



Feasibility study of shortening the no drinking time before gastroscopy to two hours

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Background: Procedural sedation is widely performed in patients who underwent endoscopy. In order to prevent aspiration pneumonia, which is a potentially life-threatening complication of sedation, patients are required to fast for more than eight hours before gastroscopy, but long-term fasting can make patients feel thirsty and irritable, which means eight-hour fasting may be unnecessary.

Methods: A total of 180 volunteers in Hospital from March 2019 to May 2019 were enrolled in the study. All volunteers who were indicated fast eight hours before the experiment were randomly divided into observation group A, observation group B and control group C, group A drank 500 mL of water and group B drank 500 mL of water two hours before gastroscopy, group C do not drink any water before gastroscopy. For the observation group, the gastric volume was estimated by abdominal color Doppler ultrasound every 15 minutes after the participants drank water. The remaining liquid was removed by taking gastroscopy after showing stomach was empty. Finally, the amount of residual liquid, completion rate, and incidence of aspiration were compared across the three groups in 2 hours after drinking.

Results: All three groups completed the examination, and no cases of aspiration occurred during the examination. The emptying time of observation group A ranged from 15–75 minutes, the average emptying time was 39.81 minutes, the volume of residual liquid ranged from 5–50 mL, and the average volume was 20.38 mL. The emptying time of observation group B ranged from 15–75 minutes, the average emptying time was 40.38 minutes, the volume of residual liquid ranged from 10–60 mL, and the average volume was 24.81 mL. The residual volume of liquid for control group C ranged from 0–60 mL, with an average of 25.95 mL. According to the statistical analysis, the difference was not statistically significant ($P>0.05$).

Conclusions: Less than 1,000 mL of water can be emptied within 75 minutes in volunteers without an emptying disorder. It is safe and feasible to shorten the no drinking time before gastroscopy to 2 hours using intravenous sedation.

Keywords: Gastroscopy; fasting time; gastric emptying time

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Introduction

Gastroscopy is a useful and reliable method for detecting and diagnosing diseases and plays a crucial role in selecting clinical

treatments. Patients usually feel uncomfortable during the examination, thus, intravenous sedation has been introduced to reduce patient anxiety during endoscopy (1). Among

Table 1 General information on the volunteers

Groups	Sex (males/females)	Age	Weight (kg)	BMI (kg/m ²)
A ($\bar{x}\pm s$)	26/34	35.6 \pm 14.2	59.4 \pm 7.3	21.9 \pm 5.3
B ($\bar{x}\pm s$)	28/32	37.1 \pm 15.6	60.1 \pm 8.7	22.2 \pm 4.9
C ($\bar{x}\pm s$)	31/29	34.6 \pm 17.4	60.6 \pm 8.1	21.38 \pm 5.0

them, propofol sedation is applied for almost all complex endoscopic procedures and the majority of diagnostic upper and lower gastrointestinal endoscopies.

Although sedation improves the quality of the procedure and the patient reports better satisfaction, there are some potential risks, such as aspiration pneumonitis (2). To prevent aspiration pneumonia, patients are required to fast for a long time. But long-term fasting can cause thirst, anxiety, dehydration, hypoglycaemia, it may also increase the risk of postoperative nausea and vomiting (3,4). Moreover, large procedural sedation series (including one with 139,142 sedation events) have failed to identify any relationship between fasting and aspiration or other adverse events (5-7).

Before operating, no fluids or solid foods can patients take in a long time as the ASA guidelines suggests. That is because the stomach must be empty while operating. The guidelines point out that they should fast at least 2 hours after drinking water and 6 hours after having light meals before sedation. We need to consider the possibility of pulmonary aspiration of gastric contents when finding impaired gastric emptying or other emergency (I) ideal sedation level, (II) determination on delaying the procedure (III) determination on requiring endotracheal intubation to protect the airway (8).

