[SO1-136] Oxymetazoline toxicity under anesthesia and proposed mechanisms for safer delivery

Metcalf K, Latham G, Jardine D
Seattle Children's Hospital, University of Washington , Seattle , WA, USA

Topical sympathomimetic nasal decongestants are frequently used in operating rooms as hemostatic agents during nasal surgery or nasal intubations.The imidazoline derivative drugs, which include oxymetazoline, are often preferred in children because of demonstrated efficacy in reducing hemostasis. Like many drugs used in pediatric anesthesia, oxymetazoline nasal spray is not FDA approved for use in children less than 6 years. Unlike most off-label or non-FDA approved drugs used in pediatric anesthesia, there are no established guidelines for therapeutic dosage or toxicity threshold of oxymetazoline nasal spray in young children. Although generally regarded as a safe over-the-counter medication, oxymetazoline can be rapidly absorbed and cause serious systemic effects in young children. We report a case of intraoperative oxymetazoline toxicity that lead to severe hypertension and bradycardia in a 4 year old, and we discuss the mechanism by which a large dose of oxymetazoline may have been unintentionally administered to our patient.

To better understand how our patient experienced toxicity from oxymetazoline administration, we investigated the possibility that the position of the spray bottle can affect the quantity of oxymetazoline delivered. Although the spray bottle is designed for use with the tip in an upright position, when a patient is anesthetized in the supine position, the bottle is typically inverted to deliver oxymetazoline to the patient's nares. We measured the volume of oxymetazoline delivered when the bottle was squeezed in the upright and in the inverted position. In the upright position, the spray from the bottle was captured in a previously weighed tissue paper. The quantity of oxymetazoline delivered in this position was 10-30 µL each time the bottle was squeezed. The bottle was then inverted, as is the case when oxymetazoline is delivered into the nares of a supine anesthetized patient. We noted that rather than a fine spray, the oxymetazoline was delivered as a stream of fluid. Over the course of 5 trials, between 450-990 µL of oxymetazoline was delivered with each squeeze, which is a 15- to 100-fold increase in volume compare to the upright position. We also found that a single drop of oxymetazoline from an inverted bottle was 30 µL. Possible alternatives for ensuring smaller volumes compared to fully squeezing the bottle in the inverted position are discussed.

Our observations indicate that the use of nasal spray bottles to deliver oxymetazoline to patients in the supine position can easily lead to an unintentional medication overdose. Nevertheless, oxymetazoline or other α agonist medications are likely to remain in widespread use by anesthesiologists and otorhinolaryngologists who must perform procedures that lead to epistaxis. To improve patient safety, it will be important to develop an alternate mechanism for delivering the proper dose of oxymetazoline to supine, anesthetized patients.
