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Revisiting Preoperative Fasting: Benefits and Safety of Shortened Clear Fluid Restrictions Before Elective Surgery

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ABSTRACT

Before Elective surgery, it is often required to restrict food intake before the procedure, with clear fluids typically allowed up to two hours before anesthesia induction. Recent studies have shown that this extended fasting period may lead to discomfort and complications such as dehydration, electrolyte imbalance, reduced patient satisfaction, increased risk of postoperative nausea and vomiting (PONV), and increased stress on the body. Protocols describing shorter periods of fluid consumption abstinence have been getting attention as potentially safer and more comfortable alternatives, with growing evidence that suggests the potential benefits for patients. This review aims to synthesize findings from various randomized controlled trials, meta-analyses, and observational studies to assess the benefits, risks, and potential applications of reduced preoperative fasting. The benefits of reduced fasting times, including improved hydration, decreased patient anxiety, and enhanced postoperative recovery, will be discussed. Additionally, this paper will assess safety concerns, including the risk of aspiration during intubation and the potential for delayed gastric emptying in certain individuals. The paper will analyze the efficacy of shortened fasting protocols in various specialties, with an emphasis on gastrointestinal and anesthesiology outcomes. The findings suggest that, with guidelines and careful management, a shortened fluid intake abstinence period can produce outcomes that would reduce perioperative discomfort without compromising any of the patient's safety.

Keywords: fasting, preoperative fasting, ERAS, fluid intake

1. INTRODUCTION

One of the pillars of modern medicine, Elective surgery, mandates careful planning and preparation in order to ensure optimal outcomes. An important component of those is food and fluid abstinence. It was implemented with the intent of

minimizing the risk of pulmonary aspiration under anesthesia. Aspiration - the inhalation of gastric contents into the lungs - can lead to life-threatening conditions such as aspiration pneumonia, pulmonary injury, and death. As such, conventional fasting guidelines recommend complete abstinence from all food and fluids for 8–12 hours before surgery, with clear fluids (such as water, tea, and black coffee) being restricted to 2–4 hours prior to anesthesia.

However, recent evidence has put the necessity of these prolonged fasting periods, particularly for clear fluids, to the question. Overly prolonged fasting can cause numerous complications, including dehydration, electrolyte imbalance, and distress in patients (Wang et al., 2010). Furthermore, prolonged fasting has been proven to increase the risk of postoperative nausea and vomiting (PONV), as well as it was found to delay the recovery from anesthesia (Van Ginhoven et al., 2011). These concerns led to a change in the fasting protocols, allowing patients to consume clear fluids up to 2 hours before surgery.

Since then, an ERAS society has been formed, which formulates ERAS (Enhanced Recovery After Surgery) guidelines for different procedures and specialties. The ERAS protocols have been widely adopted worldwide; however, some places fail to fully implement them.

This modification, also known as shortened clear fluid abstinence, has gained popularity in recent years due to its potential to improve patient comfort, decrease the number of hospital days, and reduce postoperative complications (Ljungqvist and Søreide, 2003). Despite its numerous advantages, however, there are still some lingering concerns about the safety of reducing fasting time, particularly regarding the risk of aspiration and the timing of adequate stomach emptying before surgery. As with any change in clinical practice, potential risks and benefits should be carefully analyzed, along with a thorough understanding of the physiological mechanisms involved in gastric emptying and anesthesia. Furthermore, administering carbohydrate-rich drinks before surgery may be beneficial for most patients (Singh et al., 2015).

The primary purpose of this paper is to critically examine the current body of research on the benefits and safety of shortened clear fluid abstinence before elective surgery. This review will focus particularly on studies published after 2010, providing an up-to-date assessment of randomized controlled trials (RCTs), meta-analyses, and observational studies that examine the effects of shorter fasting times on patient outcomes. This review tries to analyze the impact of shortened fasting protocols on patients' recovery, hydration and dehydration status, anxiety reduction, patient comfort, and possible complications. Furthermore, safety concerns, particularly the risk of aspiration, will be evaluated in light of the latest research.

2. METHODOLOGY

To conduct a comprehensive review of the evidence surrounding shortened clear fluid abstinence before elective surgery, a systematic literature search was conducted across three major medical databases: PubMed, Cochrane Library, and Google Scholar. These databases were selected for their comprehensive coverage of clinical and surgical research, as well as their ability to provide access to peer-reviewed articles, meta-analyses, and randomized controlled trials (RCTs).

