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A Comparative Efficacy Of Conventional H_2 Receptor Blocker Ranitidine And Newer Proton Pump Inhibitors Omeprazole, Pantoprazole And Esomeprazole For Improvement Of Gastric Fluid Property In Adults Undergoing Elective Surgery

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Abstract:
Backgroundand Aim: *Concern about the grim nature of acid aspiration syndrome grew among the anaesthesiologist over the years warranting pre-emptive intervention. The aim of study to compare efficacy of ranitidine, omepazole, pantoprazole, and esomeprazole on gastric pH and volume in adults undergoing elective surgery.*
Method: *This prospective parallel group controlled randomdized single blind study was conducted after permission from ethical committee. 250 patients of either sex between ages 15-60 years of ASA-I and II posted for elective surgeries were divided into 5 groups. In group A [n=50] participants received tablet Ranitidine , in group B[N=50] received tablet omeprazole, group C[N=50] tablet pantoprazole , group E[N=50] tablet esomeprazole received and their gastric pH and volume estimated.*
Result: *The participants in five groups were comparable in terms of age, sex, weight and ASAwise. When statistical analysis done between all these group it was found that there was significant difference between gastric volume of ranitidine group with omeprazole , pantoprazole and esomeprazole[p<0.01] but between omeprazole, pantoprazole and esomeprazole no significant difference[p>0.05]. The mean gastric volume in ranitidine group was 13.38±3.368ml, omeprazole 10.7±3.644ml, pantoprazole10.4±3.471 and esomeprazole 9.58±3.271ml. Also for gastric pH there was statistical significant difference between ranitidine and omeprazole, pantoprazole group[p<0.01] but in ranitidine and esomeprazole there was no significant difference[p>0.05]. The mean gastric pH of ranitidine group 5.318±0.482, omeprazole 4.838±0.353, pantoprazole 4.822±0.398 and esomeprazole 5.174± 0.44.*
Conclusion: *From observation and analysis of the present study it can be inferred that ranitidine increases gastric pH more than omeprazole, pantoprazole and esomeprazole. Esomeprazole reduces gastric volume more compared to pantoprazole, omeprazole and ranitidine but esomeprazole also increases gastric pH more than omeprazole and pantoprazole, so esomeprazole more effective drug among study drug for prevention of acid aspiration.*
Keywords*: Ranitidine,Omeprazole,pantoprazole,esomeprazole,acid aspiration.*

I. Introduction

Aspiration of gastric content into respiratory tract during anaesthesia has been recognized as a serious problem since James Simpson[1] referred to this complication in 1848 as a problem cause of death. He mentioned this complication as "strangulation during aneastesia. The first reported death due to aspiration during anaesthesia was in 1953[2]. In 1946, Mendelson[3] american cardiologist published his report an 66 obstetric patients who inhaled gastric contents during administration of nitrous oxide, oxygen and ether anaesthesia. The critical pH of gastric content producing acid pulmonary damage due to aspiration is 2.5 or less and the volume is 0.4ml/kg or more. There are two broad approaches which attempt to prevent acid damage to the lungs.

1. Preventing gastric content from reaching the respiratory tract.
2. Rendering the gastric content less harmful to respiratory tract by using antacid.

A new approach which has recently been found of interest is the use of H_2receptor antagonist to reduce the gastric acidity and also proton pump inhibitor to reduce gastric volume and gastric pH. This study desired to compare the effectiveness of ranitidine and proton pump inhibitors i.e. omeprazole , pantoprazole and esomeprazole given preoperatively in adult patients undergoing elective surgery by oral route.

II. Material And Methods

The present study undertaken after permission from ethical committee. Written informed consent was obtained from each patient. 250 patients of either sex between ages 15-60 years of ASA grade I and II posted for elective surgeries were studied. The patients were divided into 5 groups of 50 each.
Group A-Placebo,

Group B –Tablet Ranitidine 150mg received.
Group C Tablet Omeprazole 20mg received.
Group D-Tablet Pantoprazole 40mg received.
Group E-Tablet Esomeprazole 40mg received.

Patient with known case of history of peptic ulcer disease, recent or chronic NSAID administration , gastroesophageal reflux disease, drug altering gastric motility, patients taking antacid, patients already on H_2blocker and also or on proton pump inhibitors were excluded from study. For each patient treatment regimen was administered at 10pm day before surgery and 6am on the day of surgery with 20ml of water. On the day of surgery and prior to administration of premedication 16French gauge Ryle's tube was nasally introduced into the stomach. Gastric fluid sample was aspirated gently with the help of 20ml syringe in different position to maximize gastric emptying. At any position pressure was applied over epigastric region and stomach contain were aspirated intermittently during removal of ryle's tube. Volume of gastric content was measured with the help of syringe and pH of same was determined immediately with pH meter. We used pocket sized pH meter i.e. pHep of HANNA instrument company this pH meter having range of 0.0 to 14.0 pH . And resolution of0.1 pH accuracy is ±0.1 pH . Age, height, gender, weight, ASA-status, volume of gastric fluid and pH of gastric fluid were recorded for each patient and data was analysed to study the efficacy of each individual drug.

