

PREOPERATIVE FASTING IN CHILDREN: A COMMENT ON THE NEW GUIDELINE FROM THE EUROPEAN SOCIETY OF ANAESTHESIOLOGY AND INTENSIVE CARE MEDICINE (ESAIC)

Ehrenfried Schindler^{1,2}

¹ Medical Faculty, University of Bonn, Bonn, Germany

² Dept. for Anaesthesiology and Intensive Care Medicine (KAI), Section Pediatric Anesthesiology, University of Bonn, University Hospital (UKB)

Corresponding author:

👤 Prof. dr Ehrenfried Schindler

📍 Klinik für Anästhesiologie und operative Intensivmedizin (KAI), Universitätsklinikum Bonn (UKB), Venusberg-Campus 1, Gebäude 30 4. OG/Raum: 116 53127 Bonn

✉ ehrenfried.schindler@ukbonn.de

Abstract

The new guideline from the European Society of Anesthesiology and Intensive Care Medicine (ESAIC) has brought forth new recommendations regarding perioperative fasting in children, which represent a step towards enhancing pediatric anesthesia, with a patient-oriented approach. Children should be actively encouraged to drink clear liquids up to the limit of the recommended time, and the intervals for milk of any kind and solid food should be kept as short as possible. This is a new quality and is moving away from the purely prohibitive character of the previous recommendations on the perioperative fasting requirement. In addition to the pure complication considerations (regurgitation, aspiration), factors such as the improvement of the perioperative situation, but also psychological influences on the patient play a much greater role. The now recommended “6-4-3-1” rule has already been implemented in Germany as part of national recommendations. What remains is the question of what distinguishes the young adult from the older child, considering the physiology of gastric emptying. ESAIC is currently working on a reform of the existing fasting regulations for adults.

Keywords: guidelines, recommendations, perioperative fasting, children

Introduction

The need for preoperative fasting is as old as modern surgery. Although some interesting recommendations will surely never make it into the guides, we have found previous observations, now supported by data from the literature, in a similar form as in the current guide. The renowned Swiss surgeon Theodor Kocher, in his famous publication “Chirurgische Operationslehre” (Surgical Operative Theory) in 1907, suggested to his patients to drink a glass of red wine or rum 45 minutes before anesthesia, a recommendation that we certainly do not endorse in that form¹. On the other hand, Viktor von Bruns recognized even earlier (in 1873) that a prolonged period of fasting before surgery could lead to weakness and fainting. His views served as a precursor to more recent recommendations on this topic². While all of this information pertains to adult patients, it was challenging, especially with children, to reconsider the traditional guidelines set by professional societies regarding the prohibition of *per os* intake. The rules stipulate a fasting period of two hours for clear fluids and six hours for solid food, and adapting them to the current study situation. This is not only because approaching newborns, infants, and young children requires special attention and the expertise of an anesthesiologist, but also because adults do not face specific physiological or psychological difficulties during fasting from food and liquids.

The mentioned patient groups (newborns and infants), as well as critically ill patients, can suffer from the negative effects of prolonged fasting. Therefore, these patient groups stand to gain significant benefits from the new recommendations provided by the European Society of Anaesthesiology and Intensive Care (ESAIC). Traditionally, the majority of recommendations for perioperative fasting have primarily revolved around the concern of regurgitation or vomiting during anesthesia induction, which can subsequently lead to pulmonary or respiratory complications³.

In the subsequent sections, the new guidelines for preoperative fasting in children, issued by ESAIC in 2022, will be explained, along with an analysis of the fundamental facts upon which they are based⁴. Additionally, the author delves into an examination of the current developments in the same field within the realm of adult medicine.

Basics of the new guideline

The recommendations regarding preoperative fasting in children, which were in use until mid-2021, differentiate between infants up to one year of age and children older than one year. The fact that these recommendations were published alongside guidelines for preoperative diagnostics and vaccination intervals demonstrates the recognition of the unique aspects of perioperative fasting in children. However, the primary focus remains on the risk of aspiration and respiratory complications. Nonetheless, the Scientific Working Group for Pediatric Anesthesiology within the German Society of Anesthesiology and Intensive Care Medicine (Deutsche Gesellschaft für Anästhesiologie und Intensivmedizin, DGAI) has consistently been the driving force behind the development of these Guidelines⁵.

Of course, the new European Guidelines primarily address healthy children before elective surgical procedures, as well as diagnostic procedures requiring sedation or anesthesia. This Guide recommends a different approach from the previous rules⁶. Conditions such as congenital heart defects and diabetes mellitus have also been considered in the new Guidelines. Furthermore, there is a fundamental shift compared to previously published guidelines. While previous recommendations leaned more towards restrictions than obligations (do not eat or drink!), the new ESAIC Guide emphasizes the need to encourage children to eat and drink, but within specific time frames. The reason for this is a more differentiated consideration of various physiological needs, with a focus on specific conditions (Table 1).

