EFFECT OF SALIVA ON PH AND VOLUME OF GASTRIC CONTENTS WHILE SAMPLING FROM STOMACH WITH TWO DIFFERENT TECHNIQUES OF OROGASTRIC INTUBATION

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Objectives: To explore the effect of saliva on pH and volume of gastric aspirate by using two different techniques of blind gastric aspiration of gastric contents.

Materials and Methods: This prospective and randomized clinical trial was conducted in the Department of Anaesthesia at King Khalid University Hospital, Al-Riyadh, Saudi Arabia from August to December, 2006 on 140 adult inpatients of either sex, aged 15-70 years and American Society of Anesthesiologists physical status I-II. An orogastric tube was passed by conventional method in Group A and through an endotracheal tube placed in esophagus in Group B. Gastric contents were aspirated with a large bore, multi-orifices gastric tube after tracheal intubation and analyzed for the presence of bile salts, pH and volume.

Results: Thirty nine (28.57 %) samples were contaminated with duodenal contents and one with blood. Six patients have no gastric contents in Group A due to failed orogastric intubation and none in Group B (p 0.0280). Saliva, by conventional method of orogastric intubation, significantly affected both the pH (A-2 versus B-2: p <0.0001) and volume (A-2 versus B-2: p 0.0045) of gastric contents. Duodenogastric refluxate significantly affected both the pH (A-1 versus A-2: p0.0236), B-1 versus B-2: p 0.0019) and volume (A-1 versus A-2: p .0343), B-1 versus B-2: p 0.0005) of gastric contents.

Conclusion: Saliva significantly affected both the pH and volume of gastric contents when sampled by conventional method of orogastric intubation. Duodenogastric refluxate significantly affected both the pH and volume of gastric contents.

Keywords: Saliva, two techniques of orogastric intubation, gastric pH and volume and duodenogastric reflux.

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Introduction

PULMONARY ASPIRATION OF GASTRIC contents is the inhalation of gastric contents into the larynx and lower respiratory tract. Its severity depends upon the nature (pH) and amount (volume) of the aspirated material, and the host's factors that predispose the patient to aspirate[1] The importance of pH and volume of gastric contents as a determinant of risk for gastric aspiration has long been discussed.[2] Since Robert and Shirley's study[3] published in 1974,many authors have quoted pH <2.5 and volume greater than 0.4 ml/kg, or 25 ml of gastric contents for most adult patients, as a risk factor for serious sequelae of pulmonary aspiration of gastric contents. Many studies have been done to examine the effectiveness of various preoperative medications such as antacids, H_2 – receptor antagonists, proton pump inhibitors and prokinetic drugs alone or in combination to reduce the pH and volume of gastric contents. The most common method employed in these studies for the aspiration of gastric contents remained the blind aspiration with gastric tube. Saliva can mix up with gastric contents at the level

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of pharynx while sampling from stomach. Duodenogastric reflux can affect the pH and volume of gastric contents at the stomach level that have already been mixed with gastric contents. Our primary aim of the study was to explore impact of saliva on gastric aspirate by using the conventional method of orogastric intubation versus orogastric tube intubation through an endotracheal tube placed in esophagus. Although, the later technique is old and basically described by inserting gastric tube through a naso-esophageally placed endotracheal tube.[4, 5] We modified this technique and passed it orally to prevent epistaxis but no body has utilized this technique in previous studies. To see the impact of Saliva on gastric aspirate, we have to exclude those samples contaminated with duodenogastric refluxate. The secondary aim of study was to see the impact of duodenogastric refluxate on gastric contents. In other words, whether or not these two potential sources of contamination i.e. saliva and duodenogastric refluxate of gastric contents at two levels i.e. hypopharynx and stomach are significant in clinical practice? This issue has never been considered important in any previous study while evaluating the effectiveness of drugs used for the prophylaxis of acid aspiration syndrome.

Patients and Methods

The study was approved by the College of Medicine Research Centre (CMRC) and College Ethics Committee. Written informed consent was obtained from all the patients.

