

tions above the vocal cords are effectively removed thereby. No vocal cord damage has been reported to occur using this technique.

We also personally know of many instances in which the Fome-Cuf was removed without first being deflated, with no untoward effect.

**JACK M. KAMEN, M.D.**  
*Director Pulmonary Services Department  
St. Mary Medical Center  
Gary, Indiana*

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### Local Anesthetic vs. Spinal Fluid

*To the Editor:*—In a recent letter (ANESTHESIOLOGY 44:451, 1976), Dr. Reisner indicates the value of using a urine test strip to distinguish cerebrospinal fluid from local anesthetic solution. I am writing to call attention to another simple method for distinguishing the two solutions. If the fluid dripping from the hub of the needle is allowed to come in contact with a solution of thio-pental ( $pH$  10), turbidity will occur immediately

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### Cuffs Do Not Seal the Trachea Airtight

*To the Editor:*—In 31 consecutive patients receiving closed-circuit anesthesia I measured the concentration of nitrous oxide in the pharynx with a Foregger Nitrous Oxide Monitor. In every case I found between 100 and 800 ppm of nitrous oxide in the pharynx in spite of zero concentrations at all other areas such as outside the mouth, around the circle system, and at the ventilator. In all cases, the cuffs were inflated to the point of no audible leak with positive pressure applied to the endotracheal tube.

Mehta found that cuffs do not protect against aspiration of contrast medium, but attributed this to its presence in the ventricle between false and true cords at the time when the cuff is deflated.<sup>1</sup> Egnatinsky believes that dilatation of the trachea normally seen with inspiration allows aspiration around a cuff, and therefore recommends deliberate overinflation of high-volume cuffs.<sup>2</sup> Pavlin *et al.* reported failure of a large-volume cuff to protect against aspiration in a spontaneously breathing patient.<sup>3</sup> Stanley *et al.* recommend a pressure-relief valve to prevent overinflation of cuffs due to disproportionately rapid inward diffusion of nitrous oxide into cuffs, compared with slow outward diffusion of nitrogen.<sup>4</sup> They rightly caution against overinflation in view of possible compression of the wall of the endotracheal tube or its orifices. The membranous posterior wall of the trachea offers the least resistance to overinflation,

when the fluid is local anesthetic ( $pH$  5) but not when it is cerebrospinal fluid ( $pH$  7).

**DR. JOSÉ CATTERBERG**  
*Anesthista Consultor  
Hospital Escuela José de San Martín  
Universidad de Buenos Aires  
Buenos Aires, Argentina*

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and when 20 ml of air were injected into an ordinary cuff on a #9 Magill tube a 7 cm-long rupture of the trachea resulted.<sup>5</sup>

It seems timely to emphasize that cuffs do not provide an airtight seal except perhaps prior to utmost stretching of the trachea just preceding its rupture. My measurements show that the usual clinical maneuver of inflating cuffs just to the point of abolishing audible leakage with positive pressure to the airway does not result in an airtight seal. These results are easily verifiable with closed systems, which are without exception associated with leakage in the order of 20 to 100 ml/min. The practicing anesthetist should not place reliance on cuffs to seal the larynx, but should continue to employ additional safeguards against aspiration such as throat packs and avoidance of spontaneous respiratory efforts whenever feasible.

**JACOBUS W. MOSTERT, M.B., F.F.A.R.C.S.**  
*Department of Anesthesiology  
University of Chicago  
Chicago, Illinois 60637*

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**CAROLYN WILKINSON, M.D.**  
*Anesthesiology Department  
Northwestern University  
School of Medicine  
Chicago, Illinois*

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