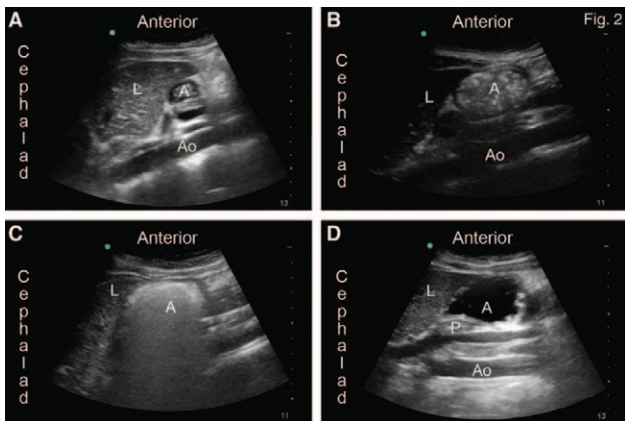


## Images in Anesthesiology: Gastric Ultrasound

Kariem El-Boghdadly, M.B.B.S., B.Sc., F.R.C.A., Richelle Kruisselbrink, M.D., F.R.C.P.C., Vincent W. S. Chan, M.D., F.R.C.P.C., F.R.C.A., Anahi Perlas, M.D., F.R.C.P.C.



**B**EDSIDE ultrasound is a simple tool for assessing the nature and volume of gastric content and thus the aspiration risk.<sup>1,2</sup> Objective findings can change anesthetic management in patients who are noncompliant with fasting instructions, are undergoing emergency surgery, or have delayed gastric emptying.<sup>3</sup> The gastric antrum (A) can be consistently imaged in the epigastric sagittal plane (figs. 1 and 2), inferior to the liver (L) and anterior to the aorta (Ao) and pancreas (P). A curved-array 2- to 5-MHz transducer is suitable for patients who weigh more than 40 kg, and the right lateral decubitus (RLD) position provides the most accurate assessment of gastric content. When lateral positioning is not suitable, imaging supine can detect a distended stomach, but a negative result cannot exclude a full stomach. The antrum has characteristic appearances depending on its content.

1. *Empty*: collapsed, flat with thick multilayered wall (fig. 2A). An “empty” antrum in RLD position consistently rules out a full stomach.
2. *Thick fluid or solid food*: hyperechoic, heterogeneous (fig. 2B) with visible peristalsis. Immediately after ingestion, gastric air may generate a “frosted glass” pattern obscuring deeper structure visualization (fig. 2C).
3. *Clear fluid*: distended with thin walls. Air bubbles appear as hyperechoic “dots” inside the hypoechoic fluid-filled lumen (fig. 2D). When clear fluid is present, the volume can be measured (based on antral cross-section), differentiating negligible volumes consistent with baseline gastric secretions (less than 1.5 ml/kg) from higher volumes that may increase aspiration risk.<sup>2</sup>

Bedside gastric ultrasound takes less than 5 min to perform and is feasible in pregnant, obese, and pediatric patients. The results may be difficult to interpret in patients with large hiatus hernias, with previous partial gastrectomy, or who cannot lie in the RLD position.

### Competing Interests

The authors declare no competing interests.

### Correspondence

Address correspondence to Dr. El-Boghdadly: elboghdadly@gmail.com

### References

1. Van De Putte P, Perlas A: Ultrasound assessment of gastric content and volume. *Br J Anaesth* 2014; 113:12–22
2. Perlas A, Mitsakakis N, Liu L, Cino M, Haldipur N, Davis L, Cubillos J, Chan V: Validation of a mathematical model for ultrasound assessment of gastric volume by gastroscopic examination. *Anesth Analg* 2013; 116:357–63
3. Alakkad H, Kruisselbrink R, Chin KJ, Niazi AU, Abbas S, Chan VW, Perlas A: Point-of-care ultrasound defines gastric content and changes the anesthetic management of elective surgical patients who have not followed fasting instructions: A prospective case series. *Can J Anaesth* 2015; 62:1188–95

From the Department of Anesthesia and Pain Medicine, Toronto Western Hospital, University Health Network, University of Toronto, Toronto, Ontario, Canada.

Copyright © 2016, the American Society of Anesthesiologists, Inc. Wolters Kluwer Health, Inc. All Rights Reserved. *Anesthesiology* 2016; 125:595