Patients and Group Assignment

We explore the effect of duodenogastric refluxate on the pH and volume of gastric contents and then compared the effect of saliva on the pH and volume of gastric contents by using two methods of orogastric intubation in the Department of Anaesthesia at King Khalid University Hospital, Al-Riyadh, Saudi Arabia on 140 inpatients aged 15-70 years of either sex and American Society of Anesthesiologists (ASA) physical status I-II, to be intubated with cuffed endotracheal tube. Patients suffering from the disorders of salivary glands or upper gastrointestinal tract or past history of operations on the salivary glands and upper gastrointestinal tract, drugs known to alter the secretory function of salivary gland, i.e. parasympathomimitics e.g. pyridostigmine, para-symphatolytics, e.g. hyosine, antihistamines, e.g. chlorpheramine, etc., receiving medications known to affect the secretory and /or motor functions of the stomach e.g. ranitidine, omeprazole. etc, Body Mass Index (BMI) more than 40 kg/m^2, Mallampati class V and /or mouth opening less than 5 centimeters and /or thyromental distance less than 6.5 centimeters and/or history of difficult intubation, parturients and intestinal obstruction were excluded from the study. Gastric contents mixed with blood in the gastric tube were also not included in the statistical analysis while analyzing pH and volume of gastric contents. We prepared two sets of envelopes of the same size, color and shape and packed one set with pieces of papers written on them “conventional method of orogastric intubation A” while other set containing pieces of papers written “orogastric intubation through endotracheal tube B”. These envelopes were mixed together. On the pre-operative anaesthesia visit, a day before surgery, the nature and purpose of the study was explained to each patient. We asked each patient to pick up only one envelope from the envelopes. Thus, the patients were allocated either to Group A (conventional method of orogastric intubation) or Group B (orogastric intubation through an endotracheal tube placed in esophagus) randomly by sealed envelope method. Age, sex, weight, height, BMI, ASA physical status were recorded for each patient. All patients were premedicated with oral diazepam 10 mg at 9.00 p.m. According to the Hospital policy, all patients were fasted from 12 midnight and Dextrose water 5% + 0.45 % NaCl + KCL 20 mmol/L started intravenously from 6.00 a.m. onwards at the rate of 2-3 ml/kg/hour.

Collection and Analysis of Gastric Contents

In the operating room, routine monitors were attached to the patients and turned on. After pre-oxygenation with 100 % O_2 by face mask using four breaths vital capacity method, anaesthesia was induced with injection fentanyl 1-3 µg/kg, propofol 2-3 mg/kg and rocuronium 0.6-0.9 mg/kg. The lungs were ventilated taking care not to inflate the stomach. Maintaining cricoid pressure, trachea was intubated with cuffed endotracheal tube. Placement and position of endotracheal tube was confirmed with $EtCO_2$ monitor and then secured properly. After establishing stable anaesthesia, a predetermined length marked with adhesive tape (Xiphoid process to ear lobules- from ear lobules to nasal tip) of stomach tube [6] (Jamjoom Medical Industries, Jeddah, Saudi Arabia) sized 18 F was passed orally in the stomach in Group A while in Group B gastric tube of the same size was passed through an endotracheal tube sized 8.5 mm internal diameter, coated internally with paraffin liquid, placed in esophagus with anterior displacement of larynx.. Placement of gastric tube within the stomach by either method was verified by auscultation over the epigastrium during insufflation of 10-15 ml of air. Gastric contents were gently aspirated manually with 60 ml of syringe. Applying manual pressure over the epigastrium while the patient was in supine and then left and right lateral positions, gastric tube was then manipulated to ensure maximum emptying of gastric contents. Stomach tube was removed in Group A while in Group B; stomach tube was removed followed by esophageally placed endotracheal tube. Time was noted with stop watch to complete the procedure of orogastric intubation in both groups. Any problem encountered during inserting or removing the oro-esophageally placed endotracheal tube or gastric tube was also recorded. The volume of gastric contents was measured with graduated syringe and pH with pH meter (Model 215 version 3.4, Denver Instrument Company, United States). The pH meter was calibrated using standard buffers at pH values of 4, 7 and 9.20. This pH meter has a precision of 0.01 units over the entire pH range. A minimum of one-milliliter volume of gastric contents was sufficient for pH determination with this pH meter. In case of very little amount of gastric contents, we cut the stomach tube and aspirated gastric material with disposable plastic pipette. Samples less than one-milliliter were considered as no gastric contents because a minimum volume of one- milliliter of gastric contents was sufficient for pH- metery. Using bile salts as a marker for bile, we applied **qualitative** Hay's Sulphur test for the presence of bile salts. A minimum volume of one milliliter of gastric contents was adequate to perform Hay's Sulphur test. In this test finely powered Sulphur is sprinkled upon the surface of cool (17 °C or below) liquid. If bile salts are present Sulphur sinks down, sooner or later, in accordance with their percentage in the fluid. (a)If bile salts are present in from 1:5000(0.02 % or 200 µg/ml) to 1:10,000(0.01 % or 100 µg/ml) Sulphur at once begins to sink and all precipitate in two or three minutes; even in a dilution of 1:120,000 (0.0008 % or 8.33 µg/ml) precipitation occurs.[7] (b) If Sulphur remains floating upon the surface of liquid, the bile salts are absent.

