

Rapid Eye Movement Sleep and General Anesthesia

To the Editor:

I read with great interest the article by Leslie *et al.*¹ describing the electroencephalographic correlates of dreaming during anesthesia. Their conclusion that traits of rapid eye movement (REM) sleep are expressed during emergence from anesthesia is provocative. It is of historical interest to note that a common mechanism of dreaming during both sleep and anesthesia was predicted by the psychoanalyst Paul Federn, after the self-analysis of a dream that he experienced under nitrous oxide. Federn discussed this in a 1943 lecture to the American Psychoanalytic Association—one decade before the discovery of REM sleep by Aserinsky and Kleitman²—and, in a later publication, concluded that “one can expect to find the basic mechanisms in dream-production during general anesthesia will not differ from those in dream-production during physiologic sleep.”³

More modern concepts of relevance to the work by Leslie *et al.* include “covert REM” and REM sleep as a form of “protoconsciousness.” Nielsen⁴ suggested that isolated REM sleep traits could be expressed during non-REM sleep, thereby accounting for dreaming and mentation during this stage. Therefore, the covert REM hypothesis is consistent with the “simple” anesthesia-related dreams that Leslie *et al.* describe, which are more characteristic of non-REM dreams despite the electroencephalographic REM-like traits. The framework of covert REM during emergence from anesthesia fits well with the observed data distinguishing the anesthetic dreamer and nondreamer and avoids the need to account for every component of classic REM sleep (*e.g.*, muscle atonia).

Also of relevance is the suggestion that REM sleep represents a form of protoconsciousness,⁵ a view derived, in part, from the observation that REM sleep occurs during gestation.⁶ The “ontogenetic hypothesis” put forth by Roffwarg *et al.*⁷ in 1966 suggests that the endogenous process of cortical activation associated with REM sleep prepares the fetus or developing animal for sensory experience. It is of interest to consider whether REM sleep-like traits are a similar form of protoconsciousness that may precede the planned or unplanned emergence from general anesthesia.

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In Reply:

We thank Dr. Mashour for his interest in our article.¹ It is hard to avoid getting entangled in semantic issues in this type of research. As Dr. Mashour has indicated, the problem with traditional heuristic definitions of sleep stage is that they are arbitrarily defined and lack a proper causal linkage with sleep functions. Thus, we are in favor of Dr. Mashour’s term “protoconsciousness” to describe states of mentation associated with activation (depolarization) of the cerebral cortex, but which fall short of wakeful responsiveness to the external world. These states are usually indicated by the increased electroencephalographic and bispectral index values and are common during general anesthesia.

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Early Labor Neuraxial Analgesia: Effects on the Progress and Outcome of Labor

To the Editor:

We congratulate Wang *et al.*¹ for their single-institution, randomized controlled trial of 12,793 parturients. The investigators confirmed that nulliparas who receive neuraxial labor analgesia in early labor (defined in this study as cervical dilation ≥ 1 cm and < 4 cm) are not at greater risk for cesarean delivery or prolonged labor compared with nulliparas who wait until cervical dilation is more than or equal to 4 cm for initiation of neuraxial analgesia. These results are in