Jet Ventilation through Jet Stylets

To the Editor—The case report by Baraka1 of jet ventilation through an airway exchange catheter (Cook Critical Care, Bloomington, IL) complicated by tension pneumothorax and cardiac asystole highlights some of the serious dangers of jet ventilation. I would like to focus on three aspects of the case report. The lessons from these can be added to the recommendations made by Baraka at the end of his case report.

1. The patient was an apparently healthy individual. There was no mention of difficult mask ventilation or oxygenation, but laryngoscopy was difficult.

A healthy individual, after adequate preoxygenation, should be able to maintain an acceptable oxygen saturation during changing of an endotracheal tube (ETT) over a stylet. If there is doubt about the patient’s ability to maintain oxygen saturation, preoxygenation and hyperventilation followed by a trial period of apnea while the original ETT is in place would be useful. Rapid desaturation (within 1 or 2 min) indicates reduced respiratory reserve. The need to change the ETT should be reviewed. If the ETT does need to be changed, a method of oxygenation during the procedure should be chosen.

2. The airway exchange catheter (AEC) was inserted until resistance was felt, and the resistance was assumed to be from the carina.

A more likely occurrence is that the AEC was in the right bronchus. The right lung was then exposed to the high-pressure jet of oxygen, and tension pneumothorax ensued. If jet ventilation is to be used, the tip of the jet stylet should preferably be in the mid trachea. This may be difficult to judge. Distance markings on the ETT and jet stylet should be used to position the stylet at the end of the ETT. If the stylet is passed until resistance is felt beyond the end of the ETT, it should be withdrawn by at least 5 cm in an adult. During jet ventilation, the position (depth of insertion) of the jet stylet should be monitored because catheter migration may occur.

3. Jet ventilation was followed by incomplete deflation of the chest. Despite this, two further jet pulses were delivered.

Jet ventilation should be discontinued the moment there is incomplete chest deflation. In most cases, a rapid rate of jetting (e.g., 10–20 jet pulses/min) would be unnecessary. One or two jet pulses per 30–60 s may be all that is necessary during the entire procedure.

Jet ventilation should be used with extreme caution because complications may be life-threatening. Documentation of rapid desaturation during apnea and failure to maintain oxygen saturation by oxygen insufflation is highly recommended before jet ventilation is used during changing of endotracheal tubes. The cardiovascular and respiratory systems should be closely monitored during and after the procedure, and there should be a high index of suspicion regarding the development of tension pneumothorax. Finally, it may be time to ensure that all jet injectors have pressure regulators. The use of lower jet pressures will not prevent barotrauma but may reduce its incidence.

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Reference


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Revisiting the ASA Guidelines for Management of a Difficult Airway

To the Editor—We read with great interest the case report by Baraka entitled “Tension Pneumothorax Complicating Jet Ventilation via a Cook Airway Exchange Catheter”1 and the accompanying editorial view, “Airway Exchange Catheters: Simple Concept, Potentially Great Danger,”2 by Benumof.2 We agree with the authors as to the importance of airway exchange catheters (AECs) in airway management but wish to address the following issues.

1. the etiology of barotrauma

Barotrauma associated with the use of AECs has been reported as a result of direct trauma to the tracheobronchial tree by the catheter3,4 and that caused by an increase in lung volume or pressure.5 We would like to suggest the blast effect of air impacting on intact human tissue as a third possible etiologic factor. Figure 1 shows the effect of a force generated by applying 25 psi into the proximal part of a 3-mm ID AEC made by Cook Critical Care (Bloomington, IN). Although we found no documentation in the literature as to the effect of this high force on the trachea and bronchial tree, this cannot possibly be benign, especially when it is exerted on the bronchial tree or in a small-diameter airway with low run-off.

2. the safety of jet ventilation through an AEC