Prophylaxis against Pulmonary Aspiration and Acid Aspiration Syndrome in Patients Undergoing Elective Surgery under General Anaesthesia: Comparison between Intravenous Esomeprazole and Patoprazole

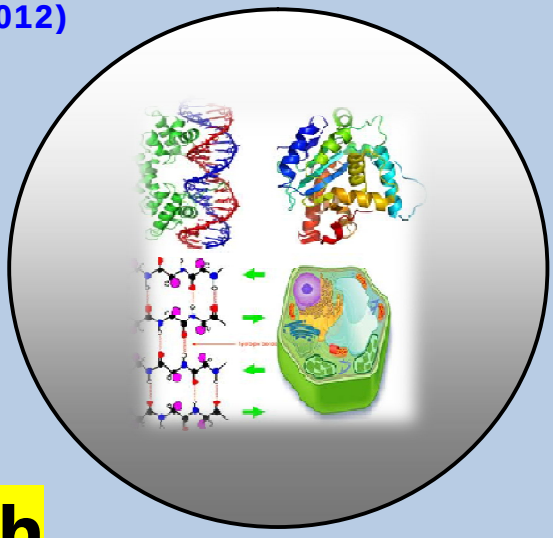
By

Piyush Kumar, Raj Bahadur Singh, Sanjay Choubey, Arindam Sarkar and Abhishek Mishra

ISSN 0970-4973 (Print)
ISSN 2319-3077 (Online/Electronic)

Index Copernicus International Value
IC Value of Journal 4.21 (Poland, Europe) (2012)
Global Impact factor of Journal: 0.587 (2012)

J. Biol. Chem. Research
Volume 31 (1) 2014 Pages No. 583-588



Journal of Biological and Chemical Research
(An International Journal of Life Sciences and Chemistry)

Published by Society for Advancement of Sciences®

J. Biol. Chem. Research. Vol. 31, No. 1: 583-588 (2014)
(An International Journal of Life Sciences and Chemistry)
Ms 31/1/85/2014, All rights reserved
ISSN 0970-4973 (Print)
ISSN 2319-3077 (Online/Electronic)

Dr. Raj Bahadur Singh
http:// www.jbcr.in
jbiolchemres@gmail.com
info@jbcr.in

RESEARCH PAPER

Received: 04/02/2014 Revised: 28/03/2014 Accepted: 31/03/2014

Prophylaxis against Pulmonary Aspiration and Acid Aspiration Syndrome in Patients Undergoing Elective Surgery under General Anaesthesia: Comparison between Intravenous Esomeprazole and Patoprazole

Piyush Kumar, *Raj Bahadur Singh, *Sanjay Choubey, *Arindam Sarkar and *Abhishek Mishra

Balrampur Hospital, Lucknow 226003, U.P. India
***Department of Anaesthesiology, Era's Lucknow Medical College and Hospital, Lucknow 226003, U.P. India**

ABSTRACT

Pulmonary aspiration by vomiting & regurgitation of gastric content is a well recognized hazard of mortality & morbidity during induction & emergence from anesthesia when airway is not protected by cuffed endotracheal tube & when laryngeal protective reflexes are absent or sluggish.To prevent the intraoperative and postoperative complications due to changes in gastric fluid volume and pH. A prospective, randomized, double blind study carried out in 100 adult patients under GA selected randomly and were allocated into two groups of 50 each aged 18-55 years ASA I and II physical status over a period of one and half year in Department of Anaesthesiology, Era's Lucknow Medical College & Hospital, Lucknow. . Inj esomeprazole 40 mg was given intravenously as prophylaxis to Group I (Esomeprazole Group) patients and Inj pantoprazole 40 mg intravenously in Group II (Pantoprazole Group) patients one hour prior to induction of anaesthesia. Gastric fluid was aspirated through Ryle's tube in supine, anti-trendelenberg and right lateral positions into a 50 ml sterile syringe immediately after intubation, one hour after induction of anaesthesia and immediately before extubation. Contd.....

Gastric fluid obtained was analysed for volume and pH.Statistical analyses were done by using Student't' test and Chi-square test. A 'p' value of <0.05 was considered statistically significant and a value of <0.001 highly significant. Mean gastric pH in esomeprazole group is significantly higher than in pantoprazole group of patients (p<0.05). The percentage of patient at risk of pulmonary aspiration due to gastric pH <2.5 were 2% in esomeprazole group and 4% in pantoprazole group.). Premedication with esomeprazole was found superior to pantaprazole when used as a prophylactic premedicant against pulmonary aspiration and acid aspiration syndrome.

