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Comparing The Effect Of Preoperative Oral Ingestion Of Clear Fluids At 2 Hours And 6 Hours Prior To Elective Cardiac Surgeries, On Gastric Volume And Ph, Aiming At Early Extubation

Dr. Gayatri Jain[1], Dr. Riis Dcruz[2], Dr. Vishwas Sathe[3], Dr. Nikita Ranjan[4],
[1]Senior Resident, [2]Junior Resident, [3]Professor, [4]Assistant Professor,
Department of Anesthesiology, MGM Medical College and Hospital, Navi Mumbai

***Corresponding Author:**
Dr. Gayatri Jain
Senior Resident, Department of Anesthesiology, MGM Medical College and Hospital, Navi Mumbai

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Abstract

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Introduction

Preoperative fasting(POF) is defined as an act of willing abstinence or reduction from certain or all foods, drinks or both, for a certain duration of time before surgery.1 Preoperative fasting (POF) is a time-tested professional practice that is undertaken for physiological and precautionary benefits to the patients globally. Patients are deprived of certain and/or all foods and drinks for specific duration before surgery.1 For clinical purposes, POF is abstinence from all foods and liquids for a specified period of time before induction of anesthesia and/or commencement of surgery. The duration for POF is dictated by the type of diet, patient condition and the kind of surgery whether emergency or elective among other factors. Some diets regardless of their texture (solids or fluids) are easily digestible, thus allowing for rapid elimination from the stomach, while others are slow release type stagnating in the gastrointestinal tract.2 The POF provides an empty or near empty stomach, a critical requirement for emergency and elective surgical interventions.3 The POF intervention ensures physiological stability, reduction of complications, hospital stay and costs.4 The practice is structured to include well-planned and packaged health information on the goal and expectations for the patient thus promoting compliance and allaying anxiety.

The main aim of fasting prior to anaesthesia or surgery is to empty the stomach to prevent aspiration. 2 Although the stomach is never empty and dry of any secretions, fasting is important in order to reduce the gastric contents during anaesthesia and the entire process of surgery. 2 The preoperative fasting practices focus on preventing aspiration which may arise due to presence of gastric contents thus causing fatal outcomes during induction of anaesthesia or surgery.

Preoperative fasting guidelines on what fluids and meals should be taken and within what period of time before surgery or anaesthesia were published by the American Society of Anaesthesiologists (ASA) in 1999.

According to newer studies allowing patients to have clear fluids 2 hours prior to surgery have less thirst, less anxiety and have improved patient satisfaction without any increase in risk of pulmonary aspiration. These practices have been described by the ASA since 1999.

One barrier to allowing patients to ingest food or water/tea/coffee before surgery has been the fear of pulmonary aspiration. The major concern is that oral ingestion will increase the gastric residual volume and decrease gastric pH, causing higher risks of aspiration pneumonitis. However, many reports have shown that ingestion of clear fluids 2 hours before

surgery lead to decreased gastric residual volumes and increased gastric pH levels compared to longer fasts. In multiple trials there was no occurrence of pulmonary complications.

Recent studies have also shown that fasting during the preoperative period for elective surgery induces a metabolic state that seems unfavorable for patients.

Overnight fasting tends to induce insulin resistance. Insulin resistance is characterized by high glucose levels despite the presence of an adequate insulin concentration. Development of post-operative insulin resistance tends to increase hospital stay and delays recovery.6 Thus preoperative oral carbohydrate consumption also reduces development of insulin resistance by approximately 50% on the day after surgery.

Aims And Objectives:

To compare and assess the influence of oral ingestion of 200ml of oral rehydration solution containing 13.50g of carbohydrates on the residual gastric volume and gastric pH 2 hours and 6 hours prior to surgery in two groups of patients undergoing elective cardiac surgeries aiming at early extubation.

