Succinylcholine Improves Tidal Volumes During Facemask Ventilation

Succinylcholine improved facemask ventilation by 30%, largely due to oral airway dilation, but rocuronium did not confer the same benefit.

To determine the effects of neuromuscular blocking agents on facemask ventilation, researchers allocated 31 consecutive healthy patients with normal upper airway anatomy who were undergoing elective surgery to receive rocuronium (14 patients) or succinylcholine (17 patients); the groups were matched for age, sex, and body-mass index. A custom-made partitioned facemask was used to separately measure oral and nasal airflow at baseline (after propofol induction and cessation of spontaneous respirations) and for 60 seconds after succinylcholine administration or until complete paralysis was achieved after rocuronium administration.

No changes in tidal volume, oral airflow, or nasal airflow were noted after rocuronium administration. However, tidal volume increased by 30% overall (64% increase orally and 15% increase nasally) after succinylcholine administration; maximum tidal volumes occurred at 35 seconds orally and 50 seconds nasally. Endoscopic observation during facemask ventilation in eight succinylcholine recipients revealed significant dilation of the soft palate and tongue base during and after succinylcholine-induced pharyngeal fasciculation.

Comment: The mechanism by which succinylcholine improved facemask ventilation was dilation of the upper airway during the depolarization (fasciculation) phase of blockade. Rocuronium does not cause transient muscle contraction, and no dilation was observed after rocuronium administration. In unconscious patients, paralysis with succinylcholine likely will improve facemask ventilation. However, it is unlikely that this effect will provide any benefit when using a laryngeal mask airway or any extraglotic device that bypasses the upper airway. Paralysis achieved with any agent also may improve mechanical ventilation by lowering the resistance of chest wall musculature.

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