Key words: Acid Aspiration Syndrome, General Anaesthesia, Prophylaxis, Esomeprazole and Pantoprazole.

INTRODUCTION

Pulmonary aspiration by vomiting & regurgitation of gastric content is a well recognized hazard of mortality & morbidity during induction & emergence from anesthesia when airway is not protected by cuffed endotracheal tube & when laryngeal protective reflexes are absent or sluggish. Preoperative Aspiration of gastric contents (Mendelson Syndrome) is a potentially total complication of anesthesia, resulting from regurgitations of stomach contents and aspiration of chemical material, therefore prophylactic acid suppression is important for safe conduct of anesthetic management. The first compound to be described as a H_2 receptor antagonist was burimamide (Black, J. 1993), Ranitidine is a selective competitive H_2 receptor antagonist which unlike cimetidine has furan rather than imidazole structure (Brunton et al., 2008.), H_2 receptor antagonist inhibits gastric acid secretion by competitive antagonism of action of histamine of H_2 receptors in parietal cells of stomach. They inhibit basal as well as nocturnal gastric secretion. They have no effect on lower esophageal sphincter and gastric emptying and also unable to neutralize acid already present in stomach. Reduction of gastric acidity to a pH above 5 approximately is considered to be important in preventing the activation of Pepsin and subsequently mucosal injury. This can be achieved by any acid production suppressing agents as well as antacids (Collins, 1960).

Aims and objectives

To compare the effect of intravenous esomeprazole and pantoprazole on gastric fluid volume and pH in adult patients undergoing elective surgery under General Anesthesia and to prevent the intraoperative and postoperative complications due to changes in gastric fluid volume and pH.

MATERIAL AND METHODS

A hospital based prospective, randomized, double blind study was carried under GA in 100 adult patients and were allocated into two groups of 50 each aged 18-55 years ASA I and II physical status over a period of one and half year in the department of Anaesthesiology, Era's Lucknow Medical College & Hospital, Lucknow. Inclusion criteria was all adult patients aged between 18-55 years of ASA-I and II physical status and where scheduled for elective surgery under general anesthesia in Era's Lucknow Medical College & Hospital, Lucknow, exclusion Criteria was taken as patients of ASA grade III & IV, patients with significant coronary artery disease, chronic pulmonary disease, renal failure, hepatic dysfunction and morbid obesity.

Demographic characteristics which were included were Age, Sex, Weight, Height and Body mass index of the two groups**.** All the patients who were selected for this study had undergone preanesthetic checkup for the assessment of the anaesthetic risk involved in the cases. Patients selected were advised tab. Diazepam 5mg night before surgery and were also advised fasting for 8 hours before operation.

Patients were categorized into 2 groups

Group-I- (Esomeprazole Group): Patients were given intravenous Esomeprazole 40 mg one hour before induction of anesthesia.

Group-II- (pantoprazole Group): Patients were given intravenous pantoprazole 40 mg one hour before induction of anesthesia.

Conduct of Anesthesia

All patients were preoxygenated with 100% oxygen for 3 minutes, patients were induced with propofol 2mg/kg body weight; intubation was carried out under paralytic dose of succinylcholine 2mg/kg, all patients were mechanically ventilated with fresh gas flow of oxygen at 2l/min and nitrous oxide 4l/min. First received bolus dose of atracurium 0.4-0.5mg/kg on return of respiration followed by 0.1mg/kg as clinically indicated (on return of respiration). With the patient in the supine, and anti trendelenberg positions, gastric fluid was aspirated into a 50ml sterile syringe just after intubation, at completion of first hour (after start of anesthesia) and just before extubation and in right lateral position fluid was aspirated just before extubation. Aspirated gastric fluids were collected in sterile 50 ml syringe Volume of gastric fluid was measured directly from syringe and send to biochemistry lab for pH measurement (By Beckman method).