1. Residual gastric volume after 2 hours of fasting
2. pH of gastric contents after 2 hours of fasting
3. Residual gastric volume after 6 hours of fasting
4. pH of gastric contents after 6 hours of fasting
5. Extubated after how many hours of induction of anaesthesia in both groups

Materials And Methods:

Source Of Data

a) Study Site: MGM Medical College, Kamothe, Navi Mumbai

b) Study Duration: January 2019 to July 2020

c) Study Design: Prospective randomized comparative study

d) Sample Size: 60 patients were included in this study

Methods Of Collection Of Data

Sampling method:

After obtaining informed written consent from patients, patients were randomly divided into 2 groups one day prior to surgery. Sequentially, numbered sealed opaque envelopes were used for allocation concealment.

Group A: 30 patients: Received 200ml of ORS 2 hours prior to Surgery Group B: 30 patients: Received 200ml of ORS 6 hours prior to Surgery

Inclusion Criteria

1. Age : 18 years to 70 years
2. ASA grade I and II patients
3. Patients who have signed the informed written consent
4. Elective cardiac surgery (Coronary artery bypass, off pump coronary artery bypass, isolated aortic valve replacement or combined AVR with coronary artery bypass graft, mitral valve replacement)
5. Either Sex

Exclusion Criteria

1. Patient refusal
2. Emergency surgery
3. Any oral cavity or nasal lesion
4. Respiratory disease
5. Pregnant and lactating women
6. Patients with GERD , gastric or duodenal ulcers, delayed gastric emptying
7. Women on oral contraceptive pills
8. Patients with poor left ventricular function (LVEF <35%)
9. Failure to intubate after 3 attempts
10. Patients who did not receive pre medications

Method Of Study

Approval of the Ethics committee was taken before starting the study

Informed consent was obtained for both laryngoscopy and insertion of a Ryle's tube which was required to aspirate the gastric contents for analysis of volume and pH. All intubations and Ryle's tube insertions were performed by a senior anaesthetist who was blind to the allocation of patients into groups.

A detailed pre anaesthetic check-up of all the patients is mandatory which included airway assessment, clinical history, general and systemic examination,

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routine biochemical investigations, chest X-ray, echocardiography and coronary angiography.

One group was given 200ml of ORS 6 hours prior to surgery and the other group was given 200ml of ORS 2 hours prior to surgery. Tablet Alprazolam 0.25mg was given to patients one day prior to surgery. After securing a wide bore IV cannula (16G) for induction of anaesthesia and attaching monitors for continuous SpO2, ECG, Capnography monitoring patient was pre medicated with Inj.Midazolam 0.05mg/kg and Inj.Fentanyl 2mcg/kg 5mins prior to induction. The next step involved securing an Arterial line (radial/femoral) followed by a Central line (Right Internal jugular vein) mainly done for intra operative Invasive Blood Pressure a.k.a. IBP monitoring and Arterial Blood Gas (ABG) analysis.

After the lines were in situ antibiotic was administered as per policy and the time of administration was noted.

Patient was then induced with Inj.Etomidate (0.3mg/kg) + IV Inj.Fentanyl + Inj.Midazolam in titrating doses. Once the patient was completely unconscious which was confirmed by checking the eye lash reflex and the patient ceased to breathe, we checked if were able to ventilate the patient using bag and mask. The baseline Train of Four count was then recorded. If we are able to ventilate the patient using bag and mask i.e., we witness chest rise, a neuromuscular blocker is given IV preferably Inj.Rocuronium (0.6mg/kg) and patient is pre oxygenated for one minute. After this, we inserted a Ryle's Tube under all aseptic conditions and after confirming TOF count below 2, direct visual laryngoscopy was done and the patient was intubated using an endotracheal tube after visualizing the vocal cords under direct vision.

After confirming the placement of the ET tube in the trachea, the cuff was inflated and the tube was secured. After this, we aspirated the gastric contents which were then sent for analysis to the laboratory.

Results

Table no 1: Mean Age amongst study population.

