A Comparative Evaluation Of Intravenous Ranitidine And Rabeprazole On Gastric Volume And Ph In Patients Undergoing Surgery Under General Anaesthesia

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ABSTRACT

Introduction: The morbidity and mortality associated with the complication of Acid aspiration syndrome increases with the volume and acidity of gastric aspirates. Objective: Routine practice often includes use of pharmacological agents to reduce gastric volume and increase gastric pH. The aim of the study was to compare the effectiveness of intravenous Rabeprazole and intravenous Ranitidine on gastric fluid volume and pH in patients undergoing elective surgery under general anesthesia.

Material and Methods: This prospective randomised double blind study was conducted on 90 healthy adult patients of either sex undergoing elective surgery under general anesthesia of age group 18-60 years and three groups were assigned with, Group 1 received intravenous Ranitidine 50 mg, Group 2 received intravenous Rabeprazole 20 mg, Group 3 received 5ml of normal saline(control group) before one hr, on the day of surgery and gastric volume and pH estimated just before induction of anaesthesia.

Results: Volume of the gastric aspirates in preintubation was 15.8±2.73 ml in Group 1 (Ranitidine), 14.2±2.93 ml in Group 2 (Rabeprazole) and 20.8±2.81 ml in Group 3 (Control). There was significant (p=0.03) decrease in gastric volume with Rabeprazole compared to Ranitidine. The pH values determined in preintubation was 3.21±0.68 in Group 1 (Ranitidine), 3.66±0.79 in Group 2 (Rabeprazole) and 2.62±0.79 in Group 3 (Control). There was significant (p=0.018) increase in pH with Rabeprazole compared to Ranitidine.

Conclusion: From present study it may be concluded that Ranitidine and Rabeprazole both are effective in reducing gastric volume and pH. As compared to Rabeprazole, Ranitidine is less effective in reducing gastric volume and pH but still more commonly used due to its cost effectiveness.

Key words: Rabeprazole, Ranitidine, Gastric aspirates.

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INTRODUCTION

Acid aspiration syndrome is a major risk factor for general anaesthesia.(1,2,3,4) Incidence of pulmonary aspiration of gastric aspirates during general Anaesthesia is 1:400 for obstetric patients as compared to 1:2000 for all patients.(2) The

morbidity and mortality associated with this complication increases with the volume and acidity of gastric aspirates(4,5,6,7,8,9,10). Nil per oral prior to surgery is the first and foremost protective method, by which emptying of stomach is done, before induction of anaesthesia(2,3). The required time for gastric emptying would vary, depending on the kind of food or drink and the underlying condition affecting the gastric emptying process (2,3). A gastric Ph <2.5 and volume >25 ml are suggestive to risk factor for acid aspiration syndrome in humans, according to criteria of Robert and Shirley (2). Various regimens like antacids, anticholinergic drugs, H2 receptor antagonists and proton pump inhibitors have been used to achieve this objective(4,5,6,7,8,9). There are many therapeutic strategies intended to minimize the risks of aspiration(5,7) . This has led to a progressive reduction of death rate from aspiration syndrome such that, in many developed countries it has fallen to almost zero(5,7).

Ranitidine reduces acid secretion by blocking the receptors of Histamine type 2, i.e. H2 receptors(1,2,8). Whereas, Rabeprazole inhibits the proton pump, present in gastric mucosa(11,12). Till now few clinical study have been undertaken to evaluate their efficacy in patients undergoing anaesthesia. Accordingly, this prospective, randomized double blind study was designed to compare the efficacy of two drugs Ranitidine and Rabeprazole (representing two different groups of gastric acid antisecretory agents) in reducing gastric acidity and volume, the risk factors for acid aspiration syndrome.

CASE REPORT

After approval from institutional ethic committee and informed written consent from patients, this prospective randomised double blind study was conducted on 90 healthy adult patients of ASA status 1 and 2, scheduled for elective surgery under general anaesthesia.

INCLUSION CRITERIA Patients of either sex, posted for elective surgery under general anaesthesia, ASA grade 1 and 2, Age group 18 to 60 years, patients who have given consent.

EXCLUSION CRITERIA Patients <18 or >60 years of age, patients with a history of any acid related gastrointestinal disease, patients on any recent gastric antisecretory drug therapy, patients on any medication which would interfere with gastrointestinal functions were not included in the study, emergency surgery, pregnant or lactating mothers, patients with hepatic and renal disease, patients having nasal bleeding during nasogastric tube insertion, obese patients, body weight >25% of ideal weight, patient refusal to be a part of study.

