Fluid Fasting in Children

Solid Science?

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Attitudes toward restricting preoperative clear fluid intake in children are changing, and this has been reflected in an increasing number of pediatric anesthesia societies and academic institutions recommending shorter fasting times in children.[1] This ongoing paradigm shift is led by an increasing sense that prolonged fasting is potentially unnecessary, contrary to patient-centered care, and may be associated with increased risk of poorer outcomes. There are several recent studies that suggest reducing fasting times for clear fluids does not increase aspiration-related events, but apart from increasing child satisfaction, few if any data show clinically relevant benefits. Indeed, it remains to be determined whether the expected psychologic and physiologic gains from reduced fasting in children translate into measurable and pertinent endpoints.

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In this issue of the Anesthesiology, Simpao *et al.* provide us with valuable information about the association of clear fluid fasting times in children with blood pressure, a commonly measured endpoint.[2] By focusing on systolic blood pressure values in a retrospective cohort of more than 15,000 anesthetized children, the authors asked whether and how the length of fasting times is related to the incidence of hypotension. They observed no association between hypotension during and immediately after anesthesia induction (a period usually characterized by the presence of painful stimuli related to airway manipulation and line insertions) and fasting times. In contrast, hypotension during the more quiescent surgical preparation period was associated with longer fasting times. The results are certainly biologically plausible; why wouldn't a degree of dehydration place a child at risk of hypotension under anesthesia?

This study is important as it is one of the few that uses a "hard" physiologic parameter in to address the benefits or drawbacks of preoperative fasting. But what do these results mean? More specifically: should the evidence for an association between longer preoperative fasting and hypotension prompt us to change practice and actively reduce fasting times in children? Single studies sometimes do tip the balance in favor of practice change, but practice should ideally change in line with the generation of high-quality clinical practice guidelines that carefully consider and synthesize the cumulative evidence around all aspects of the proposed practice change. When it comes to fasting, the outcomes to be considered include, but are not limited to, the risks of aspiration, patient discomfort, hypoglycemia, and hemodynamic compromise (reflected here as hypotension).

So how much weight should be given to this increased risk of hypotension? There is no easy answer to this question. One problem for translation is that we do not know how relevant it is to choose hypotension as a clinical endpoint. In contrast to adults, where at least some evidence suggests an association between perioperative hypotension and organ morbidity,[3] no such data is available in pediatric populations. Our ignorance is further fueled by the fact that we are still uncertain what "hypotension" is in pediatric populations. Indeed, the age-specific physiologic blood pressure ranges allowing adequate organ perfusion under anesthesia (or even in the awake child) are essentially unknown. It is, therefore,

Image: J. P. Rathmell.

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not surprising that definitions of hypotension are set by expert opinion–based consensus or practice norms rather than by concrete science; furthermore, expert opinions differ. The article, as originally submitted, defined hypotension as a 20% decrease from baseline. As a result of the peer review process, the authors reanalyzed their data using a different definition based on reference nomograms. There is, however, little if any strong evidence that one definition-based approach is better than the other, and the change in data analysis during the revision process provides an example of the lack of consensus around defining pediatric hypotension. When considering hypotension in children, it is also unclear if it is the magnitude or the duration of hypotension that matters. Regardless of the uncertain definition of "hypotension," blood pressure itself may not be as hard an endpoint as we think. In children, it varies depending on how it is measured and where it is measured.[4] While we could eventually agree on where and when to measure noninvasive cuff-based blood pressure, the development of new technologies is fundamentally changing the way we think about blood pressure.[5] Noninvasive devices are able to measure it continuously under anesthesia, as well as postoperatively, and they also give us greater insights into a patient's "normal" blood pressure preoperatively. Noninvasive devices are also being developed to measure core blood pressure, cardiac output, and organ perfusion. All these may further shift the paradigm away from our current definitions of hypotension. These new measures will of course all need validation and will have their own challenges in translation.

It is important to realize that the uncertainty around the meaning of hypotension in these children merely reflects the tip of the iceberg comprising the lack of agreed and validated outcome measures in pediatric perioperative care. There is a need to identify the important outcomes in pediatric anesthesia, and then to collate, assess, and, most likely, further develop optimal measures to assess those outcomes.[6] This is well underway in adult anesthesia but is not a simple task for children given the heterogeneity of the population (ranging from premature neonates to adolescents), and the paucity of existing well-validated pediatric outcome measures. Coming back to fasting; robust evidence-based guidelines will indeed be difficult to develop as many of the inputs such as aspiration and hypotension are not based on well-validated outcomes and measures in children. Should we, nevertheless, change our fasting practice in children? More importantly, should we actively advocate for reducing fasting times by prescribing fluid intake up to 1 h before surgery? Many have said yes; patient satisfaction is certainly improved, and there is some evidence that the risk of aspiration may be unchanged, but there is still a lack of solid end points to support a substantial benefit with such an approach. Simpao *et al.* have given us some such evidence and, like all good research, much food for thought.

Competing Interests

Dr. Vutskits is an Editor of Anesthesiology. Dr. Davidson is an Executive Editor of Anesthesiology.

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