	Groups				P value
	ORS 200ml 2 HOURS		ORS 200ml 6 HOURS		
Age in years	57.2	8.4	54.2	10.5	0.233

As seen in the above table, there was no statistically significant difference in mean age in both the groups.

Figure no 1: Mean Age amongst study population.

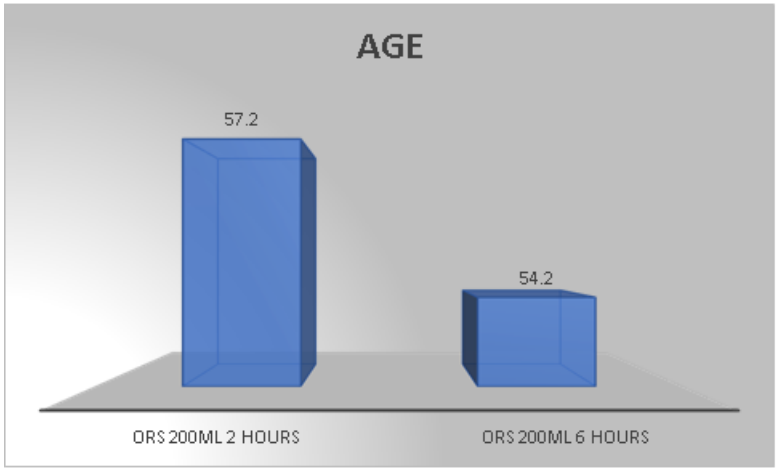

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Table no 2: Sex distribution amongst study population

			Groups		Total
			ORS 200ml 2 HOURS	ORS 200ml 6 HOURS	
Sex	Female	Count	9	8	17
		%	30.0%	26.7%	28.3%
	Male	Count	21	22	43
		%	70.0%	73.3%	71.7%
Total		Count	30	30	60
		%	100.0%	100.0%	100.0%

Chi square test, P value – 0.77

As seen in the above table, it was observed that most of the study population were male (71.7%) as compared to female (28.3 %) and the difference was statistically insignificant.

Figure no 2: Sex distribution amongst study population

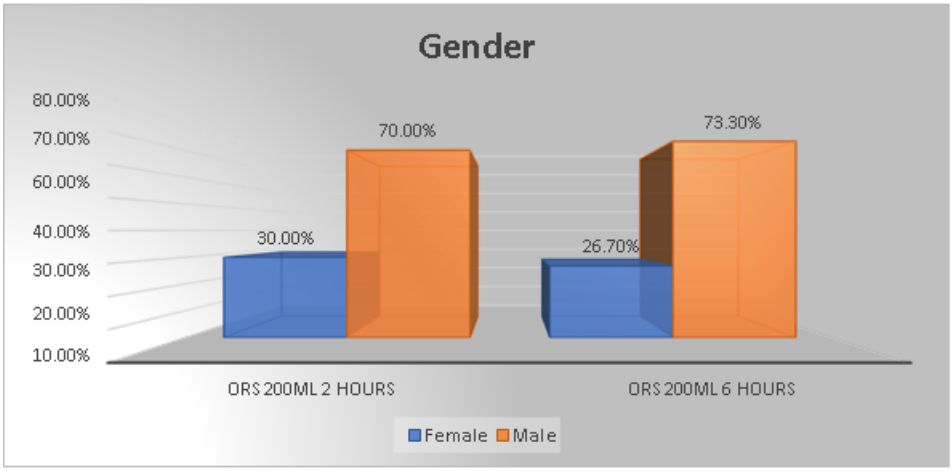

Table no 3: Diagnosis amongst study population

			Groups		Total
			ORS 200ml 2 HOURS	ORS 200ml 6 HOURS	
Diagnosis	RESTENOSIS OF	Count	1	0	1

