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Consensus statement

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Mexican consensus statement on fasting before cardiovascular diagnostic and therapeutic interventions

Consenso mexicano de ayuno previo a intervenciones cardiovasculares diagnósticas y terapéuticas

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Palabras clave: *ayuno preoperatorio, sedación, anestesia general, procedimientos electivos, cateterismo cardiaco, cateterismo cardiovascular.*

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ABSTRACT

Introduction: prolonged fasting before cardiac catheterization remains a routine practice in almost all institutions, despite the lack of solid evidence of its benefits. **Objectives:** to analyze and issue recommendations based on evidence and international consensus on preoperative fasting in elective cardiac catheterization procedures in adult and pediatric populations. **Material and methods:** this national consensus used the nominal group technique and Delphi methodology, with participation from organizations such as COMECITE, ANCAM, SOMEEC, and COMEXANE, and a systematic review of the literature in medical databases, including randomized controlled trials and meta-analyses. **Results:** the consensus established recommendations for adult and pediatric populations, based on current evidence. **Conclusions:** short or liberalized fasting is safe before cardiac catheterization procedures and is associated with superior patient satisfaction compared with prolonged fasting, without an increase in broncho aspiration-related complications.

RESUMEN

Introducción: *el ayuno prolongado antes de un cateterismo cardiaco sigue siendo una práctica habitual en casi todas las instituciones, a pesar de la falta de pruebas sólidas sobre sus beneficios.* ***Objetivos:*** *analizar y emitir recomendaciones basadas en la evidencia y el consenso internacional sobre el ayuno preoperatorio en procedimientos de cateterismo cardiaco electivo en poblaciones adultas y pediátricas.* ***Material y métodos:*** *este consenso nacional utilizó la técnica de grupo nominal y la metodología Delphi, con la participación de organizaciones como COMECITE, ANCAM, SOMEEC y COMEXANE, y una revisión sistemática de la literatura en bases de datos médicas, incluyendo ensayos controlados aleatorios y metaanálisis.* ***Resultados:*** *el consenso estableció recomendaciones para poblaciones adultas y pediátricas, basadas en la evidencia actual.* ***Conclusiones:*** *el ayuno corto o liberalizado es seguro antes de los procedimientos de cateterismo cardiaco y se asocia con una mayor satisfacción de los pacientes en comparación con el ayuno prolongado, sin aumento de las complicaciones relacionadas con la aspiración bronquial.*

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INTRODUCTION

Every discipline has repetitive, automatic patterns that have been learned over generations without any thorough analysis of their efficiency; medicine is no exception. Among traditions, fasting before surgery is a rather recent indication. Yet, in the 19th century, Dr. Joseph Lister, the British surgeon who introduced antiseptics in surgery and discovered catgut, gave patients a beef concentrate soup, 2-4 hours before surgery. The first report supporting preoperative fasting was published by Dr. Curtis Mendelson's paper in 1946, after finding 0.15% pulmonary gastric content in 44,016 women during obstetric anesthesia using a gas mixture of ether and oxygen.[1,2]

Decades later, the medical community and hospitals persist in strict fasting before surgery, even under conscious sedation, including catheter-based procedures, and noninvasive or minimally invasive procedures without sedation, such as the intravenous contrast computed tomography (CT) and magnetic resonance (MR).

The obligation to adhere to the fasting indication restricts patients from any meal and water for four hours or more, with the following consequences:

1. Prolonged fasting, for more than four hours, or even days, resulting in complications such as dehydration and consequent increased drug and contrast dye toxicity.
2. Deferral of scheduled procedures exposes the patient to the disease's natural history.
3. Increased procedural costs due to readmissions and hospital days.
4. Waste of the resources utilized on the deferred patients.
5. Impact on the patient's comfort and tolerance.
6. Institutional discredit.
7. Work environment deterioration.
8. Missed medication.

To illustrate the medical consequences of deferral, consider the experience of COVID-19, in which postponed cardiovascular interventions, resulted in 36% complications related to this delay.[3]

Current fasting protocols

The European Society of Anaesthesiology (ESA) and the American Society of Anesthesiologists (ASA) Guidelines[4] declared that patient safety is the primary goal of preoperative fasting; however, it must be kept to a minimum to avoid metabolic disruptions and reduce the risks associated with extended fasting.