Patients were randomly assigned into three groups of 30 patients each. Randomisation was done by chit method. Group 1- received 50 mg Ranitidine intravenously. Group 2- received 20 mg Rabeprazole intravenously. Group 3- received 5 ml of Saline intravenously as control group. A detailed preanaesthetic evaluation was done a day prior to scheduled surgery.

Study drugs either Ranitidine, Saline or Rabeprazole according to group was given by a person who was unaware about study. The duration between administration of drug and

commencement of operation was 1 hour . As the patient was brought to operation theatre Patients were identified on the operation table then a brief preoperative assessment was done once again for all the patients prior to anaesthesia. Multipara monitor was attached. Gastric aspiration was performed before tracheal intubation. A 16 FG nasogastric tube was introduced through the nose. Its correct position in stomach was confirmed by auscultation of injected air over epigastrium. Gastric fluid was aspirated and noted . To obtain maximum yield, aspiration was attempted with patients in supine , reverse trendenlenburg and both lateral position. Moreover repeat aspiration was done after the tube was rotated, withdrawn 10 cm and readvanced . The total volume of the aspirate was recorded for each group and later on pH of gastric aspirate analysed by pH meter.

In premedication inj Glycopyrrolate 0.2 mg IV and inj Buterophenol 1mg IV were given before induction. Patients were preoxygenated for three minutes with oxygen. G.A was given with standard technique and put on ventilator. Anaesthesia was maintained with 50% N20, 50% 02, isoflurane and incremental dose of vecuronium until the end of surgery. Patient's heart rate, blood pressure and peripheral oxygen saturation were monitored every 5 minutes during the operation. At the end of surgery, isoflurane and N2O was discontinued and 100% oxygen was used for ventilation. After adequate recovery from neuromuscular block, patients were reversed with 0.05 mg/kg of neostigmine + 0.04 mg of glycopyrrolate per mg of neostigmine intravenously. Oxygenation was continued with 100% oxygen after extubation by face mask for 5-10 minutes. Patients were shifted to recovery room only after adequate reversal was seen.

ASSESSMENT OF GASTRIC pH- pH of Gastric aspirates were recorded in the department of Pharmacology, RIMS. Patients with gastric aspirate pH <2.5 and volume greater than 25 ml were considered at risk of developing acid aspiration syndrome.

RESULTS

Different statistical aggregates like mean, standard deviation were used to analyse numerical parameters. Randomisation was done by chit method and Student t test was used to determine the significance of differences between various comparisons.
Differences were considered significant if the p value is less than 0.05. If the p value is less than 0.01, differences were considered as very significant.
If p value more than 0.05, differences were not considered as significant.
DEMOGRAPHIC DATA:

Figure 1: Graph Showing Sex Distribution

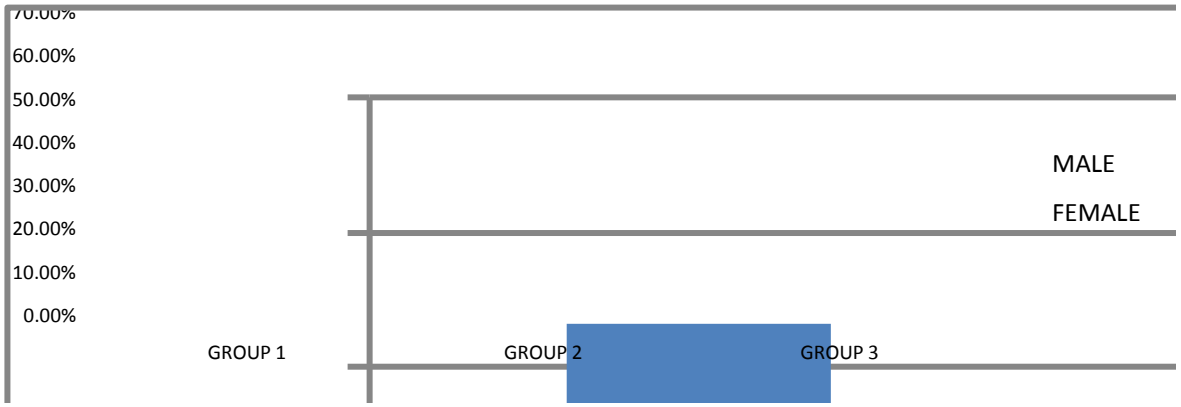


Figure 2: Graph Showing Weight Distribution

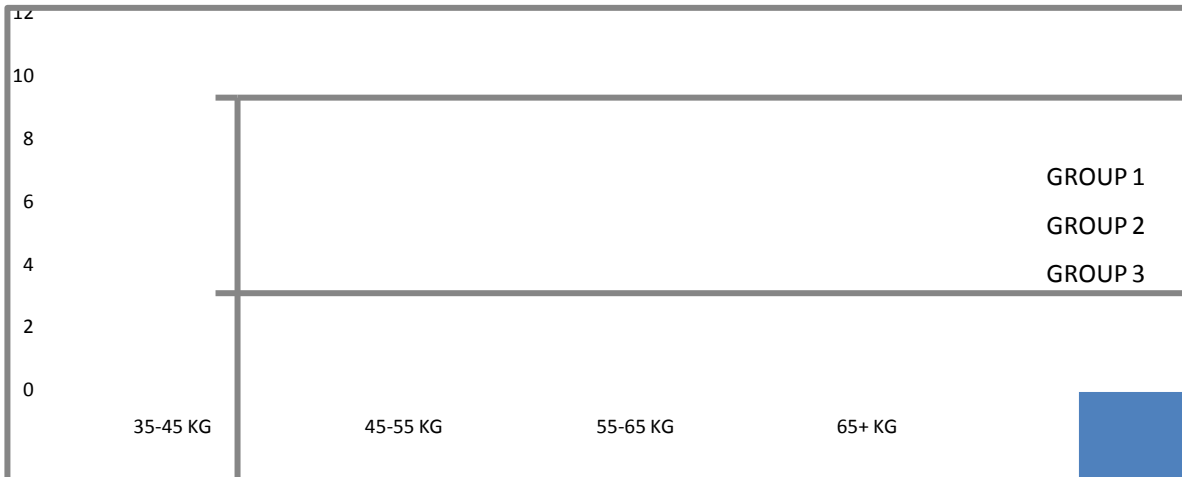


Figure 3: Graph Showing Age Distribution

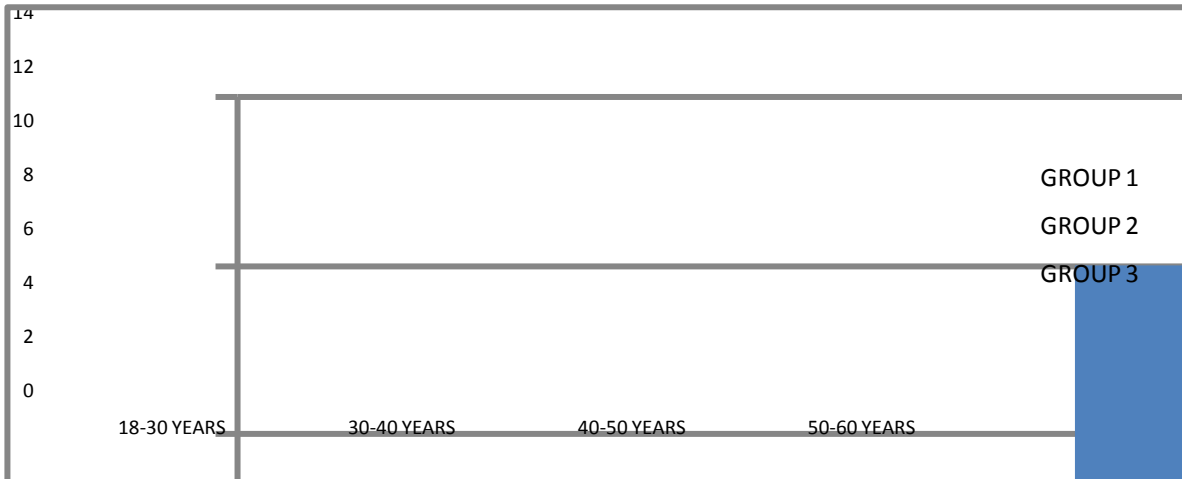


Figure 4: Graph Showing Gastric Aspirates

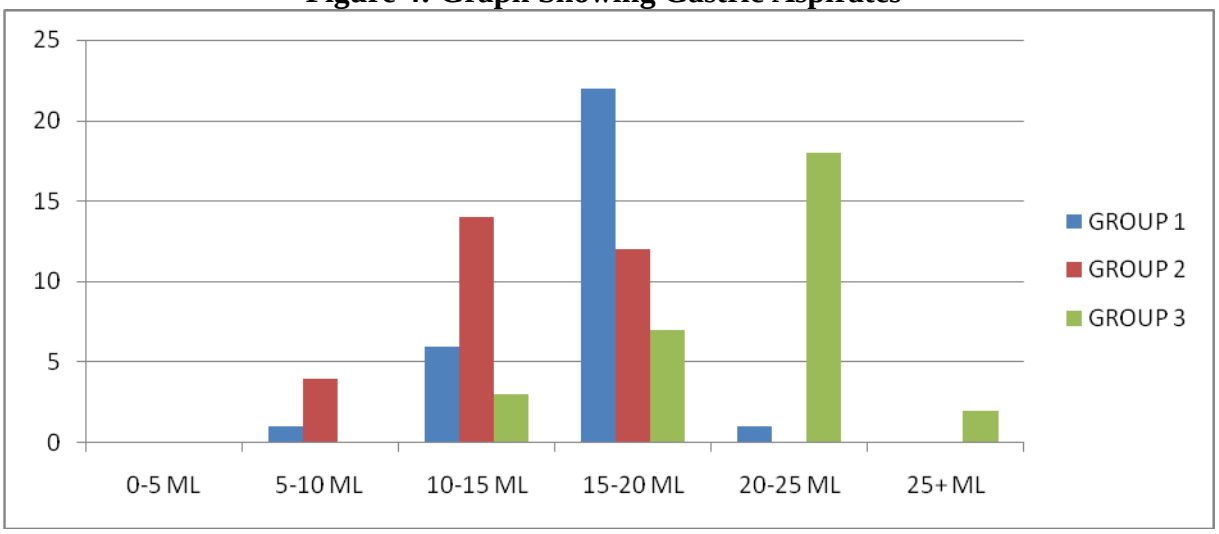
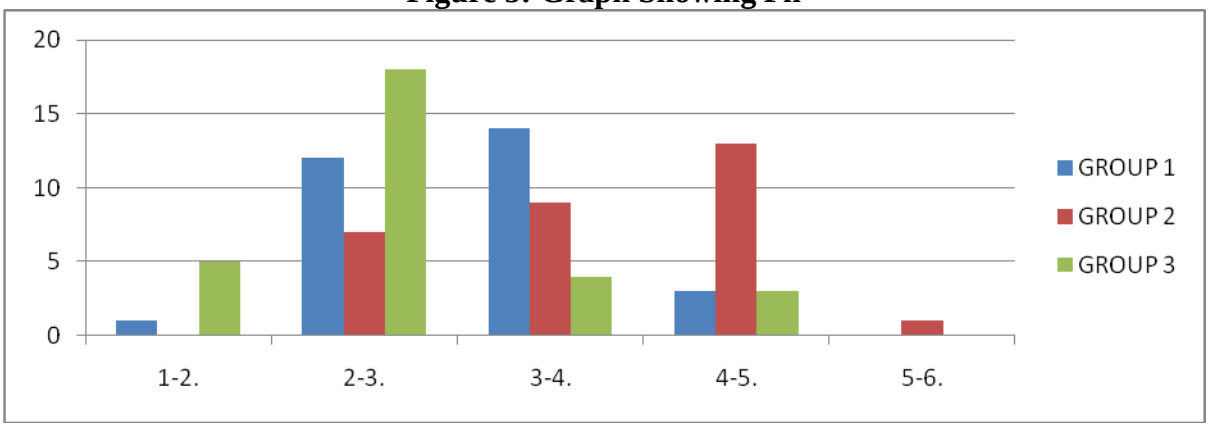


Figure 5: Graph Showing Ph



The participants of present study were comparable in terms of age sex weight and type of surgery. volume of the gastric content in preintubation was 15.8±2.73 ml in Group 1 (Ranitidine), 14.2±2.93 ml in Group 2 (Rabeprazole) and 20.8±2.81 ml in Group 3 (Control). There was significant ($p=0.03$, ie<0.05) decrease in gastric volume with Rabeprozole compared to Ranitidine. The pH values determined in preintubation was 3.21±0.68 in Group 1 (Ranitidine), 3.66±0.79 in Group 2 (Rabeprazole) and 2.62±0.79 in Group 3 (Control). There was significant ($p=0.018$, ie<0.05) increase in pH with Rabeprazole compared to Ranitidine.

DISCUSSION

Aspiration of gastric contents during induction and recovery from general anaesthesia is a major complication associated with high morbidity and even mortality (Lunn and Mushin,1982)(13) . Death due to pulmonary aspiration is a small but important cause in obstetrics anaesthesia. Since intestinal peristaltic movement in a pregnant woman is

physiologically suppressed, regurgitation of the gastric contents may occur. Labour hormones further increase the risk of acid aspiration. Accidental aspiration may lead to severe pneumonitis (Mendelson's syndrome) and poor prognosis for this conditions is well known (Mendelson C L. 1946)(14).