The search was conducted in January 2025 and included the following keywords: "shortened clear fluid fasting," "preoperative fasting," "elective surgery fasting protocols," "aspiration risk and fasting," "ERAS protocol," and "preoperative clear fluid intake." Boolean operators such as "AND" and "OR" were used to refine the search and retrieve articles that focused on the benefits and safety of shorter fasting periods in patients undergoing elective surgery. Articles published after 2010 were prioritized to ensure that the findings incorporated the most recent evidence available.

The inclusion criteria were as follows:

- Study Design: Only RCTs, meta-analyses, and observational studies were included to ensure the highest level of evidence.
- Patient Population: Studies focused on adult patients undergoing elective surgery, regardless of specialty (gastrointestinal, orthopedic, cardiac, etc.), were included.
- Outcomes: Studies that reported on postoperative recovery, complications (e.g., nausea, vomiting, dehydration), and aspiration risk were included.
- Timeframe: While studies published after 2010 were prioritized, high-quality studies from 2000 onward were also included if they met inclusion criteria.

Exclusion criteria included:

- Case reports or small-scale studies with fewer than 30 participants.
- Review articles and editorials that did not present original data. 15 articles excluded (Reason 1)

- Studies focusing on pediatric or high-risk populations, such as critically ill patients, were excluded due to differences in fasting protocols and clinical considerations. 16 articles excluded (Reason 2)

We primarily screened the search results by title and abstract, and full-text articles were retrieved for studies that met the inclusion criteria. A final selection of 22 studies was made, which were included in the review for in-depth analysis (Figure 1).