Anaesthesia was maintained with Air, O_2 and sevoflorane. The patients also received incremental doses of fentanyl and rocuronium as required. At the end of surgery, injection atropine and neostigmine were given to antagonize the residual effect of rocuronium. All patients were extubated in lateral position and then transferred to recovery room. Time since premedication, time since *Nil per Os.* (NPO), pH, volume of gastric contents and result of Hay's Sulphur test were also recorded for each patient. On the basis of Hay's Sulphur test, we further divided Group A into Group A-1 (including samples contaminated with duodenogastric refluxate) and Group A-2 (samples non-contaminated with duodenogastric refluxate) and Group B into Group B-1 (including samples contaminated with duodenogastric refluxate) and Group B-2 (samples non-contaminated with duodenogastric refluxate) to evaluate the effect of duodenogastric refluxate on pH and volume of gastric contents. After subtracting these contaminated samples we, then, compared Group-A-2 with Group B-2 to explore the effect of saliva on gastric pH and volume by utilizing two different techniques of orogastric intubation.

Statistical Analysis

Statistical tests were performed using GraphPad Software, Inc., San Diego, United States, and results are expressed as absolute values (percentage) or mean ± standard deviation (SD). Statistical comparisons between the two Groups were carried out using two-tailed Student's (unpaired) *t test* for age, weight, height, BMI, time since premedication, time since NPO, time to complete the procedure of orogastric intubation, pH and volume. Two- tailed *Fisher's exact test* was applied for sex, ASA physical status and failure rate of orogastric intubation. A *p value* of less than 0.05 was considered statistically significant.

Results

One hundred and forty (140) adult inpatients of either sex undergoing elective General (n=81), Orthopedic (n=30), Gynaecological (n=14), Urology (n=6), Thoracic (n=4) and Plastic (n=4) and

Vascular (n= 1) Surgery were studied. Physical characteristics of patients and timings of events are shown in Table 1. There was no statistically significant difference between Group A and B regarding age, sex, ASA physical status, weight, height, BMI, time since premedication and time since NPO. There was a statistically significant difference between Group A and B (p <0.0001) regarding the time to complete the procedure of orogastric intubation. We obtained gastric contents of 133 patients. Hay's test was performed on all these samples and was positive in 39 patients (29.32 %).One sample was mixed with blood in Group B. Six patients patient have no gastric contents due to failed orogastric intubation in Group A. Failure rate of orogastric intubation was higher in Group A compared with Group B (p- value) The average (range) pH and volume of contaminated cases with duodenal contents 4.88 (1. 35 -7.05) and 45.88 (23.0-87.0) ml and with blood 7.13 and 3.0 ml. These cases were considered as contaminated and not included in statistical analysis while analyzing pH and volume of gastric contents. Saliva significantly affected both the pH and volume of gastric contents when sampled by conventional method of orogastric intubation. There was a statistically significant difference between GroupA-2 and Group B-2 regarding pH (p <0.0001) and volume (p 0.0045) of gastric contents.

Table 1. *Physical characteristics of patients and timings of events. Values are expressed as mean±SD and /or numbers (percentage).*

Physical Characteristics of patients	Group A n = 70	Group B n = 70	p value
Age (years)	34.85±12.28	34.07±12.56	0.7088
Sex			1.0000
Male	35(50%)	35 (50%)	
Female	35(50%)	35 (50%)	
ASA Physical status			
Class - I	46(65.71%)	52(74.28%)	0.3566
Class - II	24(34.28%)	18(25.71%)	
Weight(kilograms)	69.84± 15.86	74.56± 14.67	0.0595
Height (centimeters)	161.44± 7.79	161.80±7.5	0.8109
Body Mass Index (kg/cm^2)	26.90± 5.88	26.60±5.48	0.0793
Timings of events			
Time since premedication(minutes)	786.23±98.31	791.30±95.22	0.7570
Time since NPO(minutes)	606.31±127.02	611.39±95.22	0.7566
Time to complete orogastric intubation (seconds)	300.97±5.88	242.30±62.95	<0.0001

