



Anaesthesiology

A PROSPECTIVE INTERVENTIONAL COMPARATIVE STUDY OF GASTRIC VOLUME 2 HOURS AFTER GIVING 250ml OF CLEAR LIQUID WITH ULTRASOUND AND CONFIRMATION WITH GASTROSCOPY

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KEYWORDS :

Pulmonary aspiration of gastric contents during anesthesia is a rare event, but one with significant morbidity and mortality¹. Fasting guidelines are based on gastric physiology and expert opinion, as there is limited evidence that these improve outcomes². Because worse outcomes may be associated with aspiration of particulate matter, acidic contents, and of large volumes of gastric contents, guidelines aim to eliminate particulate matter and decrease the volume and acidity of gastric contents at the time of induction of anesthesia.

Pre anesthesia fasting guidelines apply to patients having elective surgery and are intended for procedures performed under general anesthesia, regional anesthesia, and monitored anesthesia care. Aspiration may occur during all types of anesthesia in non-fasted patients, because anesthetic and sedative medications reduce or eliminate airway protective reflexes that normally prevent aspiration of gastric contents from entering the lungs. Recommendations are that oral intake of liquids and solids be restricted for varying times prior to anesthesia aim to minimize gastric volume at the time of surgery³. Various types of material empty from the stomach at different rates. While experts believe that restricting oral intake will decrease aspiration, gastric volume is a surrogate endpoint used in clinical studies because the incidence of aspiration is low⁴.

AIMS AND OBJECTIVE

The aim was to assess the gastric volume after 2hrs after ingestion of 250ml of clear liquid using ultrasound and confirmation with gastroscopy.

Main objective is to measure accurate residual gastric volume with in fasting patients who were allowed clear liquids up to 2hrs before the procedure.

2. To know how ultrasound helps in assessing gastric volume, ease of technique and its reproducibility and reliability in clinical practice by supporting its accuracy with gastroscopy.

MATERIALS AND METHODS

After obtaining approval from hospital scientific and ethics committee and written informed consent of 90 patients will be enrolled in this study.

The study population includes patients of either sex, ASA grade I-II, in age group between 18-60 years and BMI less than 30kg/m².

Inclusion criteria:

- Patients of either sex.
- Age between 18-60 years.
- Patients with ASA grade I, II.
- Patients with BMI (body mass index) under 30kg/m².
- Ability to understand the protocol.

Exclusion criteria:

- Unwilling patients.
- Any condition that might interfere with gastric emptying time such as pregnancy, diabetes, or presence of gastrointestinal disease.

DATA COLLECTION TOOLS

The volunteers underwent abdominal ultrasound for quantitative and qualitative analysis of gastric contents. The measurement time was 2h after ingesting 250ml of clear liquid. All clear liquids were the same and contained carbohydrates (6g), sodium (5 mg), magnesium (6 mg), potassium (8mg), flavoring and, calorie content of 24 kcal per 100ml. There was no restriction on ambulation after ingestion of solutions. The ultrasound assessment of gastric content and volume was made by a professional of the Department of Radiology of the institution. Tests were performed by using a convex probe (2- 5 MHz). This was done in supine and right lateral decubitus positions for qualitative assessment. Based on which they were graded. Then volunteers were positioned in right lateral decubitus position for 5mins and then ultrasound examination was done to get frozen cross-sectional and longitudinal images of gastric antrum. Always we examined the gastric body and fundus to assure that all liquid content had flowed into the antral area. Right lateral decubitus position was selected because it has greater sensitivity to small amounts of fluid compared with supine examinations, as fluid and semi-fluid gastric content moves towards the more dependent antrum. Additionally, in the right lateral position, air content is displaced away from the antrum towards the more proximal body and fundus. This optimizes scanning conditions by limiting sound attenuation due to intra luminal air. The gastric antrum is the area of choice to evaluate gastric residue and emptying time. The gastric residual volume was calculated using the formula Longitudinal diameter X Transverse diameter X Anteroposterior diameter X 0.52

The volunteers were then taken to the gastroscopy room, asked to lie in left lateral decubitus position on the table. Topical local anesthetic is applied to the oropharyngeal cavity and the gastroscopy probe is passed through the esophagus, lower esophageal sphincter, body, fundus, antrum, pylorus of stomach is visualised. A suction catheter is passed through the suction port which is connected outside to the collecting trap bottle with markings. As the gastroscopy is passed thorough the stomach, fluid is flowed to the most dependent position in the gastric antrum/ pylorus in the left lateral decubitus position. With the help of suction, entire gastric volume is collected into collecting trap bottle which has a capacity of 100 ml.

