# CORRESPONDENCE

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## Mechanism of Antiarrhythmic Effect of Dexmedetomidine on Epinephrine-induced Arrhythmias

*To the Editor:*—I read with interest the recent report by Hayashi *et al.*[1] demonstrating a central $\alpha_2$-adrenergic effect of dexmedetomidine in dogs. Although the authors discuss and refute a variety of potential causes of this effect (cardiac, vascular, baroreceptor, and anesthetic), they do not discuss in depth a more likely cause—vagal activation.

Enhanced vagal efferent and afferent activity have in general been shown to protect against ventricular arrhythmias. Electrical stimulation of the vagus decreases ventricular vulnerability to fibrillation,[2] as does systemic administration of carbachol or its intracellular second messenger, cyclic GMP.[3] Morphine, which enhances vagal tone, protects against ventricular arrhythmias due to stress,[4] electrical stimulation,[5] digitalis,[6] and epinephrine,[7] and this protection is abolished by atropine or vagotomy. Similarly, the $\alpha_2$-adrenergic agonist clonidine protects against ventricular arrhythmias from electrical stimulation[8] and digitalis.[9] It would have been interesting to know whether dexmedetomidine's protective effect on epinephrine-induced arrhythmias during halothane anesthesia could be altered by atropine or vagotomy.

Although the authors argue that such an indirect cardiovascular effect is unlikely because the peripheral $\alpha_2$-adrenergic antagonist "normalized" dexmedetomidine-induced bradycardia but not its antiarrhythmic effect, it is quite possible that such "normalization" occurred *via* enhanced peripheral norepinephrine release, without action on vagal efferent or afferent activity. Hemodynamic parameters alone are insufficient measures of vagal activity, as evidenced by the observation that morphine produces a profound antiarrhythmic effect in the absence of changes in heart rate, yet this antiarrhythmic effect is abolished by vagotomy.[6]

The authors are to be congratulated on a well-designed study examining yet another therapeutic facet of this class of drugs. Future studies examining the central mechanism of this antiarrhythmic effect are warranted.

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*In Reply:*—We thank Eisenach for his helpful suggestions in the further elucidation of the properties of these novel anesthetic adjuvants. Since the nucleus of the vagus is rich in $\alpha_2$ adrenoceptors,[1] we agree with Eisenach that further evaluation of the central mechanism for the antiarrhythmic properties of dexmedetomidine should consider its effect on the vagus. In our discussion,[2] we alluded to the possibility that an $\alpha_2$ agonist–induced increase in vagal tone[3] could mediate the antiarrhythmic action of dexmedetomidine. As Eisenach notes, vagal stimulation is protective in some models of arrhythmogenicity, but in the setting of anesthesia this is not a *sine qua non*.[4] Furthermore, Eisenach's example of morphine as a drug capable of increasing vagal tone and thereby increasing the arrhythmic threshold is not fulfilled when examined in the setting of halothane–catecholamine arrhythmias in dogs.[5]

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# Another Cause of Upper Airway Obstruction

*To the Editor:*—Laryngeal or pharyngeal edema following tracheal intubation, although clinically not frequent, is a serious complication. The following report describes episodic airway obstruction caused by edematous lingual follicles that was successfully diagnosed by fiberoptic laryngoscopy.

A 44-yr-old, 45-kg man underwent emergency irrigation and external fixation of multiple open fractures of the legs. Concomitant hemorrhagic shock was successfully treated with 8,500 ml crystalloid solution, 1,000 ml 6% dextran solution (dextran-70), and two units of red blood cells.

Ten days later, advanced repair of the legs was performed. Anesthesia was induced with thiopental and isoflurane in oxygen. The trachea was easily intubated at the first attempt under neuromuscular blockade with vecuronium. Anesthesia was maintained with isoflurane in a nitrous oxide/oxygen mixture. Surgery lasted for 10 h. Fluid infusion therapy consisted of 6,500 ml crystalloid solution, 500 ml dextran-70, and a unit of red blood cells. Emergence from anesthesia was uneventful, and the trachea was extubated after the successful reversal of the residual neuromuscular blockade. Approximately 5 min after extubation, marked inspiratory stridor lasting for several respiratory cycles occurred and was abruptly alleviated with the patient vocalizing and complaining of dyspnea. Similar episodes occurred repeatedly at intervals of 5–10 min, with breath sounds almost normal during the intervening periods.

Because the episodic airway obstruction persisted in the intensive care unit, fiberoptic laryngoscopy was performed. Although no abnormalities were noted in the rest of the upper airway, the lingual follicles were extremely edematous and compressed the epiglottis against the posterior pharyngeal wall (fig. 1). The trachea was intubated using a fiberoptic bronchoscope as a stylet. Methylprednisolone 125 mg was administered intravenously, and the edema subsided 20 h postoperatively without any evidence of traumatic injury to the site. The trachea was successfully extubated, and the remaining hospital course was uneventful.

To our knowledge this is the first report of airway obstruction by edematous lingual follicles. The cause of the edema in this case remains obscure. Although the most likely causes of laryngeal or pharyngeal edema are mechanical injury or infection, these seem unlikely in this case. The tracheal intubation was performed easily without any forceful maneuvers and with the use of a carefully sterilized laryngoscope. An oropharyngeal airway was not used. The endotracheal tube, which may have exerted continuous pressure on the epiglottis and the lingual follicles, is also unlikely to be the major cause considering the normal-appearing epiglottis. Had any of these factors been responsible, other pharyngeal and laryngeal structures would probably also have been involved.

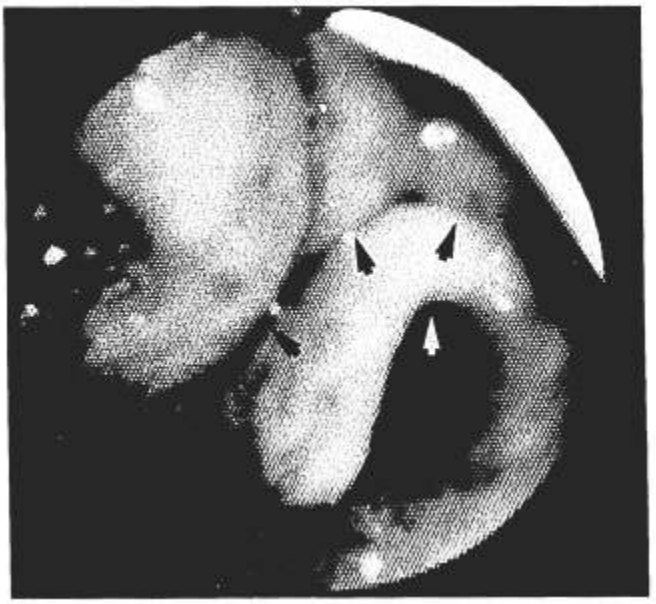

FIG. 1. The bubblelike edematous lingual follicles (black arrows) compressing the epiglottis (white arrow). The other structures in the upper airway remained almost intact.

Although no abnormalities were noted in the palatine tonsils, some intrinsic hypersensitivity of the tonsillar system, triggered by the minimal mechanical stimulation of the laryngoscope, may have participated in the edema formation. This may have been exacerbated by massive crystalloid infusion therapy.

Fortunately, in this case, we were able to observe the upper airway with a fiberoptic bronchoscope. Direct laryngoscopy is recommended in most cases of postextubation edema, which usually require prompt intervention. However, direct laryngoscopy may fail to reveal the