Does Nasal Cannula Design Affect Function?

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A crossover comparison of four nasal cannulae shows differences in oxygen delivery and ETCO₂ measurement.

To assess whether the design of nasal cannulae influences O₂ delivery and detection of end tidal carbon dioxide (ETCO₂), researchers enrolled 45 healthy adults in a randomized, crossover study of four different nasal cannulae: bifurcated nasal prongs with both O₂ delivery and CO₂ sensing in each prong (Hudson), separate nasal prongs for O₂ delivery and CO₂ sensing (Salter), and nasal prongs with CO₂ sensing only and cloud delivery of O₂ via either multi-vents (Oridion) or dual vents (Medline). ETCO₂ and oxygen delivery (assessed by pharyngeal oxygen percentage and arterial blood gases) were measured for 2 minutes on room air and during supplemental O₂ delivery at 2, 4, and 6 liters per minute. The study was funded by the manufacturer of the Salter device.

At higher flow rates, oxygen delivery via prongs was associated with higher pharyngeal O₂ percentage and PaO₂ than cloud delivery via vents; for example, at a rate of 6 L per minute, pharyngeal O₂ percentage was 49.8% with delivery via separate prongs vs. 36.2% with cloud delivery via multi-vents. Mean PaCO₂ did not differ significantly with type of nasal cannula or flow rate, averaging 39–40 mm Hg across all devices and flow rates. ETCO₂ was significantly lower with bifurcated prongs than with the other three designs, with errant CO₂ tracings at higher rates of supplemental O₂ delivery.

Comment: The optimal nasal cannula design allows both effective O₂ delivery and ETCO₂ measurement. This small study suggests that bifurcated (septated) prongs may impede proper CO₂ detection and that cloud oxygen delivery is inferior to prong delivery. Until more information is available, nasal cannula with these design elements should be avoided when alternatives are available.

Citation(s):


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