

## PUZZLE

**Subject: 1422-Cardio Pulmonary Bypass and Perfusion Technology**

### UNIT – II – ADEQUACY OF PERFUSION

#### **Case Study Puzzle: "Ensuring Adequate Perfusion During Mitral Valve Repair"**

#### **Case Background:**

Mr. Ram is scheduled for elective mitral valve repair surgery. The cardiopulmonary bypass (CPB) circuit is set up, and the pump started. After aortic cross-clamp (ACC) application and administration of cardioplegia, the heart is arrested. As the perfusionist, you must continuously monitor and ensure adequate perfusion throughout the surgery.

#### **Puzzle Instructions:**

- Form groups of 4-5 members.
- Based on the case, analyze the following monitoring data and clinical observations during the bypass.
- Identify perfusion adequacy based on the parameters and suggest corrective steps.
- Also, propose what key parameters must be included in a perfusion adequacy monitoring chart.

You have 30 minutes to discuss, analyze, and present your answers.

#### **Provided Data:**

| Parameter                                          | Value              | Normal Range/Notes                                   |
|----------------------------------------------------|--------------------|------------------------------------------------------|
| Body Surface Area (BSA)                            | 1.8 m <sup>2</sup> | --                                                   |
| Flow Rate                                          | 3.0 L/min          | Recommended adult flow: 1.8-2.4 L/min/m <sup>2</sup> |
| Mean Arterial Pressure                             | 45 mm Hg           | Minimum 50 mm Hg recommended                         |
| Hematocrit (Hct)                                   | 22%                | Optimal 24-28%                                       |
| PaO <sub>2</sub>                                   | 110 mm Hg          | Normal ~120 mm Hg                                    |
| Mixed Venous Oxygen Saturation (SvO <sub>2</sub> ) | 82%                | Normal 65-75%; >80% may indicate shunting            |
| Blood Lactate                                      | 2.5 mmol/L         | Normal 0.5-1 mmol/L                                  |
| Temperature                                        | 34°C (on bypass)   | Mild hypothermia; perfusion adjusted accordingly     |

## Questions:

1. Based on the flow rate and BSA, is the perfusion flow adequate? Justify your answer.
2. Evaluate the mean arterial pressure and its impact on organ perfusion in this patient.
3. Analyze the significance of the elevated SvO<sub>2</sub> and higher lactate levels in the context of perfusion adequacy.
4. Considering the hematocrit and oxygen delivery parameters, what adjustments would you recommend?
5. How does the patient's mild hypothermia influence oxygen consumption and perfusion targets in this scenario?
6. Propose three key parameters you would include in a perfusion adequacy monitoring chart for this case.

## Rubric (10 marks total):

| Criteria                                                    | Marks | Description                                                     |
|-------------------------------------------------------------|-------|-----------------------------------------------------------------|
| Accuracy in assessing flow adequacy                         | 2     | Proper calculation & justification based on BSA & flow rates    |
| Evaluation of arterial pressure impact                      | 1.5   | Understanding of MAP relevance to organ perfusion               |
| Interpretation of SvO <sub>2</sub> and lactate significance | 2     | Insight on perfusion vs potential shunting and metabolic status |
| Recommendations on hematocrit and oxygen delivery           | 2     | Logical next steps for improving oxygen delivery                |
| Explanation of hypothermia effect                           | 1     | Knowledge of temp-dependent oxygen consumption changes          |
| Design of key perfusion monitoring parameters               | 1.5   | Practical and critical parameters identified                    |