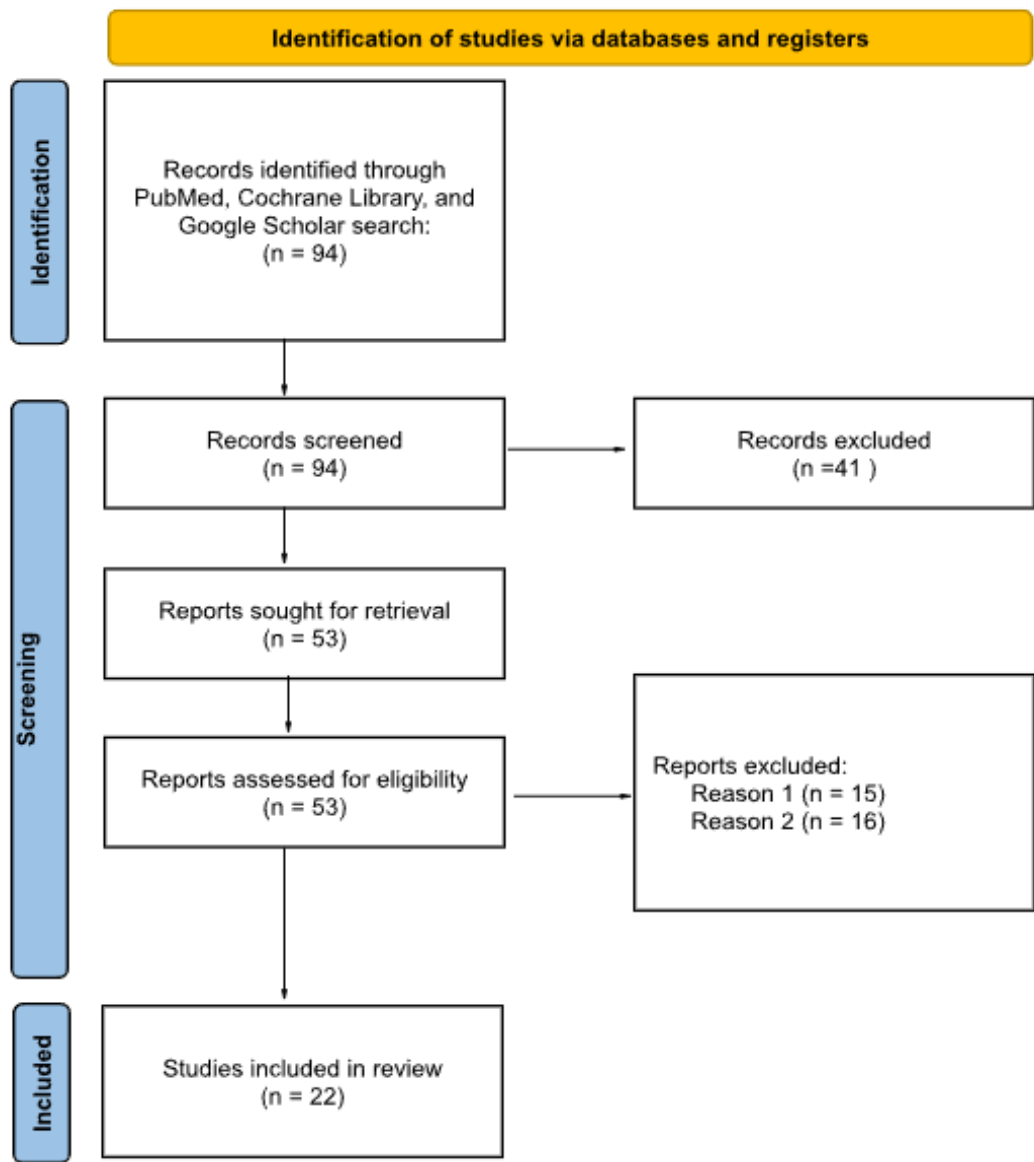


Figure 1 PRISMA flow diagram of study selection

3. RESULTS AND DISCUSSION

3.1. Benefits of Shortened Clear Fluid Abstinence

The practice of preoperative fasting has its drawbacks. The traditional 8–12-hour fasting protocol has been associated with several adverse effects, including dehydration, hypoglycemia or hyperglycemia (Faria et al., 2009), increased patient anxiety, and a delayed return to normal gastrointestinal function postoperatively. Shortened fasting protocols, specifically those that allow clear fluids up to 2 hours or less before surgery, have been shown to reduce certain negative outcomes while maintaining patient safety levels (Yagmur et al., 2011).

3.1.1. Hydration and Electrolyte Balance

Hydration status is one of the most significant concerns for patients undergoing elective surgery. A study by Smith et al., (2014) demonstrated that patients who were allowed to drink clear fluids up until 2 hours before surgery had better hydration status compared to those who adhered to the traditional fasting period. Dehydrated patients are at increased risk for complications such as hypotension, renal impairment, and delayed recovery from anesthesia. Reduced fasting time helps maintain correct fluid balance, ensuring the patient's adequate hydration prior to surgery, and it also helps decrease the need for intravenous fluids during the procedure. This is critical for patients undergoing long or major surgeries, where fluid loss could be more significant (Iversen et al., 2015).

In Addition to preventing dehydration, shortened fasting also allows for better electrolyte balance, and carbohydrate fluid ingestion may reduce patient discomfort (Hausel et al., 2001). Many patients, particularly those with chronic illnesses, may be more susceptible to electrolyte imbalances when fasting for long periods. By shortening the period of fasting, patients will be less prone to developing undesirable changes in their electrolyte levels, which could affect postoperative recovery and complication risk, such as arrhythmias (Xu et al., 2017).

3.1.2. Psychological and Comfort Benefits

One of the most significant effects of shortened fasting regimens is increased patient comfort and decreased anxiety. Traditional fasting practices have often led to uneasiness, irritability, decreased satisfaction, and generalized discomfort. A study by Patel et al., (2017) found that allowing the patients to drink clear fluids up to 2 hours before surgery resulted in lowered anxiety and discomfort levels, as compared to those under the traditional, longer fasting regimen. This proves crucial to improve the overall experience, patient comfort and satisfaction.

The less strict fasting protocol can reduce the sense of hardship and dehydration, which can help the stress and uncertainty often experienced by patients before surgery. A reduced level of anxiety has been associated with better outcomes, including faster recovery times and less need for postoperative pain management (Liang et al., 2021).

3.1.3. Postoperative Recovery

Postoperative recovery is influenced by many factors, one of them being the patient's hydration status before surgery. Studies have shown that patients who consume clear fluids up until 2 hours before surgery experience a faster recovery from anesthesia. In a meta-analysis by Awad et al., (2013), patients who followed shortened fasting protocols were able to come back to normal activities, including eating and drinking, more quickly than those who followed traditional fasting guidelines. Additionally, these patients had shorter hospital stays, reduced nausea and vomiting, and fewer gastrointestinal complications (Liang et al., 2021).

3.2. Safety Concerns of Shortened Clear Fluid Abstinence

While the potential benefits of shortened clear fluid fasting are compelling, particularly in terms of hydration, patient comfort, and postoperative recovery, the approach is not without safety concerns. The most critical safety issue surrounding any preoperative fasting protocol is the risk of aspiration — the inhalation of gastric contents into the lungs during anesthesia. This can lead to complications such as aspiration pneumonia, pulmonary injury, which could result in death. It is therefore essential to critically evaluate the safety of shorter fasting periods, particularly in terms of aspiration risk, delayed gastric emptying, and the management of fasting regimens in various patient groups.