STATISTICAL ANALYSIS

Sample size = $(S.D_1+S.D_2)(Z_{1-\alpha/2}+Z_{1-ß})^2/d^2$

S.D= standard deviation

D=mean standard deviation

ß=0.20 power 80%

Alpha=level of significance

Student't' test was used in this study. A 'p' value of < 0.05 was taken to be statistically significant and a value of <0.001 was highly significant. Data was analyzed by using the statistical software SPSS 17.0 for windows. Chi –square test was used to make categorical comparision.

OBSERVATION

Table 1. Comparision of mean gastric pH between esomeprazole group and pantoprazole group.

	Mean±SD (ml)	**p value**
Group I	6.11±0.763	
Group II	5.36±0.678	p value < 0.05

According to Table 1 Mean gastric pH in esomeprazole group is significantly higher than in pantoprazole group of patients (p<0.05).

Table 2. Comparison of patients with gastric pH<2.5 in both groups.

Groups	No. of patients		Total	% of patients with gastric pH <2.5
	Gastric pH <2.5	Gastric pH >2.5		
Group 1	1	49	50	2
Group 2	2	48	50	4

In Table 2 number of patients with gastric pH<2.5 in both groups were compared, out of 50 patients one patient (2%) was found to have gastric pH <2.5 in esomeprazole group while in pantoprazole group the number of patients with gastric pH <2.5 were two (4%).

Table 3. Sex wise Distribution of group.

Sex	Group I	Group II
Male	15	13
Female	35	37
Total	50	50

In Table 3 sex wise distribution of patients in the two groups is shown,in group I patients 15 were male and 35 were female and in group II patients 13 were male and 37patients were female.

Table 4. Age wise distribution of group.

Particular		Group I	Group II
Age (Year)	18-27	15	17
	28-37	17	10
	38-47	6	9
	Above 48	12	14

In Table 4 Mean age of patient was 36.52±12.26 years in group I and 38.36±14.66 years in group II.

DISCUSSION

Aspiration of gastric contents into the tracheo bronchial tree remains a major cause of morbidity and mortality in patients undergoing anesthesia. (Collins et al. 1960; Utting et al. 1979). It is most frequent lethal complication in children (Graff et al.1964) and the incidence is higher than in adults (Utting et al. 1979; Edwards et al. 1956). In this study proton pump inhibitor esomeprazole and pantoprazole were compared for gastric volume and pH in elective general anesthesia. Esomeprazole and pantoprazole were given 40 mg each Intravenously 1 hour prior to anesthesia and their effects were recorded at the time of induction of anesthesia, one hour post induction and at the end of surgery.

In both the groups there was a female predominance. There were 70% females in group I and 74% in group 11. In the present study mean gastric pH after esomeprazole premedication was 6.11±0.763 while in pantoprazole group mean gastric pH was 5.36±0.678 ($p<0.05$; significant). Gallagher et al[8] 1988 observed that incidence of patient at risk with gastric volume more than 25 ml to be 10% following prophylaxis against acid aspiration syndrome with a single oral dose of H_2 receptor antagonist famotidine on the evening before elective surgery. This could be attributed to variation in time of administration of the prophylactic agent that is evening before surgery. Moore J[9] *et al* 1989 in their study on prophylaxis against aspiration found that following a single 80 mg dose of omeprazole night before surgery was associated with an intragastric pH <2.5 in three of the 20 obstetric patients from the study. In the present study a similar episode was noticed in one patient of esomeprazole group in whom the volume of aspirate was more than 25ml and pH <2.5.

CONCLUSION

The present study was conducted on esomeprazole and pantaprazole for study of gastric fluid volume and pH. Esomeprazole reduce gastric volume more than pantaprazole group all though it was insignificant ($p>0.05$).Gastric pH increased in esomeprazole group was significant ($p<0.05$) as compared to pantaprazole group. Therefore esomeprazole premedication may be advocated to the patients undergoing elective surgery under general anaesthesia for prevention of pulmonary aspiration and acid aspiration syndrome.

Premedication with esomeprazole was found superior to pantaprazole when used as a prophylactic premedicant aganist pulmonary aspiration and acid aspiration syndrome. The entire patient must undergo preanesthetic checkup for assessment of the anaesthetic risk involved in the cases. Patients must undergo fasting for 8 hours before operation. Premedication with pantaprazole may also be carried out in patients undergoing surgery for prevention of pulmonary aspiration. After tracheal intubation, a ryles tube must be passed into stomach and the correct position must be confirmed by aspiration of gastric secretion or auscultation of injected air into the stomach.

