**NPO Status and Aspiration**

Pulmonary aspiration of gastric contents is a feared but largely preventable complication of anesthesia. In a recent closed claims analysis in Great Britain, it accounted for 3% of all claims and 1/6 of airway-related claims. Half of these aspiration-related claims involved emergency surgery. For non-emergent surgeries, patients are asked to fast in order to allow for sufficient gastric emptying time to prevent aspiration. The 2011 evidence-based ASA guidelines for fasting time are as follows:

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| **ASA fasting guidelines** |
| **Ingested material** | **Minimum fasta** |
| Clear liquidsb | 2 hours |
| Breast milk | 4 hours |
| Infant formula | 6 hours |
| Non-human milk | 6 hours |
| Light mealc | 6 hours |
| **a** Fasting times apply to all ages and are intended for healthy patients undergoing elective procedures. They are not intended for women in labor.**b** Examples: water, fruit juice without pulp, carbonated beverages, clear tea, black coffee.**c** Example: dry toast and clear liquid. Fried or fatty foods may prolong gastric emptying time. Both amount and type of food must be considered.No routine use of gastrointestinal stimulants, gastric acid secretion blockers or oral antacids. |

Three components of gastric contents can potentially cause problems when aspirated into the lungs: particles (causing airway obstruction), acid (causing chemical burns and inflammation), and bacteria (causing pneumonia). A good mnemonic to keep in mind is that **25 mL** of a **pH 2.5** solution is required to cause a clinically significant aspiration pneumonitis (although there is evidence that smaller volumes of less acidic solutions are not without risk).

For patients at higher risk of aspiration (for example, trauma patients, parturients, or those with severe GERD), rapid-sequence induction with cricoid pressure is often used to decrease the risk of aspiration. The classical method of RSI involves only two drugs, the induction agent and neuromuscular blocker; note the absence of benzodiazepine or opioid premedication. RSI may be modified in several ways, including the use of positive pressure ventilation. Traditionally RSI has been performed without bag-mask ventilation to decrease the risk of gastric insufflation. However, when inspiratory pressures are kept below 15-20 cm H2O, gastric distention does not typically occur. Especially with patients who are prone to desaturation when apneic (pregnant, obese, pediatric, or critically ill patients), one must consider the risks and benefits of using positive pressure ventilation during RSI. Cricoid pressure remains the standard of care but is currently a subject of significant controversy. An observational study of 32 providers in 2010 found that as many as 10 different techniques were used, and 25% of these providers actually compressed the thyroid cartilage or the sternocleidomastoid rather than the cricoid, rendering the technique ineffective at best and dangerous at worst. When improperly used, cricoid pressure can cause airway compression and difficulty with intubation, and it does not consistently occlude the esophagus even when properly used. While it is intended to reduce the risk of aspiration, it is actually associated with a decrease in the lower esophageal sphincter tone, which may defeat the purpose of its usage. As it remains the standard of care for RSI, a reasonable approach would be to start induction with properly applied cricoid pressure (10 N or 1 Kg with the patient awake followed by 30 N or 3 Kg with the patient anesthetized) but have a low threshold to discontinue it if intubation is difficult.

**Board Review Questions**

1. Nonparticulate antacid administration:
	1. Should be given 3 hours before surgery
	2. Decreases gastric volume
	3. May lead to pulmonary distress if aspiration occurs
	4. Has a lag time of 1 hour for effectiveness
	5. Is aimed at raising the pH to at least 2.5

Answer: E. The aim of antacid administration is to raise the pH. It should be given 15 to 30 minutes before surgery. Antacids will not decrease gastric volume but may actually increase it. Nonparticulate antacids should not cause any problem if aspirated. There is no lag time.

Source: Appleton & Lange, *The MGH Board Review of Anesthesiology*, 5th ed., 1999.

1. A child requires an emergent exploratory laparotomy for abdominal trauma due to a motor vehicle collision. He had eaten 2 hours before his accident. He should:
	1. Always have a rapid sequence induction with propofol and succinylcholine
	2. Have a nasogastric tube passed to remove gastric contents before induction
	3. Not be operated on for 6 hours
	4. Have vomiting induced
	5. Be allowed to awaken with the endotracheal tube in place at the end of the procedure

Answer: E. The child should have an induction that is most appropriate for his clinical condition. If there has been a large amount of blood lost, a rapid sequence induction with propofol and succinylcholine may not be appropriate. Passing a nasogastric tube may not remove all of the stomach contents. The procedure should not be delayed to allow the stomach to empty. Once the injury has occurred, the stomach emptying probably stops, and the contents will still be there 6 hours later. The child should be allowed to awaken with the endotracheal tube in place and be extubated once protective reflexes are intact.

Source: Adapted from Appleton & Lange, *The MGH Board Review of Anesthesiology*, 5th ed., 1999.

**References**

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