Trismus is not Trivial

Trismus following succinylcholine administration has long been felt to be an interesting, useful, albeit unusual sign presaging the more unusual syndrome of malignant hyperthermia (MH). However, newer data suggest that trismus may occur frequently, especially in the pediatric population. According to some authorities, trismus is a "corundum" that clinicians must face with some regularity.

Muscle rigidity following succinylcholine has been known since the 1960s to be associated with MH. However, it was Donlon et al. who, in 1978, made the specific association between trismus or masseter muscle rigidity (MMR) after succinylcholine and MH. Since then, many clinical and laboratory reports have described the clinical syndrome of MMR and its relationship to MH.

To date, we have learned the following: a) trismus is a clinical diagnosis; the mouth can barely be opened, despite great effort; b) it is a transient (several minutes) phenomenon; c) it may occur despite abolition of twitch in the periphery; d) tachycardia, nonspecific arrhythmias, may accompany MMR; e) CK elevation and, often, transient myoglobinuria characteristically follow trismus within 24 h; f) myalgias and, less commonly, weakness may be manifest for 24–36 h; g) although halothane administration usually precedes succinylcholine, trismus may follow induction with other inhalation agents, as well as barbiturates; h) although MH may follow trismus, a period of 20–40 min often intervenes between trismus and the clinical presentation of MH; and i) muscle biopsy studies employing the halothane/caffeine contracture test have reported susceptibility to MH in 40–60% of patients experiencing MMR.

Less is known about the incidence of MMR. Carroll’s report in this issue of Anesthesiology addresses this important issue. Her retrospective study confirms a previous report describing an approximate 1% incidence of MMR in children in whom anesthesia was induced with the combination of halothane and succinylcholine, with the added twist of a significantly increased incidence of MMR in patients having strabismus surgery. Therefore, instead of a rare event, MMR is, if not common, certainly not unusual, at least in children. This finding, together with the implication that one in approximately 200 children having surgery would be diagnosed MH susceptible, must, in some way, be reconciled with a much lower incidence of clinical MH.

Also in this issue of Anesthesiology, Van Der Spek et al. demonstrate and quantify increases in tone of the muscles of mastication during halothane and succinylcholine anesthesia. The somewhat paradoxical conclusion is that succinylcholine routinely increases rather than decreases jaw muscle tone, when compared to nondepolarizing relaxants. Observing such an increase in jaw muscle tone in the children they studied, these investigators then suggest that we should rethink the association between MMR and MH. They imply that, since jaw muscle tone is regularly increased following succinylcholine, diagnostic testing for MH after trismus is unnecessary.

These reports, however, need further clarification. First, both Carroll’s study and Schwartz’s previous study are retrospective chart reviews performed in teaching institutions. In a different study design, Ord reported an incidence of MMR of 1 in 12,000 anesthetics in Denmark (adults and children) in the period...
Second, interpretation of "jaw tightness" (perhaps, at times, mistakenly called trismus) is as subjective as the diagnosis of trismus itself, and may not truly represent MMR. In MMR, muscle tone is markedly increased such that the mouth can barely be opened, despite great effort. Convincing evidence of trismus would ideally require confirmation by a second experienced anesthesiologist, together with evidence of rhabdomyolysis (if dantrolene is not administered), in a patient without temporomandibular joint dysfunction.

The difference between MMR and simply increased muscle tone should be further clarified. Van Der Spek et al., because of the sensitivity of the techniques used, may be measuring the normal agonist effects of succinylcholine, or merely incomplete relaxation, and not anything akin to MMR. In support of this, the increased tone was easily overcome. In one of the three patients who posed some difficulty in tracheal intubation, twitch was not completely abolished. In the other two, the authors refrain from using the specific word "rigidity." Had postoperative CKs been determined, perhaps some quantitative correlate of "... increases in jaw stiffness" would have been obtained. Studies such as Van Der Spek's are necessary and valuable for understanding succinylcholine's action in different muscle groups. My opinion is that MMR is at least quantitatively, and may even be qualitatively, different from what they describe. Ideally, their study should be expanded in order to detect a patient with unequivocal MMR.

Why might MH not be observed regularly after true MMR? When trismus is noted after succinylcholine, many anesthesiologists now either discontinue anesthesia, administer dantrolene, or, at a minimum, switch to nontriggering agents. MH may not develop if the procedure is brief. Adults may not experience trismus as frequently as children, because anesthesia is usually induced with a barbiturate. Barbiturates have been shown to delay the onset of MH.

Based on the previously documented association between MMR and MH, the clinician convinced that his or her patient is experiencing MMR must proceed as if the patient is at imminent risk for MH. The options available are discontinuing anesthesia (with or without dantrolene administration) or continuing with end tidal CO₂ monitoring after switching to nontriggering agents. All patients, however, must be carefully monitored for signs of MH for about 24 hours after trismus.

Should such patients be advised to undergo muscle biopsy and caffeine/halothane contracture testing for MH? To me, the answer is unequivocally yes. Muscle biopsy, when done with histopathology, will detect an underlying myopathy. Although there is some debate concerning the sensitivity and specificity of contracture testing for MH, well-controlled animal studies, such as the recent one by Gallant, and Rempel support the reliability of this assay. The contracture response to halothane and caffeine is the only diagnostic test for MH confirmed by multiple laboratories. Such biopsy testing will help clarify the association between MMR and MH and provide valuable material for research. If the patients are not biopsied, some families will be needlessly inconvenienced and their lives disrupted by carrying a diagnosis of MH susceptible. On the other hand, others may be in danger of not being properly warned of susceptibility to a disorder which is still life threatening. Finally, Dr. Richard Kaplan has recently theorized on the implications of diagnosing all those experiencing MMR as MH susceptible. His conclusion is that, within a few generations one of three pediatric patients and one of 25 adult patients will be said to be potentially at risk for MH, if a diagnostic muscle biopsy is not done after MMR.

The only exceptions to biopsy are those who have experienced unequivocal MH and those with perioperative CKs greater than 20,000 IU/L after MMR in the absence of a myopathy. In both of those cases, however, other family members should be investigated.

Other studies are urgently needed to confirm and expand the clinical and laboratory correlates of MMR. Such questions include: is there a functional difference in response to succinylcholine of masseter muscle compared to peripheral muscle? If so, why? Is MMR a quantitatively or qualitatively different phenomenon from the normal increase in muscle tone after succinylcholine? What are the physiologic and biochemical differences in the muscles of those experiencing MMR who are MH susceptible from those who are not? What surgical procedures are more likely to be associated with MMR?

Finally, it is time to evaluate the routine use of succinylcholine in anesthesia practice. Better relaxation and fewer predictable and unpredictable problems can be achieved with the new nondepolarizing relaxants. In my opinion, succinylcholine is a drug that should now be reserved for specific indications.


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References