Another distinctive feature within the new guidelines is the absence of age group divisions; in other words, there is no mention of an age limit. The authors start from the general understanding that, legally speaking, individuals aged 0 to 18 years are considered children. It's important to note that in 2018, the European Society for Pediatric Anesthesiology (ESPA) created a "Consensus Statement" regarding the liberalization of fasting times for children aged 0 to 16 years⁷. The reason was that the Scots in the United Kingdom have an age limit of 0-16 years and this was used as a specifier. These circumstances are significant insofar as it is not about physiological reasons about gastric emptying, but arbitrary legal regulations are in the foreground. The data indicate that age (years of life) of a person may not necessarily be a significant determinant of gastric emptying rate. This raises the question of what distinguishes individuals aged 22 and 16 and why guidelines on preoperative fasting still differentiate between children and adults. This concept will be revisited at the end of the article.

It's also worth mentioning that unlike the ESPA "Consensus Statement", the authors of the ESAIC guidelines do not specify a quantitative limit for the intake of clear fluids or even milk (human or milk substitute). It can be assumed that common sense is being used here, understanding that unrealistically large amounts expressed in

Table 1. New ESAIC Recommendations for Preoperative Fasting and Possible Effects

Recommendations related to:	Consider:
Clear liquids	Possible effects: - Intake: Risk of aspiration - No intake: Ketoacidosis, hypotension, hunger/thirst (physiological component)
Solid/semi-solid food	Take into consideration: - Gastric emptying time after food intake - Evidence for human milk, fortified human milk, powdered milk - Gastric emptying time of non-clear fluids
Specificities of gastric emptying in special diseases/conditions	Gastroesophageal reflux Congenital heart defects Obesity Diabetes mellitus

mL/kg are undesirable in everyday clinical practice and are only applied in the rarest of cases. In previous guidelines from the German Society of Anesthesiology and Intensive Care Medicine, the recommendation was to consume a "glass of water", but without emphasizing the exact quantity.

Now, the recommended "6-4-3-1" rule has been introduced, which has already been implemented in Germany as part of national recommendations (Table 2). What remains to be clarified is: what distinguishes a young adult from an older child in terms of gastric emptying? ESAIC is currently working on reforming the existing fasting guidelines for adult individuals (PROSPERO study CRD42022370040).

Table 2. Perioperative fasting guidelines for children (0-18 years) of the German Society for Anesthesiology and Intensive Care Medicine (DGAI)

Fasting item	time (h)
Solid meals	6
Non-clear fluids, non-human milk, hot chocolate "Small breakfast" *	4
Human milk (with fortifiers too)	3
Clear fluids (tea, water, juices without particles)	1
Postoperative: clear liquid as desired by the children	0

Source: Anesth. Intensivmed. 2022;63:320-8

* "Small breakfast" includes either yogurt, porridge (no muesli!) or toast, depending on age.

An overview of some aspects of the new guidelines

The recommendation of a "small breakfast" is an attention-worthy inclusion in the new ESAIC Guidelines, also adopted in the German guidelines as the "can recommendation". It states: "A small, light meal with solid food, porridge, or a thick liquid (dense juice) is permitted up to 4 hours before anesthesia induction". The European expert group did not reach a consensus on this recommendation. This is certainly a polarizing point, especially considering the potential for more frequent changes in the surgical plan in pediatric medicine. While planning fasting for surgical patients

scheduled for early morning procedures is feasible, scheduling fasting for subsequent patients and others on the surgical roster becomes increasingly challenging in terms of timing. Particularly if there are changes in the order of patients in the surgical schedule, a small meal might lead to delays in the surgical process. Advocates of this concept suggest that those involved in operative processes quickly adapt to these recommendations and plan their actions accordingly within the surgical environment. A final assessment of the pros and cons will likely be possible in the coming years. The ESAIC Guidelines also highlight that in case of doubt, a cross-sectional area (CSA) can be measured to assess stomach filling or residual gastric content. Comparative research demonstrates good agreement between magnetic resonance (MR) findings and measurements of residual fluids through gastric tube aspiration^{8,9}. Based on these studies, the ESAIC Guidelines assert that an experienced examiner can determine not only the quantitative amount of gastric content using sonography but also qualitatively differentiate between solid and liquid components.

There are also disagreements regarding recommendations for powdered milk and enriched powdered milk. The recommendations from the Association for Pediatric Anesthesiology (APA) in the UK have differentiated between human milk and milk. For many years the recommendation for the last consumption before surgery was: human milk 4 hours, replacement - 6 hours preoperatively. In contrast to APA, the current ESAIC recommendations do not differentiate between human milk and substitutes. As for Germany, such distinctions have never existed.

The presence of gastroesophageal reflux (from anamnesis or heteroanamnesis) is often cited as a reason for extended fasting or even rapid sequence induction (RSI) anesthesia. In this regard, the ESAIC Guidelines emphasize that functional dyspepsia or dyspepsia not associated with ulcers, in any case, does not require changes to the

recommendations for healthy children. This also applies to obese patients, where standard fasting rules are applied¹⁰. Studies have also shown that children who have undergone correction for esophageal atresia (with or without tracheoesophageal fistula) do not require special recommendations. Exceptions exist for children with complications such as esophageal stenosis or documented prolonged gastric emptying¹¹. A special group comprises children who cannot be fed orally, such as those with a gastrostomy or those currently requiring a gastric tube¹². Here, the rules applied are the same as those for healthy children.

