Prevention of Aspiration Pneumonia at Induction of General Anesthesia; By Single Dose Omeprazole versus Esomeprazole.

Tahir Nazeer, Muhammad Younas, Asif Nadeem, Amna Tahir.

ABSTRACT

Objectives: The objective of this study was to evaluate and compare the effectiveness of single dose of omeprazole 40mg versus esomeprazole 40mg on gastric acidity (stomach pH). Methodology: This was a prospective comparative study on 50 patients, undergoing elective inguinal hernia surgery were included. Two groups were given omeprazole and esomeprazole 40 mgs respectively a night before surgery to see effect on gastric pH. Results: In group "O" the median range of gastric fluid pH was 4.5 (1.5-7.0). In group "E" it was 7.0 (3.0-8.0). P value is not significant. Conclusion: Single oral dose of Esomeprazole 40mg at bed time before surgery has same efficacy and results to increase the intra-gastric pH like single oral dose of Omeprazole 40mg.

Keywords: Gastric pH, Omeprazole, Esomeprazole.

INTRODUCTION

Pulmonary aspiration of gastric contents is one of the most feared complications of general anaesthesia. Its severity depends both on pH and volume of gastric juice aspirated and the host’s factors that predispose patient to aspirate.(1,2)

The risk of gastric aspiration may be reduced by identification of patients at risk, pre-operative fasting, adaptation of various anaesthetic maneuvers and pharmacological interventions. Gastric acidity may be at its peak after overnight fast when patient comes to operation room leading to greater danger of acidic juice aspiration(1).

In 1946, Mendelson described an “asthma like” syndrome in obstetric patients aspirating gastric contents at induction of anaesthesia and reported 66 cases of airway obstruction.(3). Teabeaut demonstrated in rats that once the pH of inhaled material falls below 2.4 then typical syndromes develops (4).

Proton pump inhibitors are drugs that provide gastric acid suppression and maintain pH of > 4 for 18-24 hr/day. 5 Different drugs like rabeprazole, esomeprazole, lansoprazole, pantoprazole and omeprazole are used to decrease the gastric acid secretion and increase pH of gastric juice thus reducing the risk of aspiration (6,7,8,9,10,11).

Keeping in mind that improved efficacy of proton pump inhibitors in modifying pH and decreasing gastric acid secretions, this study is planned to evaluate and compare the effect of single oral dose of omeprazole 40mg with esomeprazole 40mg on gastric pH, given at bed time in patients undergoing elective inguinal hernia surgery under general anesthesia.

METHODOLOGY

This study was conducted after approval of hospital ethics committee and IRB of KEMU in general surgery operation theatres of Mayo Hospital Lahore. 50 patients of ASA class P1 and P2 status, age 15 to 60 years, Body mass index (BMI) of 20 to 35 kg/m2, of both genders undergoing inguinal hernia surgery electively were included after informed consent.

Two groups of 25 patients each were made by using random number table. In group “O” 40mg Omeprazole and in group “E” 40mg Esomeprazole was given to participants on the night before surgery, at 10pm and were asked to remain nothing per orum after midnight. All patients were reassured and explained about the premedication and general anesthesia management preoperatively.

In the operation theatre all patients were monitored (ECG, SPO2, NIBP, Temperature) and intravenous access was secured with 18G cannula. Ringer lactate was infused at body temperature @ 15ml/kg.

All participants were pre oxygenated for 3 minutes. Induction was performed with intravenous pentothal 5mg/kg, nalbuphine 0.1mg/kg and tracheal intubation facilitated with atracurium 0.5 mg/kg intravenously. Anesthesia was maintained with 50% oxygen, N2O and isoflurane 1.5%. A multiorifice nasogastric tube of size 16 frenchguagewas passed into the stomach and verified by auscultation over the epigastrium with 10ml air. Gastric fluid was withdrawn in a sterile syringe and transferred to a sterile test tube. pH was determined by calibrated pH paper (Universal indicator pH 0-14 Merck) and confirmed by pH meter. Nasogastric tube then removed. At end of surgery patients were reversed by using atropine 20µg/kg and neostigmine 35µg/kg.

Data analysis was done using SPSS version 15. Patient characteristics were presented as Mean±SD. Gastric pH was compared by student t-test. P <0.05 was taken significant.

RESULTS

The physical characteristics of the two groups were presented as mean ± SD and did not differ in groups significantly. (Table.1 &table.2)

Median range of gastric fluid pH was 4.5 (1.5 – 7.0) in group “O” and 7.0 (3.0 – 8.0) in group “E” in table no.3. Figure no.1 represent number and percentage of patients at risk i.e. four patients out of 25 were at risk in group “O” and no patient was found to be at risk in group “E”. Figure 2 denotes the relationship of premedication period to the pH metery of group “O”.