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	RCX + MVCAD	%	3.3%	0.0%	1.7%
	AR	Count	1	0	1
		%	3.3%	0.0%	1.7%
	AR + AS	Count	1	2	3
		%	3.3%	6.7%	5.0%
	AR + MS	Count	1	0	1
		%	3.3%	0.0%	1.7%
	AS + AR	Count	1	0	1
		%	3.3%	0.0%	1.7%
	DVCAD	Count	7	7	14
		%	23.3%	23.3%	23.3%
	LMCAD + MVCAD	Count	2	3	5
		%	6.7%	10.0%	8.3%
	MS	Count	0	4	4
		%	0.0%	13.3%	6.7%
	MS + AR	Count	0	1	1
		%	0.0%	3.3%	1.7%
	MS + MR	Count	1	0	1
		%	3.3%	0.0%	1.7%
	MVCA	Count	1	0	1
		%	3.3%	0.0%	1.7%
	MVCAD	Count	13	13	26
		%	43.3%	43.3%	43.3%
	MVCAD + 30% LM	Count	1	0	1
		%	3.3%	0.0%	1.7%
Total		Count	30	30	60
		%	100.0%	100.0%	100.0%

P value – 0.404

As seen in the above table, there was no statistically significant difference in the various diagnosis in both the groups.

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Figure no 3: Diagnosis amongst study population.