There is no practice standard for pre-procedural fasting that has been universally accepted. The aim of this study is to explore how much water could we intake and feasibility of shortening the no drinking time before gastroscopy to two hours under procedural sedation. These data may contribute to a realistic judgement of relevant sedation associated complications during gastrointestinal endoscopy in clinical practice. We present the following article in accordance with the CONSORT reporting checklist (available at <http://dx.doi.org/10.21037/dmr-20-64>).

Methods

Materials

A total of 180 healthy volunteers participated in this experiment, gastroscopy was performed in The Seventh

Affiliated Hospital, Sun Yat-sen University. The inclusion criteria were as follows: 18–69 years, without serious heart and lung diseases, ASA I-II. The exclusion criteria were as follows: patients with a history of abdominal surgery, obesity, suspected gastroesophageal reflux, pyloric obstruction, or intestinal obstruction and those who received medications that had effects on gastric secretion and empty within 24 hours prior to the experiment. The volunteers included 85 males and 95 females aged from 22 to 65 (*Table 1*).

Study methods

The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the ethics committee of the Seventh Affiliated Hospital of Sun Yat-sen University (No.: KY-2021-024-01). Informed consent was signed before 180 volunteers were examined. All member in three groups were fast for more than eight hours before the experiment. Members in group A drank 500 mL of water within 5 minutes, group B drank the maximum amount of water within 5 minutes, which was at least 500 mL. Group C, the control group, was not allowed to drink liquid for more than 8 hours. Abdominal doppler ultrasound (Aloka SSD 1700) was performed to measure the intragastric fluid volume every 15 minutes in groups A and B. Gastric emptying time was measured indirectly using two-dimensional ultrasound to measure the antral cross-sectional area (CSA), anteroposterior diameter (AP), gastric antrum left and right diameter (LL). Gastric antrum volume = AP+1/2 LL, until the antrum can be seen clearly under ultrasound. Gastroscopy (PENTAX, EG-29) was used to absorb the residual gastric liquid, which was measured by a test mixer. All gastroscopy is anesthetized with propofol. The completion rate and the incidence of aspiration were compared between the observation group and control group.

Statistical analysis

SPSS17.0 (SPSS, Chicago, Illinois, USA) was used to

analyze the data, and ANOVA statistical method was performed. The measurement data are summarized as the $\bar{x} \pm s$, and the enumeration data are summarized as the %. According to the χ^2 test, $P < 0.05$ was considered statistically significant.

Results

General information

There were no statistically significant differences in sex, age, weight or BMI in across the three groups ($P > 0.05$).

The comparison of the effects of drinking different amounts of water

All members in group A drank 500 mL within 5 minutes; the emptying time ranged from 15–75 minutes, the average time was 39.81 minutes, the residual volume measured by gastroscopy ranged from 5–50 mL, and the average volume was 20.38 mL. In addition, group B drank 550–1,000 mL of water within 5 minutes; the average

volume was 787.31 ± 166.82 mL, the emptying time ranged from 15–75 minutes, the average emptying time was 40.38 minutes, the residual volume measured by gastroscopy ranged from 10–60 mL, and the average volume was 24.81 mL. The residual volume in control group C ranged from 0–60 mL, with an average of 25.95 mL (Tables 2–4). All volunteers in the three groups completed the experiments without aspiration, and the difference was not statistically significant ($P > 0.05$).

Discussion

Pulmonary aspiration is a rare but potentially life-threatening complication of sedation, avoidance of which is the goal of preprocedural fasting guidelines. Fluid fasting policy advanced from the 1960s’ ‘nil by mouth’ dogma to more permissive international guidelines. In the advanced guidelines, adults are advised that in the 2 hours before operating, no fluid can be taken while for children, an hour is enough (9,10). This advice aims to recognize solids and liquids in gastric emptying.