3.2.1. Aspiration Risk and Gastric Emptying

Aspiration risk still remains one of the primary concerns when it comes to reducing preoperative fasting periods. By allowing the patient's clear fluids until 2 hours before surgery, there can be concerns whether sufficient time has passed for the stomach to fully empty, potentially leading to the risk of aspiration during intubation.

However, several studies addressing this concern have demonstrated that the risk of aspiration with a 2-hour clear fluid fasting period is comparable, particularly if guidelines are correctly followed. Awad et al., (2013) conducted a systematic review, which examined the effects of shortened fasting times on aspiration risk and found no significant increase in aspiration incidents among patients who consumed clear fluids up to 2 hours before surgery. This study indicated that, under controlled circumstances, the gastric

contents from clear fluids are generally emptied from the stomach within 1–2 hours, which aligns with the timing of the anesthesia induction.

A study by Roberts et al., (2016) found that the pH of gastric contents in patients who consumed clear fluids up to 2 hours before surgery was significantly higher than that in patients who had fasted for more extended periods. This is critical, as higher gastric pH reduces the likelihood of aspiration leading to severe pulmonary injury. Furthermore, in cases of aspiration, higher pH reduces the likelihood of chemical pneumonitis, which can be more dangerous if the aspirated fluid is acidic.

However, some patient populations may still be at risk for delayed gastric emptying, such as those with obesity, gastrointestinal reflux disease (GERD), or delayed gastric motility due to previous surgeries or underlying conditions. In these cases, traditional fasting protocols may be preferred, or additional measures, such as the use of prokinetic agents (medications that speed up gastric emptying), may be considered to mitigate the risk of aspiration (Miller et al., 2017).

3.2.2. Gastric Emptying Times and Delayed Emptying

While the overall risk of aspiration is relatively low with shortened fasting protocols, gastric emptying times can vary depending on several factors. In normal, healthy individuals, gastric emptying typically occurs within 0.5–2 hours after the ingestion of clear fluids (Rüggeberg et al., 2024). However, certain conditions, such as diabetes and gastroparesis, may delay this time, posing a potential concern for those following shortened fasting protocols.

A study by Miller et al., (2017) examined the effects of obesity and gastric reflux on gastric emptying in patients who consumed clear fluids up to 2 hours before surgery. The study found that in obese patients, gastric emptying times were significantly longer, and in patients with GERD, gastric contents remained in the stomach for a more extended period, increasing the risk of aspiration. The delayed gastric emptying in these patients suggests that while shortened fasting protocols are effective for most individuals, a personalized approach is required for some high-risk populations. This would involve more stringent monitoring, personalized protocols, and meticulous anesthesia management.

Additionally, a study by Lin et al., (2022) examined the impact gastric emptying in diabetic patients. Diabetic gastroparesis (a condition where the stomach's peristaltic movements are abnormally, or less active) was identified as a risk factor for delayed gastric emptying and aspiration.

3.2.3. Risk assessment and patient selection

One of the key aspects of safely implementing shortened fasting protocols is selecting patients appropriately. Not all patients are suitable candidates for shortened fasting, and a thorough preoperative assessment is crucial to identify those at risk for delayed gastric emptying or aspiration. Certain patients, including those with a history of gastrointestinal reflux, obesity, diabetes, or any form of gastric motility disorder, may require extended fasting periods or other interventions to mitigate risks.

The American Society of Anesthesiologists (ASA) provides guidelines that take into account the risk factors for aspiration and gastric emptying delays. According to these guidelines, patients with conditions such as gastroesophageal reflux disease (GERD), gastroparesis, or obesity should be evaluated for a more extended fasting period or other medical interventions (e.g., the use of prokinetic drugs, such as metoclopramide). These guidelines help ensure that safety is not compromised when implementing shortened fasting protocols for certain populations.

Furthermore, patient education is an integral part of the process. Proper, easy-to-understand instructions regarding fluid intake, types of clear fluids, and the exact timing play a crucial role in minimizing risks. Clear communication about the importance of following the guidelines ensures that the fluid intake is regulated correctly to prevent complications.

3.3. Clinical Implications

The evidence supporting less strict fasting protocols indicates that they have numerous advantages, including the ability to increase patient comfort (Table 1), reduce anxiety, enhance satisfaction, minimize complications, and expedite recovery time. Implementing these protocols, however, requires careful planning and adherence to the guidelines to ensure patient safety. The following section of this article will discuss implications for healthcare workers, focusing on the integration of said protocols into everyday clinical practice.