The ESA and ASA suggested the following indications for elective procedures, including those performed under conscious sedation, local anesthesia, regional anesthesia, or a combination thereof.

Adults

Clear liquids: patients may consume water, pulp-free juices, tea, or coffee without milk up to two hours before the procedure. This technique reduces thirst, promotes hydration, and reduces the risk of aspiration.

Light diet: the treating physician determines the fasting length, recommending six hours fasting following a simple meal, such as bread, fruit, or crackers, or eight hours after consuming high-fat or high-protein meals.

Carbohydrate-rich drinks: even patients with well-controlled diabetes may consume carbohydrate-rich drinks up to two hours before surgery, to improve patient satisfaction, lessen hunger and thirst, and lower postoperative insulin resistance, without raising the risk of aspiration.

Other considerations: never cancel or postpone the procedures solely because of chewing gum, sucking on a hard candy, or smoking before the intervention, as these do not represent a clinically significant risk of aspiration.

Patients with delayed gastric emptying: follow the same recommendations outlined above.

Children

Clear liquids: permitted up to two hours before the procedure, including water, pulp-free juices, or pediatric electrolyte solutions.

Solid diet: six-hour fasting following a light meal, as in adults.

Breast milk: allowed up to four hours before the procedure, as gastric emptying is faster and safer. Other types of milk, such as formula or cow's milk, delay gastric emptying due to their higher protein and fat content, requiring a minimum six-hour fasting period.

Intravenous iodine contrast-enhanced image studies

Arbitrary tradition includes fasting in the preparation protocol for intravenous iodine contrast-enhanced imaging, despite a lack of evidence of benefit, even in the high-osmolality contrast era. Currently, in the modern era of iodine preparation, nausea and vomiting occur at non-significant, non-relevant rates of 0.013% and 0.059%, respectively. The European Society of Urogenital Radiology (ESUR) and American College of Radiology (ACR) guidelines discourage fasting before these studies.[5]

Current concepts regarding fasting

No evidence supports fasting before interventional or diagnostic cardiovascular procedures; instead, fasting is associated with increased complications and misunderstandings, particularly when medical and nursing staff interpret «nothing by mouth» literally. Prolonged fasting entails abstaining from food and water for several days. The operators and anesthesiologists believe that their patients are on a hospital fasting time routine, when in fact they are not.

Fasting is not easy; patients may eat or drink, which can lead to deferral or rescheduling of procedures by operators or other staff members. Fasting since dinner can result in up to 12 hours of fasting for the first morning procedure, and longer for subsequent procedures.[6] Deferring scheduled cardiovascular procedures negatively impacts patients' prognosis, especially those with hypertension, chronic kidney disease, and heart valve implants.[3]

Current evidence does not support the benefits of fasting, instead highlighting the harms associated with interventional cardiovascular procedures. Mishra et al., report in cardiac catheterization procedures, similar rates of primary and secondary outcomes (hypotension, aspiration pneumonitis, nausea/vomiting, hypoglycemia, patient satisfaction, and 30-day mortality).[7]

Sheila Bacus et al. report the effects of fasting in a single-center, non-emergency cardiac catheterization study of 1,030 patients; no episodes of aspiration, inadequate preprocedural hydration in patients at high risk for contrast-induced nephropathy, fasting for significantly longer periods, and fasting-related symptoms (hunger, nausea, and vomiting).[8] The TONIC trial, a single-center, prospective, blind randomized controlled trial, included 739 patients undergoing non-emergency coronary procedures, reported noninferiority of a non-fasting strategy compared to a fasting one, while improving patients' comfort.[9] Carri Woods et al. reported a single-center elective cardiac catheterization study in 197 subjects; the non-fasting group had significantly greater satisfaction without a safety risk than the fasting group.[10]