Refraining from drinking liquid for a long time is not beneficial, and it is currently not guaranteed to be harmless. A survey from UK practice revealed that the comfort of patients undergoing general anaesthesia can be obviously decreased when starving for over 6 h, and over 2 h fluid fasting; 68% (131/193) of endoscopy departments perhaps enhances the discomfortable feeling significantly by excessive hunger; 68% (131/193) of units forbids patients to have clear fluid within 2 h of gastroscopy for the risk of significant aspiration in patients increases if he having fluids over 2 h who are now undergoing general anaesthesia (11). However, ignorance or unenforced with no problems recorded on preprocedural fasting take place in numerous sedation settings, including dentistry, therapeutic abortions, cardiac catheterization, echocardiography, and cataract surgery.

The aim of this clinical experiment was to explore the feasibility of shortening the no drinking time before gastroscopy to 2 hours. In our study, both the volunteers

Table 2 Comparison of the residual gastric fluid across the three groups

Groups	A	B	C
Residual gastric fluid (mL)	20.38±13.34	24.81±10.63	25.95±11.14
P		0.226	

Table 3 Comparison of completion rate and aspiration rate across the three groups

Groups	A	B	C
Completion rate (%)	100	100	100
Aspiration rate (%)	0	0	0
P		1	

Table 4 Comparison of gastric emptying time and residual gastric fluid volume between groups A and B

Groups	Average water intake (mL)	Residual gastric fluid (mL)	Emptying time (min)
A	500	20.38±13.34	39.81±14.66
B	787.31±166.82	24.81±10.63	40.38±11.83
P	0.000	0.181	0.877

who drank 500 mL of water and those who drank the average amount of water 787 mL had emptied stomachs within 75 minutes, and there was no significant difference in the amount of residual liquid in the stomach between these volunteers and the control group (Table 4), who were not allowed to drink liquid for 8 hours. This experiment fully confirms that there is no correlation between fasting and the gastric fluid volume when the gastric emptying time is exceeded.

Before the concept of ERAS (enhanced recovery after surgery) was introduced to China, all patients undergoing gastrointestinal tract surgeries had to fast for more than 8 hours. Currently, ERAS has been implemented in China for more than 10 years. The clinical research and application results show that drinking 800 mL of clear water in 10 hours or 400 mL in 2 hours before surgery can reduce patient's levels of thirst, hunger, annoyance or reduce insulin resistance after surgery, without increasing the risk of reflux and aspiration under anesthesia (12). For gastrointestinal tract surgeries, patients are allowed to drink 400 mL of clear water before surgery, and the effect of gastroscopy on the human body is lower than that of surgery, so it is safe to intake a certain amount of water before gastroscopy. In our study, all volunteers who consumed 500–1,000 mL water could empty their stomach within 75 minutes, and there was no significant difference between these volunteers and those who could not drink liquid for 8 hours. The evidence shows that if the amount water intake does not exceed 1,000 mL, the gastric emptying effect is equivalent. In our trial, all volunteers completed the gastroscopy examination, and no reflux or aspiration events occurred, which further confirms the safety of not drinking 2 hours before gastroscopy.

In addition, in our study, there was no significant difference in the gastric emptying time or volume of residual gastric fluid in volunteers who drank 500 mL of water and 787.31±166.82 mL of water, which is a confusing result. We speculate that the emptying speed in gastric tissue varies according to the volume, leading to this result. The specific cause of this phenomenon needs to be confirmed by additional experiments.

In summary, if an individual does not have abnormal gastric movements and does not drink more than 1,000 mL of water, it is safe for them to stop drinking liquid 2 hours before a gastroscopy examination. Stopping drinking more than 2 hours before the test is not necessary and increases the risk of stress responses such as thirst, anxiety, and irritability.

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Footnote

Reporting Checklist: The authors have completed the CONSORT reporting checklist. Available at <http://dx.doi.org/10.21037/dmr-20-64>

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Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the ethics committee of the Seventh Affiliated Hospital of Sun Yat-sen University (No.: KY-2021-024-01). Informed consent was obtained from the patient for publication of this study and any accompanying images.

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