3.3.1. Integration into Clinical Practice

Implementing a reduced fasting regimen in a clinical environment requires coordination among surgical teams, anesthesiology staff, and nursing staff. Anesthesia teams must be informed about which patients are suitable candidates for reduced fasting and the associated risks. Furthermore, effective communication with patients is crucial, as many may be concerned about the safety of the method or may not even be aware of the concept.

To ensure safety and consistency, clinical protocols should be updated in line with current evidence, introducing standardized rules for patient evaluation, education, and post-operative monitoring. For instance, patients with risk factors for aspiration or delayed gastric emptying may require individually tailored fasting guidelines, such as a more extended fasting period or additional assessments, including ultrasound, to evaluate stomach contents (Patel et al., 2017). Moreover, a revised patient intake checklist may be implemented.

3.3.2. Role of Anesthesia and Surgical Teams

Anesthesia specialists, nurses and surgeons' role in managing shortened fasting protocols is crucial. The decision to deviate from standard protocol should be made after a thorough examination of the patient's medical history, the type of surgery, and relevant risk factors. For example, patients undergoing surgeries with high risk (e.g., open abdominal surgery, neurosurgery) may still need to follow traditional, longer fasting protocols. However, for lower-risk surgeries (e.g., small orthopedic or minor laparoscopic procedures), a shortened fasting protocol may be considered more appropriate.

Moreover, the possible use of visual imaging, such as an ultrasound, can help determine the level of gastric content and identify patients who may be at risk for aspiration despite shortened fasting. Monitoring tools can provide real-time data on gastric emptying, allowing anesthesia providers to make more informed decisions about the timing of anesthesia induction and the appropriate fasting protocol.

The surgical team's role should be to follow those recommendations and explain the fasting times and their benefits to the patients.

3.3.3. Training and Education

The transition to more liberal fasting protocols requires ongoing training and education for healthcare professionals. Nurses, anaesthetists, and surgeons must be familiar with preoperative fasting guidelines, including the types of clear fluids that are allowed (e.g., water, clear broth, tea, black coffee) and the specific timings for consumption. Patients should also be educated about the importance of adhering to fasting protocols and be aware of the potential risks of deviating from the guidelines. Patients can be reassured with simple explanations such as: 'Having clear fluids, such as water or tea, up to two hours before surgery helps you recover faster and doesn't increase the risk.'

Table 1 Key Summary Points of the Study

Main risks of shortened fasting
• Increased risk of aspiration • Delayed gastric emptying (in case of gastric surgery)
Main benefits of shortened fasting
• Lessened risk of post-operative nausea and vomiting • Decreased intra-operative serum glucose spike • Higher patient comfort and satisfaction • Decreased length of hospitalization • Decreased risk of acute renal failure
Current guidelines for preoperative fasting
• Limited solid food intake up to 6 hours before elective surgery • Limited fluids intake up to 2 hours before elective surgery • Carbohydrate-rich drink consumption 2 hours before elective surgery

4. CONCLUSIONS

Shortened clear fluid abstinence before elective surgery presents an alternative to traditional fasting practices. The evidence suggests that it offers numerous significant benefits, including improved hydration, reduced patient anxiety, enhanced postoperative recovery, and decreased complications such as nausea and vomiting. Furthermore, studies indicate that, when appropriately implemented, the safety risks associated with shortened fasting protocols — particularly the risk of aspiration — are minimal for most patients. However, careful patient selection remains crucial, particularly for individuals with underlying conditions that impact gastric emptying.

Evidence supporting shortened fasting periods grows, meaning that all Healthcare providers should actively incorporate these findings into their everyday practice, adjusting protocols in individual cases based on specific patient needs and surgical risks. Research in this area should be continued to explore the long-term effects of liberal fasting protocols and refine guidelines, ultimately improving perioperative care, patient safety, and efficiency for all.

Author's Contributions

Dominik Tomczak- Material conceptualization, review and editing, investigation, methodology

Justyna Kuciel- Methodology, investigation, visualization, supervision

Kinga Świtała- Conceptualization, visualization, review and editing

Maria Mrocza- Review, data curation, investigation

Roksana Hrapkowicz- Resources, draft writing, data curation

Kinga Erasmus- Visualization, data curation, formal analysis

Agnieszka Czernecka- Review, visualization, investigation

Karolina Jałocha- Supervision, writing- rough preparation, data curation

Marek Borecki- Resources, formal analysis, supervision

Patrycja Pysz- Resources, initial drafting, formal analysis

Project administration- Dominik Tomczak

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Informed consent

Not applicable.

Ethical approval

Not applicable.

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Conflict of interest

The authors declare that there is no conflict of interest.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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