The CALORI trial, a single-center randomized trial of 198 patients undergoing cardiac catheterization, demonstrated improved patient well-being and satisfaction without compromising safety with the non-fasting strategy.[11] The multicenter randomized SCOFF trial included 716 patients; primary outcomes (aspiration pneumonia, hypotension, hyperglycemia, and hypoglycemia), and patient satisfaction scores were significantly better in the non-fasting group than the fasting group.[12] Adil Salihu et al. reported a meta-analysis of elective and nonurgent coronary angiography and found no evidence that fasting reduces adverse events, but provoked patient dissatisfaction.[13] O-K Kwon informed an open-label clinical trial of cerebral angiography in 2,554 patients; nausea and vomiting are low and not affected by diet or fasting, without pulmonary aspiration rates between groups.[14]

Many studies with thousands of patients confirmed the limited utility of fasting for the preparation for intravenous contrast-enhanced imaging, including pulmonary aspiration, nausea, vomiting, and other serious adverse events.[15-18]

Fasting in non-invasive studies

Arbitrary tradition includes fasting in the protocol for intravenous iodine contrast for enhanced imaging, despite a lack of evidence of benefit, even in the era of high-osmolarity contrast. Currently, with modern iodine preparations, nausea and vomiting occur at insignificant rates of 0.013% and 0.059%, respectively.

Nevertheless, some centers require fluid fasting prior to intravenous contrast studies to reduce the risk of aspiration pneumonia. Lee et al. published 13 studies in the medical literature on contrast-enhanced CT performed after fluid ingestion at 69 hospitals and concluded that there is little evidence that clear liquids cause aspiration pneumonia.[18] Low and iso-osmolar non-ionic contrast agents used in CT and gadolinium-based paramagnetic contrast agents used in MRI represent a lower risk of vomiting than the high-osmolarity ionic contrast agents previously used.[19] Contrary to previous beliefs, fasting before the procedure could have unpleasant effects, such as difficulties in scheduling appointments, risk of hypoglycemia in patients with diabetes mellitus, and general dissatisfaction. Hunt et al. published a study of 456,930 doses of iodinated and gadolinium contrast agents and reported adverse events (hives and nausea) in 0.11% of low-osmolar iodinated and 0.64% of gadolinium doses.[20] No gadolinium-conducted studies report the risk of aspiration pneumonia. Neeman et al. conducted a randomized controlled trial that enrolled 2,091 hospitalized patients for non-emergency contrast-enhanced CT scans. Nausea, vomiting, risk of aspiration pneumonitis, or adverse gastrointestinal symptoms did not differ statistically between the fasting and non-fasting groups.[21] Routine intravenous contrast administration does not require fasting unless sedation is required, and it follows standard anesthesia recommendations.[22]

Special considerations for pediatric patients

The topic of fasting in pediatric patients needs a separate section because they undergo these procedures, ranging from premature newborns, who apparently have slower gastric emptying than full-term infants, to adolescents with altered nutritional status and complex congenital heart disease, who have unique physiological characteristics regarding hydration and nutrition. For example, in patients with univentricular physiology, the main variables for evaluating the quality of the cavopulmonary circulation are invasive measurements of central pulmonary arterial and systemic ventricular end-diastolic pressures. These patients traditionally fast for at least eight hours, with strict control of intravenous fluids during this same period. There is some controversy about measuring these pressures on a single occasion, when patients are fasting, supine, under sedation or general anesthesia, or under conditions more representative of normal activity. However, the practical aspects of this measurement make it difficult to perform.[23]

Occult diastolic dysfunction

Peck et al. (2022), in a single-center study, measured baseline variables and repeated measurements after an intravenous bolus of crystalloid (15 mL/kg body weight) administered over less than five minutes, repeating after a five-minute stabilization period, obtaining the cardiac output by the Fick's equation, defining occult diastolic dysfunction as a systemic ventricular end-diastolic pressure of 15 mmHg or greater after crystalloid administration.[24]

Maintaining patients under near-physiological conditions as close to normal as possible, using the body's own homeostatic mechanisms and without prolonged fasting, is the best protocol for maintaining euvolemia.[25] However, it remains uncertain whether, in these patients with univentricular physiology, there are differences in baseline measurements when performed under fasting conditions, with or without intravenous fluids, and whether interventions affect dysfunction parameters. Gastric aspiration may happen in 1.3/10,000 procedures.[26]

The «no food after midnight» paradigm persists, even in pediatric patients; however, given the lack of solid scientific

evidence regarding its safety, consensus statements tend to recommend reducing preoperative fasting time.

