occasional problems, for laser airway surgery in centers with experience with this technique. However, my report[1] outlines safe techniques for those practitioners who choose to perform laser airway surgery with the use of a protected endotracheal tube. Koufman *et al.*[4] do state that they sometimes use foil-wrapped tracheal tubes in preference to the jet ventilation technique.

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Safety of General Anesthesia in Patients Previously Tested Negative for Malignant Hyperthermia Susceptibility

To the Editor:—In the recent article by Allen *et al.* on the safety of anesthesia in malignant hyperthermia-negative (MH(−)) patients,[1] the authors concluded that triggering "anesthetic agents may be safely administered to patients who test MH(−) by *in vitro* contracture testing." The authors noted that there were no adverse incidents observed in 16 patients who received MH "triggering" anesthetic agents and who had previously been found to be MH(−) as defined by *in vitro* contracture testing. Although these patients represented a cohort more likely that the general population to have MH susceptibility (MHS) (*e.g.*, those with myopathy, masseter muscle rigidity, perioperative temperature elevation, *etc.*), it is critical to ascertain the prevalence of MHS within this select population before any conclusions may be drawn about the negative predictive value of contracture testing with halothane or caffeine.

According to Bayes' theorem,[2] the probability that a condition is absent given that a test result is negative can be determined by:

$$P(D-|T-) = \frac{P(T-|D-)\cdot P(D-)}{P(T-|D-)\cdot P(D) + P(T-|D+)\cdot P(D+)}$$

where P(D+) represents the prevalence of the disease condition in the population, and P(A|B) is a generic notation used to represent the probability that event A will occur given that event B has occurred. Therefore, the probability of MHS is actually absent, given that the contracture test result is negative, is intrinsically dependent on the prevalence of MH susceptibility in the population studied.

The prevalence of MHS in the general adult population has been estimated by Sessler to be approximately 1 in 40,000.[3] Allen *et al.* make no note of the likely prevalence of MHS in their select, high-risk population. Because the incidence of MHS is in fact so low,[4] it can be demonstrated mathematically that an arbitrary test could have yielded exactly the same results as the authors reported.

Consider a test that *always* is negative, regardless of whether or not a disease state is present. That is, the test has a P(T−|D−) and a P(T−|D+) both equal to 1, and therefore a P(T+|D+) or sensitivity equal to 0. The probability of having *no* MHS patients within a group of 16 individuals can range from 0.9996 (in a population in which the prevalence of MHS is 1 in 40,000) to 0.185 (in a population in which the prevalence of MHS is 1 in 10). Therefore, in the general population, there is a 99.96% chance that a group of 16 patients would contain no individuals with MHS. Consequently, there would be no incident associated with the use of anesthetic agents known to trigger MH in this group. However, one certainly could not conclude that these agents may be administered safely, on the basis of a negative test result preoperatively, since, by definition, the test is always negative!

Suppose that in a high-risk group (as investigated by the authors), as many as 10% of the patients would be expected to be MHS; *i.e.*, the prevalence of MHS in this group is 0.10. (In actuality, it is probably much lower than this.) There still is a $(1.00 - 0.10)^{16} = 18.5\%$ chance that no individual in this group actually has MHS. Therefore, there is an almost 20% chance that an arbitrary test that always is negative would accurately predict no adverse incident in the high-risk group.

In conclusion, it may have been premature to make conclusions about the negative predictive value of *in vitro* contracture testing with a small sample size, especially since the prevalence of MHS is not accurately known, and may in fact be quite low, even in select populations.

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