Table 2. *Facts and figures about gastric aspirate*

Groups	Group A	Group B	Total
No. of cases	70	70	140
Male	35	35	70
Female	35	35	70
Failed orogastric intubation*	6	0	6
Samples mixed with blood	0	1	1
Samples available for Hay's Sulphur test	64	69	133
Samples mixed with duodenal contents**	18	21	39
Male ***	7	9	16
Female	11	12	23

Note:
p* value (0.0280)
**Total incidence 29.32 %
***Incidence between male and female p value (1.0000)

Duodenogastric refluxate statistically significantly affected both the pH and volume of gastric contents. There was a statistically significant difference between GroupA-1 and Group A-2 regarding pH (p 0.0236) and volume (p 0.0343) of gastric contents. The same was true between Group B-1 and B-2 as regard pH (p 0.0019) and volume (p 0.0005) of gastric contents. The detail is shown in Table 3.

Table 3. *pH and volume of gastric contents. Values are expressed as mean± SD*

Variables	Group A n=70		Group B n=70	
Subgroups	Group A-1 n = 64	Group A-2 n = 46	Group B-1 n =69	Group -2 n = 48
pH	3.76 ±1.75	3.05±1.28	2.85±1.69	2.21±0.42
Volume (milliliters)	32.64±19.33	25.17±16.00	25.28±13.14	18.15±4.77

Note:
(a) Patients with failed orogastric intubation six (6) in Group A and one (1) Patient with blood mixed sample in Group B are excluded from the above analysis.
(b) Where Group **A-1** and Group **B-1** represents Groups including contaminated samples with duodenogastric refluxate. Group **A-2** and Group **B-2** represent Groups excluding contaminated samples with duodenogastric refluxate.
Comparisons between the different Groups:
pH & volume between Group A-1 and Group A-2 (p value 0.0236& 0.0343).
pH & volume between Group B-1 and Group B-2 (p value 0.0019 & 0.0005).
pH & volume between Group A-2 and Group B-2 (p value <0.0001 & 0.0045).

Discussion

Aspiration of gastric contents (Mendelson's syndrome) was first described by Mendelson CL in

1946 in obstetrical cases.[8] Since then a lot of work has been done and published in the form of brief reports, forums, original papers, editorials and review articles in anaesthesia literature. In all the previous studies conducted importance of saliva and duodenogastric reflux (DGR), as possible and potential factors that can affect both the pH and volume of gastric contents, has never been addressed. While evaluating the effectiveness of pharmacological agents used to decrease the acidity and volume of gastric contents, the most commonly used method is blind aspiration with gastric tube. We may come across four types of secretions from our alimentary tract. These are the salivary secretion, esophageal secretion, gastric secretion and duodenal fluid. Saliva is produced by the parotid, submandibular, sublingual and many small buccal glands. The daily secretion of saliva normally ranges between 800 and 1500 milliliters at the basal rate of 0.5 milliliters/minute. Saliva has a pH between 6.0 - 7.0 with the concentration of bicarbonate 50-70 mEq/L; about two to three times that of plasma. Salivary glands are controlled mainly by parasympathetic nervous signals from the superior and inferior salivatory nuclei in the brain stem. The salivatory nuclei are exited by both taste and tactile stimuli from the tongue and other areas of the mouth and pharynx. Smooth objects in the mouth markedly increase salivation, whereas rough objects cause less salivation and occasionally even inhibit salivation. Salivation can also be stimulated or inhibit by nervous signals arriving in the salivatory nuclei from higher centers of the central nervous system. Sympathetic stimulation can also increase salivation a moderate amount, but much less so than doe's parasympathetic stimulation.[9]

