

# Gastrointestinal Monitoring: Evaluating Gastric Residuals in End-Stage Renal Disease

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## Description

The perioperative aspiration of gastric contents, although infrequent, is linked to substantial morbidity and mortality, which has garnered significant attention and concern within the field of anesthesiology. Furthermore, a recent analysis of closed claims within the American Society of Anesthesiologists Closed Claims Project revealed that aspiration of gastric contents contributed to 5% of these claims, with death directly attributable to pulmonary aspiration in 57% of cases and permanent severe injury occurring in 14% of cases. Pulmonary aspiration can lead to significant morbidity such as respiratory failure, acute lung injury, prolonged mechanical ventilation, multi-organ failure and extended hospitalization. Consequently, pulmonary aspiration represents a critical patient safety concern, underscored by its inclusion as one of the three anesthesia-related items on the World Health Organization (WHO) surgical safety checklist. The measures implemented to decrease the likelihood and severity of pulmonary aspiration encompass a range of interventions, including the use of prokinetics, antacids, rapid sequence intubation and cuffed endotracheal tubes for intubation. Nonetheless, among these approaches, the most crucial and widely practiced method involves preoperative fasting prior to anesthesia administration.

## Chronic kidney disease

Various anesthesia societies have established guidelines for preoperative fasting; however, these guidelines are primarily applicable to healthy patients undergoing elective surgeries and may not be entirely reliable for individuals with risk factors associated with delayed gastric emptying, such as diabetes, chronic liver disease, gastroesophageal reflux, or chronic kidney disease, as well as in emergency surgical scenarios. It's worth noting that there is considerable individual variability in gastric emptying times, with up to 4.5% of patients demonstrating the presence of solid or significant liquid content in the stomach despite adhering to the recommended standard fasting duration, even among those without recognized risk factors for delayed emptying. The volume of gastric content is a significant risk factor for aspiration, although the precise threshold volume that elevates this risk is subject to debate. Various methods are available to assess gastric transit time, such as paracetamol absorption, electrical impedance tomography, polyethylene glycol dilution, gastric scintigraphy and gastric content aspiration, with scintigraphy considered the gold standard technique. However, these approaches are hindered by their

time-consuming nature, high cost and requirement for specialized equipment, which limits their practicality during the perioperative period. Gastroenterologists have turned to ultrasonography of the stomach to evaluate gastric motility, assess gastric emptying, and detect gastric lesions.

## Ultrasound scans

Sequential measurement of antral cross-sectional area using serial ultrasound scans following a standard meal has been demonstrated to correlate with scintigraphy, offering a promising non-invasive method to study gastric emptying time. Ultrasound has become increasingly utilized by anesthesiologists for regional anesthesia and vascular access, with gastric ultrasound emerging as a point-of-care tool for bedside examination of stomach contents and assessment of aspiration risk. This technique is straightforward, non-invasive and easy to acquire proficiency in and rapid. The gastric antrum can be readily visualized using a low-frequency curvilinear probe, enabling not only determination of stomach contents but also quantification through appropriate validated methods. Gastric emptying is recognized to be delayed in patients with chronic renal failure, regardless of whether they are under conservative management or undergoing hemodialysis. While certain biochemical markers have been associated with delayed gastric emptying in chronic renal failure patients, there is currently no widely accepted method for identifying such patients before anesthesia. The aim of this study was to use gastric ultrasound to assess gastric contents and residual volume in end-stage renal failure patients adhering to standard fasting guidelines. With the global population aging, the incidence of Chronic Kidney Disease (CKD) has been steadily rising, surpassing a prevalence of 14%. CKD progressing to End-Stage Renal Disease (ESRD) has emerged as a significant global health concern affecting multiple organ systems. Research has indicated a 2.71 times higher risk of sudden Sensorineural Hearing Loss (SNHL) in individuals with kidney disease compared to those without. Furthermore, studies have demonstrated that as renal function declines, the risk of Hearing Loss (HL) in CKD patient's increases, with a higher prevalence of HL in this population than in the general public. Various factors contribute to hearing dysfunction in CKD patients, and cochlear dysfunction appears to be a likely cause of SNHL in this group. Additionally, some studies suggest that with improved kidney function, HL can be mitigated or even resolved completely. However, the direct relationship between SNHL and CKD remains unclear.