

In-vitro comparison of bag-valve-mask and the manually triggered oxygen-powered breathing device.

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OBJECTIVE: To determine whether tidal volume, intrapleural pressure, and gastric volume differ when the bag--valve-- mask (BVM) and the manually triggered oxygen powered breathing device (MTBD) are used in the settings of normal and decreased lung compliance. **METHODS:** Prospective, randomized in-vitro model, with emergency medical technician-paramedics (EMT-Ps; n = 10) and emergency medical technicians (EMTs; n = 20) blinded to model gauges. Each participant randomly performed four one-minute trials ventilating a mechanical test lung through an intubation mannikin head at a rate of 20 breaths/min. Each subject used the BVM and the MTBD to ventilate the lung for 20 breaths during normal (0.10 L/cm H₂O) and decreased 0.04 L/cm H₂O) compliance. Tidal volumes and intrapleural pressures were recorded for every breath and the gastric volume was recorded for each trial using a flowmeter placed below a simulated esophageal sphincter (20 cm H₂O PEEP valve). **RESULTS:** With normal compliance, mean tidal volumes and intrapleural pressures were not significantly different, while mean gastric volumes differed significantly (BVM = 1,300 mL, MTBD = 0 mL; p < 0.001). When compliance was decreased, mean tidal volumes and intrapleural pressures again did not differ significantly, while gastric volumes remained significantly different (BVM = 3,700 mL, MTBD = 1,100 mL p < 0.001). **CONCLUSIONS:** In this model, tidal volumes and intrapleural pressures were similar for the two devices. When compliance was normal, no participant insufflated the stomach with the MTBD, while the gastric volume with BVM ventilation averaged 1.3 L. With decreased compliance, the MTBD again delivered significantly less gastric volume than the BVM (1.1 vs. 3.7 L, respectively). These findings favoring MTBD ventilation require corroboration in vivo.

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