The gastric volume can be assessed qualitatively by visual appearance. A simple 3-point grading system is found to correlate well with the total volume as follows:

- Grade 0: Empty antrum in both supine and RLD positions, suggesting an empty stomach
- Grade 1: Presence of liquid apparent only in RLD, suggesting small amount of fluid in stomach
- Grade 2: Presence of liquid contents in both supine and RLD positions, suggesting presence of increased gastric volume

	Mean Standard deviation
Age(years)	37.8444 10.73
Weight(kg)	68.169.34
Height(m)	163.088.87
BMI(kg/m ²)	25.572.35
Female	15.78 3.07

Male	17.35 3.91					
		Grade 0	Grade 1	Grade 2	Total	P value
Age in years	18-30	10	18	1	27	0.6010
	31-40	13	12	1	26	
	41-50	9	11	3	23	
	51-60	7	5	2	14	
	Total	39	44	7	90	
Gender	male	22	26	4	52	0.8939
	female	17	19	2	38	

From the above tables, it is concluded that the age ,gender of the patients is not showing any significant difference on total Gastric volume at 5% level of significance with ultrasound.

	Mean	N	Standard. Deviation	Standard. Error Mean
Fasting+2hours after taking 250ml of clear liquid ultrasound findings (total volume)	10.02	90	5.403	.570
Fasting+2hours 250ml of Gastroscopy volume) after taking clear liquid findings(total	16.69	90	3.643	.384

From the above tables, total residual gastric volume of the patients at 5% level of significance is 10ml with ultrasound and 16ml with gastroscopy which shows no significant difference $p > 0.05$ in gastric residual volume when ultrasound is compared with gastroscopy

DISCUSSION

In our study of 90 fasted patients undergoing gastrointestinal endoscopy, average amount of gastric residual volume was 10 ml in ultrasound and 16 ml in gastroscopy. There was no significant difference ($p > 0.05$) observed in residual gastric volume between ultrasound and gastroscopy. We also did not observe statistically significant associations between high-risk residual gastric content and other demographic and clinical factors.

Among all the patients no one has residual gastric volume of more than 1.5 ml/kg which is considered as critical volume for aspiration. We have taken the subjects with age group of 18-60 years, among them there is no significant difference in gastric residual volume based on age . There is no significant difference in gastric residual volume based on gender.

SUMMARY AND CONCLUSION

Based on our study aspiration under direct vision provides a more accurate assessment of gastric volume in the adult population. Imaging techniques such as ultrasound, magnetic resonance imaging and scinti scanning have been used in other studies for accurate measurement of gastric volume. ultrasound is a novel point of care technique, easy to use and no discomfort or side effects to the patient in evaluating the gastric residual volume. Ultrasound though it has a limitation of operator dependency and pH of gastric content cannot be evaluated, it is highly reproducible and helps in decision making in emergency conditions.

Allowing the patient to take clear liquids up to 2 hrs before procedure increases patients comfort without increase in gastric volume compared to prolonged fasting. In our study even 1hr after taking clear liquids also no patient has gastric volume more than 1.5 ml/kg, though there is increase in number of subjects with grade-2 category based on qualitative assessment.

But the present study was conducted with healthy volunteers after taking fixed amount of clear liquid (250 ml) and energy of 60 kcal. So, these results cannot be extrapolated to other subjects with chronic diseases which effect gastric emptying, and those who were taking medications which alter gastric emptying, those taken high energy liquids and large quantities.

we here by conclude that allowing healthy patients to take clear liquids up to 2 hours before procedure have almost same gastric residual volume as prolonged fasting, when assessed with ultrasound as well as gastroscopy. As there is no significant difference in gastric volume when measured with ultrasound and with gastroscopy. we conclude

that ultrasound can be used for accurate measurement of gastric residual volume. In addition as reported in previous studies ultrasound has benefits of bedside technique, easy availability, non invasive and helps even in emergency situations in decision making about risk of aspiration during induction and intubation5. These healthy volunteers have gastric residual volume of less than 1.5ml/hr after 2hour after taking 250 ml of clear liquid.

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