Historical records of fasting emphasize that patient well-being is an essential part of the perioperative process. Patient well-being should never be forgotten, not only in pediatric medicine. Prolonged periods of fasting before and after surgery are often stressful. The authors of the guideline have placed special emphasis on this aspect. Studies indicate that children feel significantly better when they can drink without restrictions after surgery¹³. Early application of ice and water has been successful in preventing postoperative agitation in children. In the ESAIC guideline, the authors point out the proven reduced need for opioids and a lower incidence of nausea and vomiting^{14,15}. However, children should not be pressured to drink, which is another important point addressed in this guide.

Conclusion

The most significant recommendations of the new ESAIC Guidelines are as follows: Children should be actively encouraged to drink up to one hour before surgery, and newborns and infants should consume human milk or milk substitutes up to three hours before surgery. The new ESAIC Perioperative Fasting Guideline also includes the immediate postoperative period - the recommendation is that children should start drinking fluids early, but without pressure. Obesity, congenital heart defects, diabetes mellitus, and functional dyspepsia are not reasons to deviate from the guideline recommendations. Chewing gum is not a reason for extending fasting time, but the gum must be spat out before entering the operating room.

Literature

1. Kocher T. Chirurgische Operationslehre; 1907.
2. Bruns P. Handbuch der praktischen Chirurgie: Hansebooks; 1873.
3. Frykholm P, Schindler E, Sümpelmann R, Walker R, Weiss M. Preoperative fasting in children: review of existing guidelines and recent developments. *Br J Anaesth*. 2018 Mar;120(3):469-74.
4. Frykholm P, Disma N, Andersson H, Beck C, Bouvet L, Cercueil E, et al. Pre-operative fasting in children: A guideline from the European Society of Anaesthesiology and Intensive Care. *Eur J Anaesthesiol*. 2022 Jan 1;39(1):4-25.
5. Becke K, Giest J, Strauss J. Handlungsempfehlungen zur präoperativen Diagnostik, Impfabstand und Nüchternheit im Kindesalter. *Anästh Intensivmed* 2007; 48:4.
6. Thomas M, Morrison C, Newton R, Schindler E. Consensus statement on clear fluids fasting for elective pediatric general anesthesia. *Paediatr Anaesth*. 2018 May;28(5):411-4.
7. Bonner JJ, Vajjah P, Abduljalil K, Jamei M, Rostami-Hodjegan A, Tucker GT, et al. Does age affect gastric emptying time? A model-based meta-analysis of data from premature neonates through to adults. *Biopharm Drug Dispos*. 2015 May;36(4):245-57.
8. Moake MM, Presley BC, Hill JG, Wolf BJ, Kane ID, Busch CE, et al. Point-of-Care Ultrasound to Assess Gastric Content in Pediatric Emergency Department Procedural Sedation Patients. *Pediatr Emerg Care*. 2022 Jan 1;38(1):e178-e186.
9. Bisinotto FM, Pansani PL, Silveira LA, Naves AA, Peixoto AC, Lima HM, et al. Qualitative and quantitative ultrasound assessment of gastric content. *Rev Assoc Med Bras* (1992). 2017 Feb;63(2):134-41.
10. Chiloiro M, Caroli M, Guerra V, Lodadea Piepoli A, Riezzo G. Gastric emptying in normal weight and obese children--an ultrasound study. *Int J Obes Relat Metab Disord*. 1999 Dec;23(12):1303-6.
11. Romeo C, Bonanno N, Baldari S, Centorrino A, Scalfari G, Antonuccio P, et al. Gastric motility disorders in patients operated on for esophageal atresia and tracheoesophageal fistula: long-term evaluation. *J Pediatr Surg*. 2000 May;35(5):740-4.
12. Franken J, Mauritz FA, Stellato RK, Van der Zee DC, Van Herwaarden-Lindeboom MYA. The Effect of Gastrostomy Placement on Gastric Function in Children: a Prospective Cohort Study. *J Gastrointest Surg*. 2017 Jul;21(7):1105-11.
13. Yin X, Zeng X, Wang T, Dong B, Wu M, Jia A, et al. Early versus delayed postoperative oral hydration in children following general anesthesia: a prospective randomized trial. *BMC Anesthesiol*. 2020 Jul 18;20(1):174.
14. Radke OC, Biedler A, Kolodzie K, Cakmakkaya OS, Silomon M, Apfel CC. The effect of postoperative fasting on vomiting in children and their assessment of pain. *Paediatr Anaesth*. 2009 May;19(5):494-9.
15. Chauvin C, Schalber-Geyer AS, Lefebvre F, Bopp C, Carrenard G, Marcoux L, et al. Early postoperative oral fluid intake in paediatric day case surgery influences the need for opioids and postoperative vomiting: a controlled randomized trial†. *Br J Anaesth*. 2017 Mar 1;118(3):407-14.

Declaration of interest statement: None

Received: 01. 06. 2023.

Accepted: 28. 06. 2023.

Online: 01. 09. 2023.