No corresponding changes in intra-gastric pH were seen with increase in premedication time. So result remains quite variable. Figure 3 shows as premedication period was increased the intra-gastric pH remain well above 2.5 in all cases.

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Table 1: Physical Characteristic of Patients (Group “O”)
Number of Patients: 25

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Median</th>
<th>Mean</th>
<th>SD</th>
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<tbody>
<tr>
<td>Age (yrs)</td>
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<tr>
<td>Weight (kg)</td>
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<td>6.95</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>154</td>
<td>156.68</td>
<td>4.81</td>
</tr>
<tr>
<td>NPO period (hrs)</td>
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<td>1.72</td>
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<td>BMI kg/m²</td>
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<td>27.02</td>
<td>3.06</td>
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</tbody>
</table>

Table 2: Physical Characteristic of Patients (Group “E”)
Number of Patients: 25

<table>
<thead>
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<td>Weight (kg)</td>
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<tr>
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<td>25.71</td>
<td>25.92</td>
<td>24.35-34.69</td>
<td>3.21</td>
</tr>
</tbody>
</table>

Table 3: pH of Gastric Contents

**DISCUSSION**

Aspiration of gastric contents is one of the major causes of general anesthesia related morbidity and mortality. Prophylaxis against aspiration may be considered in certain surgeries such as cesarean section. Many different kinds of drugs have been used to decrease the intra-gastric fluid volume and to increase the pH of intra-gastric fluid.

This trial was aimed to improve the quality of anesthesia care and to reduce the complications related to acidic gastric pH in pulmonary aspiration of gastric contents. In our study we found that esomeprazole has same effect like omeprazole regarding increase in pH of gastric fluid. In our study we used 95% confidence level, power of study was 95%, effect size was 0.5, alpha=0.05 and beta =0.05.

In the study of Chen CY et al they compared esomeprazole 40mg with 20mg omeprazole and found esomeprazole was better than omeprazole. This study does not support the results of my study. In the study of Armstrong D et al, he compared esomeprazole with pantoprazole 40 mg and found that esomeprazole was better than pantaprazole. Similarly in the study of Wilder-smith C et al, they found that esomeprazole was better than Lansoprazole. The study of Ezcolano F et, al. also not supporting our results and explains that omeprazole is not reliable drug for prevention of acid aspiration. In a review article Dent J explains that plasma concentration measurements have confirmed that the advantageous hepatic metabolism of esomeprazole results in a greater delivery of acid suppressant to the systemic circulation, compared with an equal dose of omeprazole. Also this superior delivery has been shown to cause a more consistent and greater suppression of pentagastrin stimulated gastric acid secretion by esomeprazole 20mg compared with omeprazole 20mg. In the animal study of ZacutoAC et al found that pre anesthetic administration of cisapride and esomeprazole decreases the number of reflux events in anesthetized dogs.

Similarly in the study of Sandstrom M et al, they use safely esomeprazole in children of 0 to 17 years of age and found it well tolerated and effective like omeprazole.

In the study of Cruickshank RH et al, they found that omeprazole increase pH of gastric content in majority of patients and omeprazole have a role in prophylaxis against acid aspiration syndrome. This study supports the result of my study. Similarly in the study of Bunno M et al they used both omeprazole and esomeprazole and found that the safety and efficacy profiles of esomeprazole plus rebamipide and omeprazole and rebamipide are similar for the treatment of endoscopic sub-mucosal dissection induced ulcers. This study also support the results of my study regarding decrease in pH of stomach secretions and efficacy of both drugs. In a meta-analysis of randomized control trials by Clark K et al pooled outcomes suggest that premedication with ranitidine is more effective than proton pump inhibitors in reducing the volume of gastric secretions and increasing gastric pH. In a study Kinoshita Y et al compared esomeprazole with omeprazole regarding reflux esophagitis, they found both have same efficacy. This study also supports the results of my study regarding efficacy of both drugs. In the study of Levack ID et al they compare oral omeprazole with oral ranitidine on gastric aspirate pH and volume in
patients undergoing elective surgery and found that there were no statistically significant differences between two groups. Their results also indirectly support the result of my study regarding efficacy of both groups of drugs. Overall we can say that omeprazole and esomeprazole have a role in premedication for prevention of acid aspiration at the time of induction of general anesthesia and have approximately same efficacy.

In our study we drop one patient who develops skin rashes and select a new patient instead of that and that is known complication of proton pump inhibitor. We suggest that there is need of further large sample size studies to find out more accurate results regarding gastric acid aspiration prophylaxis.

CONCLUSION

We conclude that single oral dose of esomeprazole 40mg at bed time before surgery has same efficacy to increase the intra-gastric pH like single oral dose of omeprazole 40mg and both drugs can safely use for gastric acid aspiration prophylaxis.

REFERENCES