Despite guidelines, multifactorial, generally systemic factors impede compliance with fasting hours, leading to extremely prolonged fasting times in children and to the physiological consequences of this practice, such as discomfort, irritability, fatigue, hypoglycemia, ketosis, and hypotension.[27] Alarcón-Almanza et al, published in 2024, the addition to fasting in 500 patients between 0 and 18 years old scheduled for elective procedures, demonstrated that only 40% of patients complied with the indicated fasting time, with 59.6% of children fasting for more than eight hours, of whom 18.1% were infants; 13.6% presented with hypoglycemia.[28]

Current recommendations follow the guidelines issued by the European Society of Anaesthesiology and Intensive Care, without any methodological literature on pediatric cardiovascular intervention, whose latest update in 2022 recommended maintaining a six-hour fast for solids, four hours for infant formula, three hours for breast milk, including fortified breast milk, and one hour for clear liquids.[29] The update consists of reducing the fasting time for clear liquids to one hour (level of evidence 1B/1C) and for breast milk to three hours (level of evidence 1C).[28,29]

These recommendations regarding clear liquids follow the publications of the Association of Pediatric Anesthetists of Great Britain and Ireland, the Australian and New Zealand College of Anesthetists, the European Society for Pediatric Anesthesiology, the Association of Pediatric Anesthesiologists and Resuscitators of France, and the Working Group of the Pediatric Section of the Spanish Society of Anesthesiology, Resuscitation and Pain Therapy. These societies support a three-hour fast for breast milk (whether fortified or not) and a one-hour fast for clear liquids, except in cases with risk factors for delayed gastric emptying or low cardiac output.[30]

Conversely, in 2023, the ASA published updated guidelines on preoperative fasting, replacing the 2017 guidelines. These guidelines addressed specific topics, including the administration of clear liquids containing carbohydrates with or without protein, the use of chewing gum, and the duration of pediatric fasting. This publication concludes that the evidence is insufficient to support the benefits of a one-hour clear liquid fast for patients undergoing procedures under general or regional anesthesia or sedation, and recommends a fast of approximately two hours. However, it also states that a shorter fasting duration should be at the clinician's discretion.[26]

In September 2025, the Pediatric Society of Anesthesia published the results of a survey of 430 members of the Society of Pediatric Anesthesia on the timing of clear fluid intake before procedures, supported by international anesthesia societies for a guideline reducing the clear fluid intake period to one hour in pediatric patients, consistent with the ASA updated guidelines, which maintain the recommendation of clear fluid intake for two hours before anesthesia. 73% of members adhere to the two-hour clear-fluid fasting recommendation, whereas 24% adhere to a one-hour policy. However, 71% considered the one-hour clear-fluid fasting policy adequate, and 86% stated they would shorten it to one hour if the ASA guidelines were updated.[26]

MATERIAL AND METHODS

After written invitation to the main national cardiological organizations, the Mexican College of Interventional Cardiology and Endovascular Therapy (COMECITE) collaborated with prominent members of associations and societies such as the National Association of Cardiologists of Mexico (ANCAM), the Mexican Society of Electrophysiology and Cardiac Stimulation (SOMEEC), the National Association of Cardiologists of the State Workers' Security and Social Services Institute (ISSSTE) (ANCISSSTE), and the Mexican College of Anesthesiology (COMEXANE). A consultant gastroenterologist from the *Universidad de Baja California* assessed the gastric emptying function. The consensus also included collaboration with the Social Service of the Anahuac University Campus, Cancún and the Universidad Autónoma de Zacatecas.

The consensus group elected a chair and a co-chair, then assigned specific roles to the remaining members. The authors searched medical databases, including PubMed, SciELO, Google Scholar, and Scopus, and peer-reviewed articles on fasting in preparation for cardiovascular procedures, both invasive and non-invasive, drawing on their experience.

A search was conducted across PubMed, Scopus, SciELO, and Google Scholar for publications from the last five years on fasting in pediatric patients undergoing elective diagnostic or interventional cardiac catheterization with prior sedation or general anesthesia.

The MeSH terms used were:

Preoperative fasting, cardiac catheterization, pediatric patients, children, sedation, general anesthesia, and congenital heart disease.

The consensus worked between March and September 2025.

