6.2: Causes

Hyperventilation is the mechanism in ALL cases

Hyperventilation (ie increased alveolar ventilation) is the mechanism responsible for the lowered arterial pCO₂ in ALL cases of respiratory alkalosis.

This low arterial pCO₂ will be sensed by the central and peripheral chemoreceptors and the hyperventilation will be inhibited unless the patient's ventilation is controlled.

Causes of Respiratory Alkalosis

1. Central Causes (direct action via respiratory centre)

- Head Injury
- Stroke
- Anxiety-hyperventilation syndrome (psychogenic)
- Other 'supra-tentorial' causes (pain, fear, stress, voluntary)
- Various drugs (eg analeptics, propanidid, salicylate intoxication)
- Various endogenous compounds (eg progesterone during pregnancy, cytokines during sepsis, toxins in patients)
Can a decreased CO₂ production cause respiratory alkalosis?

Hyperventilation is the mechanism in all of the situations in the above list & indeed in all cases.

Theoretically, a decreased carbon dioxide production could result in respiratory alkalosis if alveolar ventilation remained fixed. But this would not occur in a normal person because any drop in arterial pCO₂ would reflexly cause a decreased ventilation (via chemoreceptor inhibitory input into the respiratory centre).

About the only situation where maybe a decrease in CO₂ production could be the mechanism of respiratory alkalosis would be in an intubated patient on fixed ventilation during Anaesthesia or in Intensive Care Unit and where the CO₂ production was low due to hypothermia and decreased metabolic rate. However, even in such a circumstance, this mechanism is usually referred to as 'excessive controlled ventilation' (which it is relative to the amount of CO₂ production). So the answer to the question posed must be no.

Miscellaneous Notes on Causes
• Hyperventilation due to respiratory centre stimulation is a feature of salicylate toxicity, especially in adults, and results in a mixed disorder (metabolic acidosis and respiratory alkalosis).

• Propanidid was once used as an anaesthetic induction agent - it caused prominent hyperventilation.

• A respiratory alkalosis is the commonest acid-base disorder found in patients with chronic liver disease.

• Hyperventilation syndrome related to anxiety can cause alkalosis severe enough to cause carpopedal spasm.

• A mild fairly well compensated respiratory alkalosis is the usual finding in pregnancy.

• Any condition which decreases pulmonary compliance causes a sensation of dyspnoea. Respiratory alkalosis is commonly found in patients with asthma, pneumonia & pulmonary embolism.