In this current study, we passed gastric tube through an endotracheal tube (Group B) passed blindly in the esophagus. We avoided possibility of contamination of gastric contents with pooled saliva in pharynx during inserting, manipulating or particularly removing gastric contents with suction applied to proximal end of the gastric tube either with syringe or wall suctions. In the awake states, as already noted above, the basal rate of saliva production is about 0.5 ml/minute, but this may increase to 5 ml /minute with intense stimulation.[10] Firstly, insertion of oropharyngeal airway, act of laryngoscopy and laryngoscope itself and tracheal tube insertion are the stimulants that increase the production rate of saliva. Secondly, saliva pools due to the lack of swallowing reflex in pharynx. Thirdly, in an intubated patient, the esophagus may be occluded by inflated endotracheal tube cuff. It is difficult to pass or remove stomach tube without the entry of saliva through the side holes into the tube because the stomach tubes do not have obturator as we use in tracheotomy tubes. If we do not apply suction, with the loss of suction effect we will loose gastric content from the gastric tube. We obtained other number of advantages with this technique. Firstly, under general anaesthesia as noted above, swallowing reflex is depressed and in an intubated patient, the esophagus may be occluded by inflated endotracheal tube cuff and can interfere with stomach tube insertion. Secondly, this technique also avoids finding the upper esophageal opening and coiling of the tube in the mouth even after successfully passing the distal end of tube into stomach so giving us higher success rate compared with conventional method. Thirdly, manipulation of gastric tube in and out during different positions is very easy causing no or very minimal trauma to the patient. In previous studies, no investigator has mentioned that pharynx was suctioned before inserting or removing the gastric tube. We did follow the same policy in Group A. Esophageal secretions are entirely mucoid in character and principally provide lubrication for swallowing. The mucus secreted by the compound mucus glands in the upper esophagus prevent mucosal excoriation by newly entering food in the upper esophagus where as the compound mucus gland located near the esophagogastric junction protect the esophageal wall from digestion by acidic gastric juice that often reflux from the stomach back into the lower esophagus. We could not find exact pH and volume of esophageal secretions in the literature. Probably esophageal secretions do not play any role to contaminate the gastric aspirate. Gastric juice is a mixture of secretions from gastric glands and epithelial cells. Other components are salt, water, HCl, pepsin, intrinsic factor, and mucus. All of these constituents increase after a meal. The greater the secretory rate of gastric juice, the higher the hydrogen and chloride ion concentrations. The daily secretion of gastric juice is 1500 ml with a pH of 0.8-3.5. At this pH, the hydrogen concentration is about 3 millions times that of the arterial blood. The cephalic phase of gastric secretion occurs even before food enters the stomach, especially while it is eaten. The cephalic phase of gastric acid secretion is elicited by the sight, smell, and taste of food. This phase of gastric secretion normally accounts for about 20 % of total gastric secretion. The gastric phase is initiated by the presence of food in the stomach and accounts for about 70 % of total gastric secretion. The intestinal phase of gastric secretion starts when food enters the upper portion of small intestine particularly the duodenum. It accounts about 10 % of total gastric secretion. The stomach secretes a few millimeters of gastric juice each hour during the interdigestive period when little or no digestion is occurring anywhere in the gut. However, emotional stimuli frequently increase highly acid and peptic interdigestive secretion to 50 ml/hour or more. This point is very important in anaesthesia practice because all patients undergoing general anaesthesia remain NPO.