The meetings followed a nominal group technique format, consisting of a virtual meeting in which each member presented their proposal and rationale, with no time limit.

The Delphi rounds ultimately resolved the disagreements (description of the process).[31]

Authorship

The consensus group defined the list of authors from the outset of the consensus process and revised it throughout the process. According to the International Committee of Medical Journal Editors (ICMJE).[32] All individuals who contribute and strictly meet each of the following criteria will be considered authors:

1. Make a substantial contribution to the conception or design of the work; or to the acquisition, analysis, or interpretation of data.
2. Write the work or critically revise it.
3. Approve the final version for publication.
4. Confirm the accuracy and completeness of each part of the work.

The acknowledgments section recognizes contributors who have not met all four criteria mentioned above.

RESULTS

The results from the research are described in the introduction, because it is the basic information regarding these statements.

DISCUSSION

This document highlights the opportunities to improve recommendations regarding of Randomized Clinical Trials on the duration of fasting, the study of changes in gastric emptying and gastric pH, and the utility of gastric ultrasound for estimating gastric contents, which are already established in specific situations using point-of-care gastric ultrasound (POCUS).[33] It also addresses indications for gastric ultrasound in patients with specific comorbidities, such as heart disease in children.

Likewise, this document emphasizes the importance of educating medical personnel who care for patients, the patients themselves, and their families and caregivers about preoperative fasting recommendations and guidelines. It also addresses the potential consequences of adhering to the recommended fasting times, including the risk of aspiration due to elevated gastric contents and the physiological effects of exceeding the recommended fasting period.

RECOMMENDATIONS

1. Current recommendations regarding fasting time should be the maximum permissible durations, avoiding any fasting exceeding six hours for solids and two hours for liquids.
2. Current recommendations are based on consensus.
3. Delaying a cardiovascular procedure, whether invasive or non-invasive, causes more harm than benefit to the patient and institution.
4. Cardiovascular procedures should only be delayed following multidisciplinary assessment of risks and benefits.
5. Fasting is not recommended before noninvasive imaging studies requiring intravenous contrast.
6. Deferrals due to food intake are not indicated for imaging studies with intravenous contrast.

7. All of the above apply to elective or non-immediate emergency procedures. Fasting does not apply to immediate emergency procedures.
8. Recommendations apply to coronary and structural interventions, as well as to electrophysiological procedures and implantation of pacemakers, defibrillators, and cardiac resynchronization therapy devices.
9. Each cardiovascular center may agree to perform procedures without prior fasting.

We recommend the following fasting indications, based on the revised guidelines and updates,[27,34] to improve the quality and safety of care for pediatric patients undergoing cardiac catheterization before elective anesthetic procedures:

1. Always avoid prolonged fasting (eliminate the «nothing after midnight» paradigm).
2. Clear liquids (water, pulp-free juice, tea, or coffee without milk or sugar): a two-hour fast is recommended. A one-hour fast before induction of general anesthesia, regional anesthesia, or sedation may be considered, based on clinical judgment in each case and the patient's comorbidities.
3. Breast milk: a three-hour fast is recommended for infants under six months and a four-hour fast for infants over six months.
4. Infant formula and cow's milk: a four-hour fast is recommended for infants under six months and a six-hour fast for infants over six months.
5. Solid foods and other non-clear liquids: a six-hour fast is recommended for light lunches (toast with jam or jelly; crackers; herbal teas with or without skim milk; juices with pulp).
6. Consider the hydration status of patients, paying special attention to those with complex congenital heart disease, decreased pulmonary blood flow in states of hyperviscosity, or univentricular physiology.
7. Implement strategies to promote the assessment of gastric contents using ultrasound techniques in patients for whom the time elapsed between their last meal and the start of sedation or anesthesia is uncertain, when delaying is not appropriate, or in those with comorbidities that compromise gastric emptying.
8. Implement proactive institutional strategies in which medical and paramedical staff ensure that children undergoing elective anesthetic procedures can consume clear liquids up to two hours beforehand, considering that in each case, this could be as little as one hour prior.
9. It is recommended to resume the intake of clear liquids as soon as the patient recovers from the anesthetic procedure or sedation, on demand, according to the patient's tolerance, provided there are no contraindications.

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