ACKNOWLEDGEMENTS

Authors are grateful to authorities of Era's Lucknow Medical College and Hospital, Lucknow 226003, U.P. India for providing OT facilities during the course of data collection presented in this paper.

REFERENCES

Black, J. 1993. Reflections on analytical pharmacology of histamine receptor antagonist. *Gasteroenterology*, 105(4): 963-968.

Laurence, L. Brunton, Keith and L. Parker. 2008. Manual of pharmacology and therapeutics: pharmacotherapy of gastric acidity, peptic ulcers, and gastroesophageal reflux disease. 11ed New Delhi: Mc-graw Hill; 2008. p. 624.

Collins, V.J. 1960. Fatalities of anesthesia and surgery. *J. Am Med. Assoc*. 172(6): 549-555.

Cook, D. 1998. A comparison of sucralfate and ranitidine for the prevention of upper gastrointestinal bleeding in patients requiring mechanical ventilation. Canadian critical care trials group. *N Engl. J. Med.*, 338(12): 791-797.

Utting, J. E., Gray, T. C. and Shelly, F.C. 1979. Human misadventure in anesthesia. *Can Anaesth Soc. J.*1979: 26(6); 72-478.

Graft, T.D., Phillips, O.C., Benson, D.W. and Kelly, E. 1964. Baltimore anesthesia study committee factors in paediatric anesthesia mortality. *Anaeth Analgesia* 1964: (43); 407-414.

Edwards, C., Morton, H.J.V. and Pask, E.A. 1956. Deaths associated with anesthesia a report on 1000 cases. Anesthesia (11); 194-222.

Gallagher, E.G., White, M., Ward, S. Cottrell, J. and Mann S. G. 1988. Prophylaxis against acid aspiration syndrome, single oral dose H_2 antagonist on the evening before elective surgery. *Anaesthesia* 43(12):1011-1014.

Moore, J. Flynn, R.J. Sampaio, M., Wilson, C.M. and Gillan, K.R.W. 1989. Effect of single dose of omeprazole on intragastric acidity and volume during obstetric anaesthesia. *Anaesthesia* 44(7): 559-562.

Roberts, R.B. and Shirley M.A. 1974. Reduction the risk of acid aspiration during caesarian section. *Anaesth. Analg*. 3(6):859-68

Turndorf, H., Rodis, I.D. and Clark, T.S. 1974. Silent regurgitation and aspiration during general anesthesia. *Anaesth Analg*; 53(5): 700-3.

Hester, J.B. and Heath, M.L. 1977. Pulmonary acid aspiration prophylaxis; should prophylaxis be routine. *Br. J.Anaesth*. 49(6): 595-599.

Manchikanti, L. and Colliver, J. A. 1986. Ranitidine and metaclopramide for prophylaxis of aspiration. Pneumonitis in elective surgery. *Anaesth. Analog*.; 65(2):195-199.

Tiret, L. and Desmonts, J. M. 1986. Complications associated with anesthesia – a prospective survey in France. *Can. Anaesth. Soc. J.*, 33(3 pt 1): 336-44.

Olsson, C.L., Hallen, B. and Hambraeus Jonzon, K. 1986. Aspiration during anesthesia a computer- aided study of 185,358, anaesthetics. *Acta. Anaesthesiol Scand*.; 30(1): 84-92.

Mattby, J.R., Sutherland, A.D., Sale, J.P. and Shaffer, E.A. 1986. "Pre operative oral fluid. Is a fine hour fast justified prior to selective surgery". *Anesthesia and Analgesia.* 65(2): 1112-1126.

Satiani, B. Bonner, J.T., and Stone, H. 1978. Factors influencing intra operative regurgitation –a prospective random study of nasogastric tube drainage. *Aroh. Surg*; 113(6): 721-3.

Nimmo, W.S. 1984. Effect of anesthesia on gastric motility and emptying. *Br. J. Anaesth*. 56(1); 29-36

Todd, J.C. and Nimmo, W.S. 1983. Effect of premedication on drug absorbtion and gastric emptying. *Br J Anesth*; 55(11): 1189-93.

Corresponding author: Dr. Raj Bahadur Singh, Department of Anaesthesiology and critical care Era's Lucknow Medical College and Hospital, Lucknow 226003, U.P. India
Email: virgodocraj36@yahoo.co.in, Ph. No. 9026036163