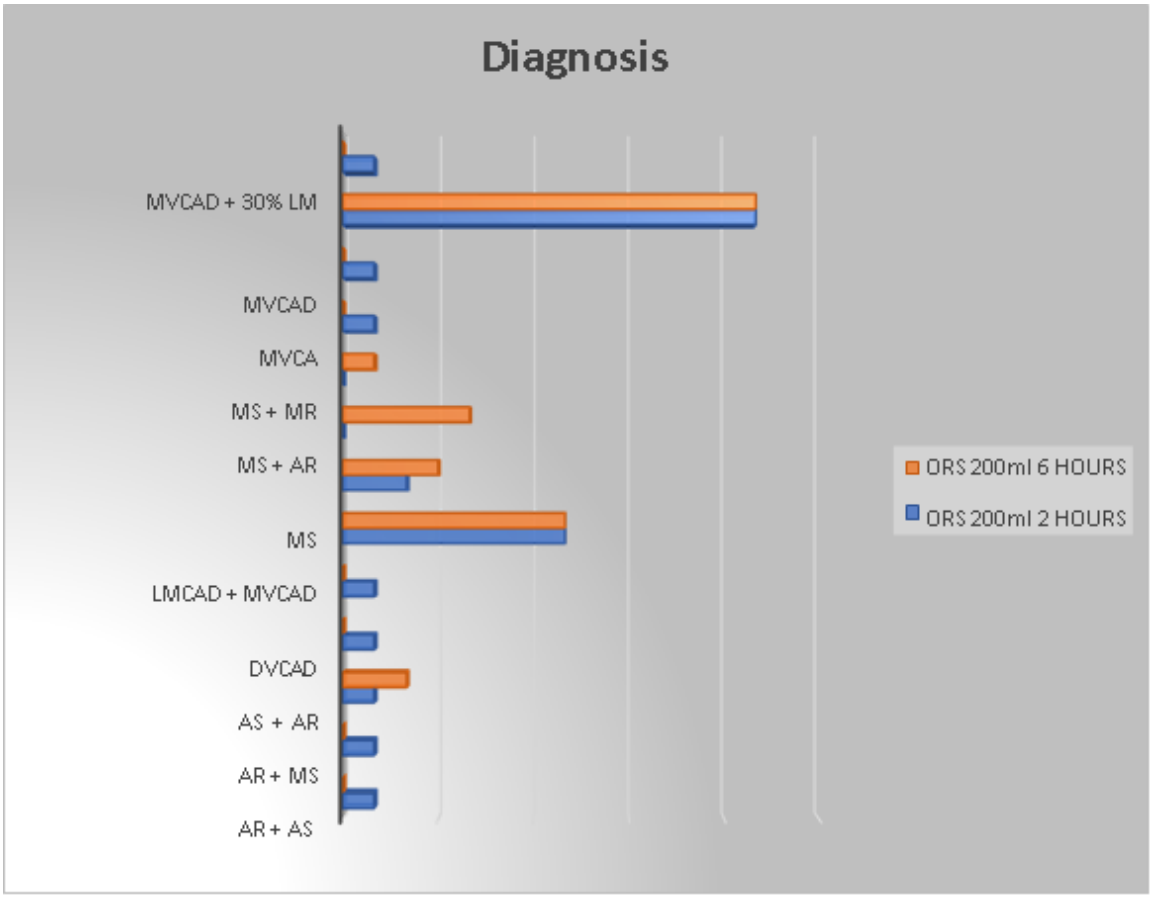

Table no 4: Surgery amongst study population

			Groups		
			ORS 200ml 2 HOURS	ORS 200ml 6 HOURS	Total
SURGERY	AVR	Count	3	2	5
		%	10.0%	6.7%	8.3%
	CABG	Count	25	23	48
		%	83.3%	76.7%	80.0%
	DVR	Count	1	1	2
		%	3.3%	3.3%	3.3%
	MVR	Count	1	4	5
		%	3.3%	13.3%	8.3%
Total		Count	30	30	60
		%	100.0%	100.0%	100.0%

P value – 0.55

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As seen in the above table, there was no statistically significant difference in the surgery performed in both the groups.

Figure no 4: Surgery amongst study population.

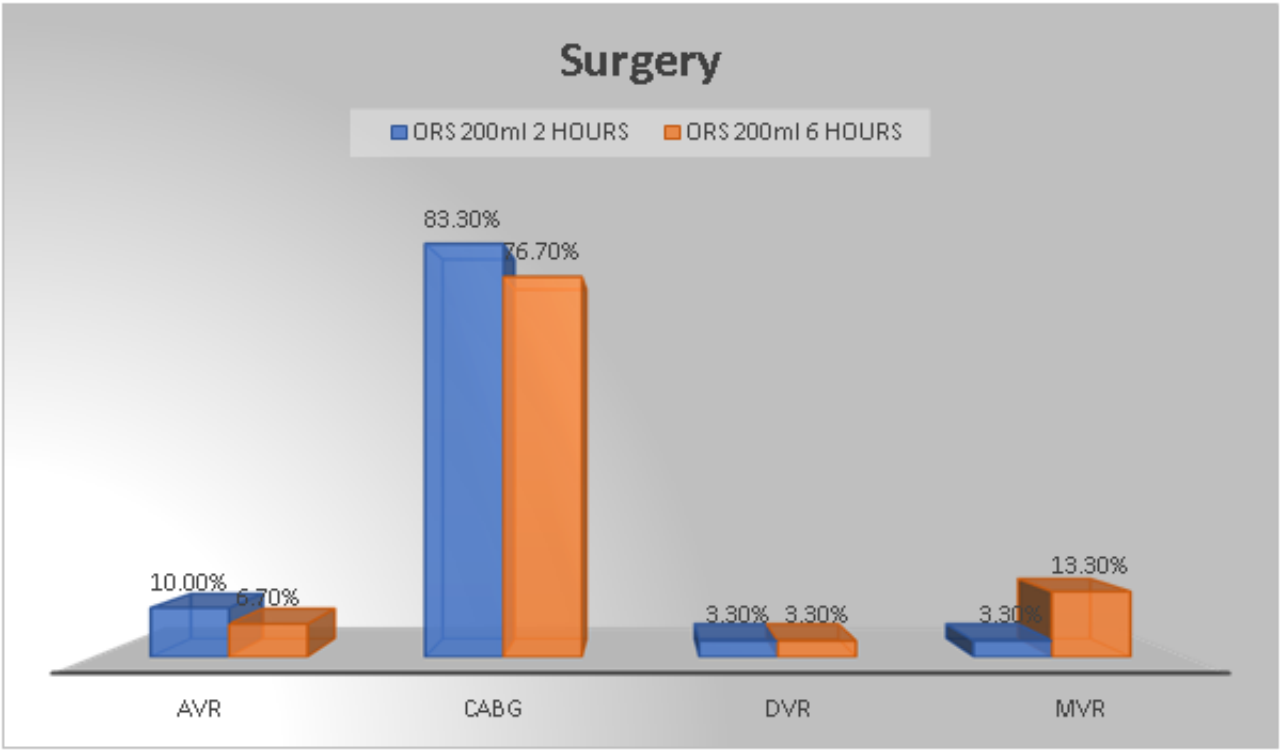

Table no 5: Gastric Volume, Gastric pH and Extubation time in different study groups

