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Ventilatory Compromise Secondary to Occlusion of an Endotracheal Tube's Balloon Air Channel by a Malpositioned Bite Block

To the Editor:—Many methods for securing endotracheal tubes and for protecting them from biting damage have been devised.[1-3] Our facility recently introduced the use of a new bite block device deigned to help secure endotracheal tubes in the ICU setting. The devise is called the Bite Proof Bite Block® (B&B Medical Technologies Inc., Orangevale, CA). The use of this bite block in a patient scheduled for an elective tracheostomy lead to a situation that resulted in a large air leak around the endotracheal tube immediately after induction of anesthesia. The air leak could not be sealed despite overinflation of the endotracheal tube cuff's pilot balloon. Fortunately, with high fresh gas flow rates and occasional filling of the anesthesia reservoir bag with the oxygen flush valve, a moderate amount of chest excursion and ventilation could be maintained. On completion of the tracheostomy and attachment of the anesthesia circuit to the newly inserted cuffed tracheostomy tube, the air leak was eliminated, and ventilation was normalized. Examination of the endotracheal tube revealed the situation illustrated in figure 1. The endotracheal tube's cuff was deflated, and the bite block was occluding the pilot balloon's air channel to the endotracheal tube's cuff. The occlusion primarily resulted from the fact that the air channel had been bent back on itself and trapped underneath the bite block, similar to how one might squeeze off water flow in a garden hose by bending it back on itself. No air could be forced into, or out of, the cuff with the bite block in place.

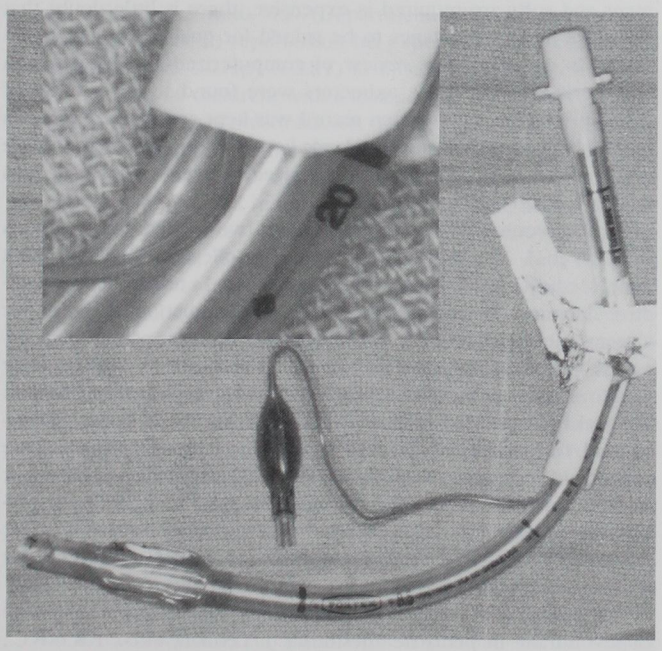

Fig. 1. An endotracheal tube is shown with a Bite Proof Bite Block in place. The pilot balloon is shown fully inflated. However, note that because the bite block is occluding the air channel to the endotracheal tube's cuff (inserted close up), the cuff remains deflated. The inability to inflate the cuff resulted in ventilatory compromise for the patient described, until a tracheostomy could be completed.

Given the development of the clinical scenario described, it is likely that the endotracheal tube's cuff had been underinflated (or uninflated) for some time while the patient was in the MICU. This fact was completely unrecognized by his medical care team because whenever the pilot balloon was palpated at bedside, it always appeared to have an appropriate amount of air in it.

The complication of pilot balloon air channel entrapment needs to be recognized by all medical care professionals who deal with ventilated patients. Other scenarios can be easily imagined that could result in different types of injury caused by this "entrapment problem."

The manufacturer of this particular bite block device is aware of the potential entrapment problem, as the package insert contains this statement, "CAUTION: Should cuff filling problems occur, gently pull the pilot balloon tube taut to remove any kinks." Unfortunately, in the situation described previously, no amount of pulling could free the pilot tube.

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