

Objective

Compute oedema from Starling forces; walk Virchow's triad to infarct.

1 Key knowledge and worked examples

■ **The arithmetic**

Hydrostatic out ~30 mmHg (arterial) / ~15 (venous); oncotic (albumin) ~25 pulls back; lymph drains the surplus ✓. Oedema: ↑ hydrostatic, ↓ oncotic, ↑ permeability, lymph block.

■ **Worked example: triad to infarct**

Endothelial injury + stasis + hypercoagulability → thrombus → embolus → infarct ✓. Shock: cardiogenic, hypovolaemic (class III ~30 %, class IV >40 %), distributive (septic, warm first).

2 Practice

2.1 Name the four oedema mechanisms. [3]

2.2 Which protein provides most oncotic pressure? [3]

2.3 The three elements of Virchow's triad. [3]

3 Exam-style questions

3.1 A fictional patient: right heart failure with dependent pitting oedema; a second with nephrotic syndrome and periorbital oedema.

For each, trace the Starling term that changed (venous hydrostatic rises; albumin lost ≥3.5 g/day so oncotic falls) and explain the different distributions (dependent vs periorbital) ✓. State the two further mechanisms with one example each (permeability – inflammation, exudate; lymph block – post-surgical) ✓. [8]

3.2 A fictional long-haul flight after surgery: calf pain, then sudden breathlessness.

Walk the chain: stasis + post-op hypercoagulability → calf thrombus → embolus to pulmonary arteries ✓. Explain why infarcts are pale in solid organs but red in lung (dual supply, loose tissue) ✓. Classify the three shock families with one example each. [7]

Solutions

2.1

- ↑ hydrostatic · ↓ oncotic · ↑ permeability · lymph block ✓.

2.2

- Albumin ✓.

2.3

- Endothelial injury, stasis, hypercoagulability ✓.

3.1

- Right heart failure: venous hydrostatic ↑ → dependent pitting oedema ✓.
- Nephrotic: albumin ≥3.5 g/day lost → oncotic ↓ → periorbital (loose tissue) oedema ✓.
- Same finding, different arithmetic – blood albumin separates ✓.
- Permeability: inflammation (exudate, protein-rich); lymph block: post-surgical arm swelling ✓.

3.2

- Stasis + hypercoagulability → calf venous thrombus ✓.
- Embolus travels to pulmonary arteries → infarct or sudden death ✓.
- Pale infarcts: solid organs, single supply; red: lung and gut – dual supply, loose tissue bleeds in ✓.
- Shock: cardiogenic (infarct), hypovolaemic (class III ~30 % loss), distributive (sepsis, warm then cold) ✓.

exercises.lol exercises.com.cn