	Groups				P value
	ORS 200ml 2 HOURS		ORS 200ml 6 HOURS		
Gastric Volume	37.2	12.6	70	17.3	0.0001
Gastric pH	4.5	0.5	3.3	0.5	0.0001
Extubation time	10.1	2.1	12.5	2.3	0.0001

As seen in the above table, gastric volume and extubation time was significantly lower in patients receiving ORS 200ml 2 hours prior as compared to ORS 200ml 6 hours prior to elective surgery while gastric pH was significantly higher in patients receiving ORS 200ml 2 hours prior as compared to ORS 200ml 6 hours prior to elective surgery.

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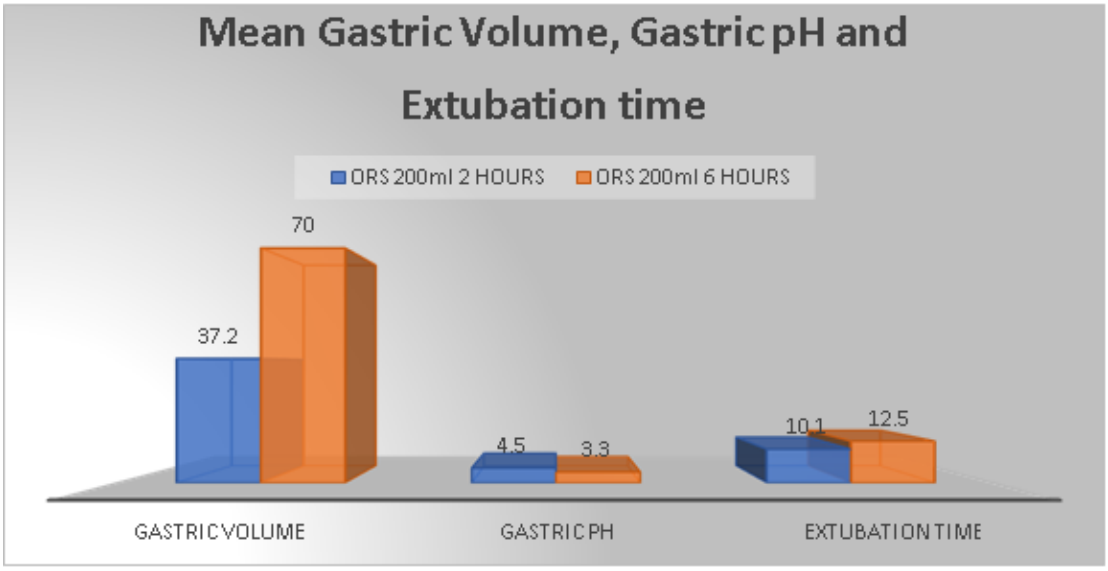
Figure no 5: Gastric Volume, Gastric pH and Extubation time in different study groups



Discussion:

Preoperative fasting involves being nil by mouth before surgical procedures requiring sedation or anaesthesia.55 In the postoperative period, complete avoidance of oral dietary intake is practiced, till recovery of bowel function for abdominal surgeries. 56 Impairment or abolition of airway reflexes following deep sedation or anaesthesia can lead to pulmonary aspiration of gastric contents. 41 The ideal condition for reducing the risk of regurgitation and aspiration is an empty stomach before anaesthesia, which may be difficult to achieve due to continuous gastric secretory activity along with impaired physiology due to multiple aetiologies in the preoperative period.