Administration of oral drugs require at least 60 mins to decrease gastric pH adequately (Escolano et al 1996)(15). Ikenou et al (1991)(16,17) found a similar increase in pH when they used intravenous Ranitidine in the same dose in patients undergoing surgery under general anaesthesia. Atanassoff et al(18) in 1995 observed that the time taken to achieve gastric pH 2.5 was 40 minutes (range 6-102) for intravenous Omeprazole and 32 minutes (15-82) for intravenous Ranitidine . They used gastric electrodes for continuous 24 hours pH monitoring. In our study , the duration between administration of drug (Rabeprazole / Ranitidine) and commencement of operation was 1 hour.

The gastric acidity and volume of gastric aspirate were observed to be significantly lower in Omeprazole group than Ranitidine group, in the study conducted by Tripathi et al(19) in 1996 and Ikenou et al(20) (1991). The gastric aspirate were taken postintubation and preextubation respectively. In our study, IV Rabeprazole and IV Ranitidine were used and gastric content was taken before intubation.

Anderson et al(21) (1989) found that median time taken to reach pH 4 was 39 minutes (range 13-110) after intravenous Omeprazole. They monitored gastric pH continuously using a monocrystalline antimony electrode system in 11 patients during fasting conditions. In our study, we used pH machine for measurement of gastric pH.

The comparative study of Omeprazole and Ranitidine was done by McAuley et al(22), Moor Ct et al(23), Gin et al(24), Ewart et al(25) and comparision of Pantoprazole and Ranitidine was done by Memis D et al(26), Chetan Goel et al(27), Lew et al28) and Gurkaran kaur sidhu et al(29). Above studies present that Proton pump inhibitors are better than Ranitidine for reducing gastric acidity and volume.

Rabeprazole was compared with Ranitidine by R Padmaja et al(30) . Volume of gastric content in preintubation was 15.37±0.37 ml in Ranitidine group, 15.03±1.92 ml in Rabeprazole group. The pH values determined in preintubation was 1.78±0.23 in Ranitidine group, 1.85±0.20 in Rabeprazole group.

In our study, Volume of gastric content in preintubation was 15.8±2.73 ml in Group 1(Ranitidine), 14.2±2.93 ml in Group 2(Rabeprazole) and 20.8±2.81 ml in Group 3(Control). There was significant (p=0.03) decrease in gastric volume with Rabeprozole compared to Ranitidine. The pH values determined in preintubation was 3.21±0.68 in Group 1(Ranitidine), 3.66±0.79 in Group 2(Rabeprazole) and 2.62±0.79 in Group 3(Control). There was significant (p=0.018) increase in pH with Rabeprazole compared to Ranitidine.

Most of the studies were done for emergency caesarean cases, while present study was performed on elective surgeries, including general and neurosurgeries. Chetan Goel et al(27),

Memis et al(26) and Padmaja et al(30) were also conducted their studies in elective surgeries.

In a study done by Kahoru Nishina et al(31) (2002) it was found that single dose of Ranitidine 150 mg orally was the most effective regimen to control gastric fluid property and administration of two consecutive doses of Rabeprazole 20 mg was the second most effective remedy. Rabeprazole has minimal indication for prophylaxis of acid aspiration syndrome. In the study done by above authors Ranitidine was more effective than Rabeprazole to control gastric fluid property and volume.

In our study Rabeprazole have been more effective as it was used intravenously. The reason of this difference may be due to, the enteric coating on oral Rabeprazole tablet which causes delayed absorption .

In a study done at Dehradun hospital, in the year 2008 by Gurkaran kaur Sidhu et al(32) concluded that administration of i.v Pantoprazole when compared to i.v Ranitidine was associated with more appreciable changes in characteristics of gastric content and was more efficient for decreasing chances of mendelson syndrome.

The above study has been in total agreement with the present study done to conclude that proton pump inhibitor used preoperatively, was better than Ranitidine.

Tapas Bhattacharyya Debabrata et al(36) in 2011 concluded that Pantoprazole is more effective than Ranitidine in raising the gastric pH for prevention of aspiration pneumonitis. Our study have concluded that proton pump inhibitor Rabeprazole was superior to H2 receptor antagonist Ranitidine in reducing gastric fluid acidity for prevention of aspiration pneumonitis.

No side effect including nausea and vomiting were significantly prevenlent in either of studies including our present study.

CONCLUSION

From present study it may be concluded that both the drugs Rabeprazole and Ranitidine administered intravenously before elective surgery can be safely used. Both were effective in reducing gastric fluid volume and acidity below the critical value and their comparision with control group clearly warrants their routine use not only in high risk patients for pulmonary aspiration but also in patients who have been fasted overnight for elective surgery. As compared to Rabeprazole, Ranitidine was less effective preanaesthetic drug but still more commonly used due to its cost effectiveness.

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