Duodenogastric reflux, the trans-pyloric retrograde flow of duodenal contents into the stomach, is well known, well established clinical entity[11, 12, 13] with variable incidence. Mild to moderate duodenogastric reflux occurs in approximately one third (33%) of normal subjects, and in one third (33%) of patients with non-ulcer dyspepsia as shown by the radiological tests of Keet[14] and Huges et al[15] , in other words, the pylorus is normally not competent in a significant percentage of normal subjects and approximately the same percentage of patients with non-ulcer dyspepsia. Raved et al [16] a study based on the results of 4256 primary endoscopies of the stomach and duodenum: 3673 in non-operated patients and 583 in patients having undergone vagatomy and resection. Duodenogastric reflux was judged on the basis of yellow coloration of the gastric juice and regurgitation of bile at the time of examination. Reflux was positive in 330(8.98 %) in non-operated patients and 98 (16.81%) in operated patients. Wolverson et al [17] studied the incidence of duodenogastric reflux in peptic ulcer disease using 99mTc Hydroxy Iminodiacetic acid (HIDA) scan, with a gamma camera in the supine position in control patients and patients with active duodenal ulceration. Cholecystokinin was injected intravenously during the test to contract the gall bladder. Patients with benign gastric ulcers, and a group of age matched controls, were investigated for duodenogastric bile reflux in the sitting position by a nasogastric aspiration technique after 10 % dextrose meal. Of 60 patients with duodenal ulceration 32(53%) were reflux positive, and of 13 control patients 6 (46%) were positive. Of 30 patients with gastric ulceration 17 (53%) were reflux positive, and of 8 out of 15 (53%) control subjects were positive. The incidence of duodenogastric reflux assessed supine in the fasting state, and seated after a liquid meal, was similar in patients with peptic ulceration and in normal controls. In healthy subjects, duodenogastric reflux occurs sporadically in the interdigestive states. Its underlying mechanisms are poorly understood.[18] Our reported incidence 28.57 % is slightly less than the previously reported above mentioned studies. Duodenal fluid (contents) consists of bile (volume 1000 ml/day; pH 7.8), pancreatic juice (volume 1000 ml/day; pH 9.0-8.3), small intestine secretion (volume1800 ml/day; pH 7.5-8.0) and Brunner's gland (volume 200 ml/day; pH 8.0-8.9). All these secretions are, of course, alkaline in nature due to HCO_3^- ions. When duodenal contents flow in retrograde fashion, then mix with acid and Pepsin [19] in the stomach and bring the pH towards less acidity thus affecting pH and at the same time increase the volume of gastric contents similar to oral ingestion of sodium bicarbonate. The change in intragastric pH related to variations of the amount of different components in the regurgitated duodenal fluid.[20] Fushs et al [20] studied the variability in the composition of physiological duodenogastric reflux and found pancreatic enzyme aspirate was significantly more often associated with a rise in pH in comparison to bile reflux. To overcome this problem, firstly, we aspirated gastric contents in optimal position of the patient as described by Niinai et al.[21] Secondly; we passed a predetermined length of stomach tube so that it should not go beyond pyloric sphincter. Thirdly, we excluded those samples that were positive for Hay's Sulphur test while analyzing pH and volume of gastric contents. Lastly, the average (range) volume of contaminated cases with duodenal contents was 45.88 (23.0-87.0) ml that can only be aspirated from a storage organ like stomach. It is very amazing that so many rather overflow of studies have been conducted and published in anaesthesia literature but no body has reported even a single case of golden yellow, yellow, dark green or light green color of gastric aspirate from that one may suspect this is bile or intestinal or Brunner gland secretions.

The Bilitec™ 2000 ambulatory bile reflux recorder is currently the only commercially available device that is proven effective in measuring bile reflux. Using Bilirubin as a marker for bile, the Bilitec 2000 recorder captures the frequency and duration of bile exposure either in the stomach or esophagus over a 24-hour period. This method was not feasible for us we applied Hay's Sulphur test to detect bile salts in the gastric contents. This simple, sensitive and fairly reliable test [22] depends on the principal that bile salts have the property of reducing the surface tension of fluids in which they are contained[23] , was devised in1886 by Matthew Hay (1855-1932). After excluding those samples contaminated with duodenogastric refluxate, hypopharynx is the only place where pooled saliva can contaminate the gastric aspirate while inserting or removing the gastric tube. Orogastric intubation through an endotracheal tube placed in esophagus significantly prevented contaminated at this point. This technique provided more accurate results compared with conventional method of Orogastric intubation. In this current study we found that saliva and duodenogastric refluxate significantly affected both the pH and volume of gastric aspirate on the basis of significant p-value. If these values, even, not statistically significant, then, is contamination with either saliva or duodenogastric reflux not important? We believe these factors are still important because we will not get true results regarding pH and volume of gastric contents. These results will be of mixed gastric contents either with duodenogastric refluxate or saliva rather than pure gastric contents. The common techniques to aspirate the residual volume of gastric contents are Fiberoptic gastroscopy, Indicator dilution technique and Blind aspiration via gastric tube. In this current study, total gastric volume may have been underestimated by the blind aspiration via gastric tube in each patient due to the functional divisions of the stomach into antral and fundal sacs. A similar error would occur in all patients of both groups and inter-group comparisons are, therefore, valid. This method is simple, inexpensive, and easy to perform and has been widely used in the similar studies. As the effect of a drug on intragastric volume reduction is difficult to demonstrate using blind aspiration via gastric tube via gastric tube, the pH values seem preferable, therefore, for comparisons of results in the literature.

Conclusion

Saliva significantly affected both the pH and volume of gastric contents when sampled by conventional method of orogastric intubation. Samples obtained with this method of orogastric intubation are not true gastric contents rather gastric contents mixed with saliva. Aspiration of gastric contents done with orogastric intubation through an endotracheal tube prevented significantly contamination from saliva. This method possesses high success rate, minimal or no trauma to the patients and is time saving. Duodenogastric refluxate also significantly affected both pH and volume of gastric contents. We used pH as a marker of saliva; more work is needed to identify the specific marker for saliva (like bilirubin, bile salts for bile reflux) in the gastric aspirate to see its impact on gastric contents.

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