The stomach always has a basal volume due to continuous gastric secretions. The duration of fasting is considered acceptable if the post prandial gastric volume returns to basal levels. The 20 studies identified by our search regarding intake of clear liquids and gastric volumes did not report any event of aspiration or regurgitation.57-74 The studies were of Low, or Very Low level of evidence. In eight studies, after overnight fasting, one group received water to consume medications and the other, received between 100mL and 500 mL of water till 2 hours before induction of anaesthesia. 57-64 In the present study, it was observed that most of the study population were male (71.7%) as compared to female (28.3 %) and the difference was statistically insignificant.

In the present study, gastric volume and extubation time was significantly lower in patients receiving ORS 200ml 2 hours as compared to ORS 200ml 6 hours prior to elective surgery while gastric pH was significantly higher in patients receiving ORS 200ml 2 hours as compared to ORS 200ml 6 hours prior to elective surgery. This finding is comparable with the meta-analysis of three studies conducted using studies published between 1988 and 2016, comparing consumption of water 2 hours prior to induction of anaesthesia and overnight fasting found that the groups who had consumed water 2 hours prior had comparable residual gastric volumes with a mean difference of 0.76 mL and 95% CI 0.60 to 1.02 (LOE- Moderate).57,56

Studies comparing consumption of other clear liquids such as orange juice, black coffee with overnight fasting were analyzed separately (LOE- Very Low to Low). The meta- analysis of six such studies published between 1988 to 2016 showed that the residual gastric volumes were comparable between the two groups of patients with a mean difference of 1.04 mL and 95% CI of 0.90 mL to 1.2 mL) (LOE-Moderate).60-65

The meta-analysis of 4 studies conducted between 1988 to 2016 showed a lower gastric pH in patients who fasted overnight compared to those allowed

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water 2 hours before the induction of anaesthesia with a mean difference of 1.0 and 95% CI of 1.07 (LOE- Moderate). 57-65 The meta-analysis of 5 studies found higher gastric pH after administration of clear liquids other than water 2 hours before the induction of anaesthesia compared to overnight fasting with a mean difference of 1.08 and 95% CI of 0.98 to 1.19, while network meta-analysis showed the pH to be higher in groups allowed to consume clear liquids when compared to water (LOE-Moderate).59-63

Scarr et al. conducted an observational study in patients scheduled for ambulatory surgeries and classified 181 patients into 4 groups based on the duration of fasting (<3h,3-4.9 h, 5-8 h and >8 h) and found similar gastric volumes and pH in all the groups. The participants in the study were asked not to consume solid food from midnight and were asked to consume 150 mL liquid (coffee, tea, water or apple juice) 1 h before leaving home (LOE- Very Low).66

The average fasting time for solids, liquids and clear liquids as per the survey from 56 institutions were 7.43 ± 1.65 h, 5.68 ± 1.90 h and 3.16 ± 2.33 h, respectively. Clear liquids should be allowed up to 2 h prior to administration of sedation or anaesthesia. The volume of clear liquid consumed may be restricted to < 450 mL, 2 h prior to administration of sedation or anaesthesia. Non-clear liquids may be allowed up to 4 h prior to administration of sedation or anaesthesia. Light meals may be allowed up to 6 h prior to administration of sedation or anaesthesia. If the patient has consumed a heavy meal, it may be prudent to wait for at least 10 h prior to administration of sedation or anaesthesia. Heavy meal consumption is not advisable the night prior to surgery.

Conclusion:

We conclude that patients undergoing elective cardiac surgeries should be an allowed short preoperative fasting period before their scheduled time of elective ambulatory surgery as it significantly lowers gastric volume and extubation time. This will reduce the Postoperative time, early mobilisation & reduce the hospital stay.

Limitations:

The risk of unexpected regurgitation or vomiting is not altered, and the anesthetist must always be prepared to deal with these complications.

This should not be applied to obstetric cases or to patients who are to undergo emergency surgery.

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