III. Result

The participants in five groups were compare in terms of age, sex, weight, height and ASA status were statistically insignificant. when statistical analysis done between gastric volume of all five groups it was found that mean gastric volume of Group A patient 25.6±3.995ml , Group B 13.38±3.368ml , Group C 10.7±3.644ml, Group D 10.48±3.47ml and Group E 9.58±3.721ml

Table 1 : Preoperative gastric volume in each group

Gastric Volume	GROUP A [N=50]		GROUP B [N=50]		GROUP C [N=50]		GROUP D [N=50]		GROUP E N=50]	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
5-10ml	0	0	10	20	30	60	32	64	35	70
11-15ml	0	0	30	60	11	22	10	20	10	20
16-20ml	8	16	8	16	9	18	8	16	5	10
21-25ml	10	20	2	4	0	0	0	0	0	0
26-30ml	29	58	0	0	0	0	0	0	0	0
31-35ml	3	6	0	0	0	0	0	0	0	0
Total	50	100	50	100	50	100	50	100	50	100

Table1 shows that Group A 58% patients in 26-30ml gastric volume, Group B 60% patient in 11-15ml, Group C 60% patient in 11-15ml, Group D 64% patient in 11-15ml and Group E 70% patient in 11-15ml gastric volume. When gastric volume of all five group are vertically compared it is seen that group E decrease more gastric volume than other group. Also statistical analysis done between group A and other groups it is statistically highly significant [$p<0.01$]. Also when gastric volume of group B compared statistically with group C and group D it is statistically highly significant [$p<0.01$], but when statistical analysis done between group C , group D and group E it is statistically not significant [$p>0.05$]. Although quantitatively it is seen that group E decreases gastric volume more than other groups.

When statistical analysis done between all five group for gastric pH it was found that mean gastric pH of Group A patient is 3.040±0.482, Group B 5.318±0.482, Group C 4.838±0.353, Group D 4.822±0.398 and Group E patient is 5.174±0.440.

Table 2 : Gastric pH preoperatively in each group patients

Gastric p^H	GROUP A		GROUP B		GROUP C		GROUP D		GROUP E	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
1.5-2	2	4	0	0	0	0	0	0	0	0
2.1-2.5	6	12	0	0	0	0	0	0	0	0
2.6-3.0	12	24	0	0	0	0	0	0	0	0
3.1-3.5	26	52	0	0	0	0	0	0	0	0
3.6-4.0	3	6	0	0	0	0	2	4	1	2
4.1-4.5	1	2	2	4	9	18	12	24	3	6
4.6-5.0	0	0	12	24	26	52	24	48	14	28
5.1-5.5	0	0	24	48	13	26	10	20	20	40
5.6-6.0	0	0	10	20	2	4	2	4	10	20
6.1-6.5	0	0	2	4	0	0	0	0	2	4
Total	50	100	50	100	50	100	50	100	50	100

From table 2 it is seen that Group A 52% patients in 3.1to3.5 Gastric pH, Group B 48% Patients in5to5.5, Group C 52% patients in 4.6to5, Group D 48% patient in 4.6to5.0 and Group E 40% patients in 5to5.5 gastric pH . When gastric pH of all five group compared vertically it is seen that group A increase more gastric pH than other groups .But among proton pump inhibitors group E increase more gastric pH than group C and group D. But when statistical analysis done between group A and group B , group C, group D, group E it is statistically highly significant [$p<0.01$]. Also statistically comparison done between group B with group C and group D it is also statistically highly significant [$p<0.01$], but between group B and group E it is statistically insignificant [$p>0.05$]. Although quantitatively it is observed that group B increase gastric pH more group E. Also when group C compare with group D it is statistically insignificant [$p>0.05$] and between group D and group E it is significant [$P<0.01$]. So amongst proton pump inhibitor esomeprazole increases gastric pH more than omeprazole and pantoprazole.

IV. Discussion

We studied the effect of ranitidine , omeprazole, pantoprazole and esomeprazole on gastric pH and volume in adults undergoing elective surgery. In this study we given the two dose of each drug one night before surgery and another in morning day of surgery. when the vertical comparision done between all four drug we found that esomeprazole cause more decrease in gastric volume than pantoprazole and ranitidine . But when statistical analysis done between ranitidine and omeprazole, pantoprazole, esomeprazole it is highly significant but between omeprazole, pantoprazole and esomeprazole it is insignificant. But when they compare quantitatively it is found that esomeprazole decrease more gastric volume than pantoprazole and omeprazole. This result compared with other auther study. From this result it is concluded that proton pump inhibitors causes more decrease in gastric volume than H_2receptor antagonist and among proton pump inhibitor esomeprazole causes more decrease in gastric volume.

So when result of present compared with other previous auther study the mean gastric volume of ranitidine is get compared with David H. Morison et al[4]. Also our study results are compared with Sachin Sadawarte et al[5] and Hussain A-Al-saed et al[6] study. when there result are compared with the F.Escolano J. Castano et al[7] study it has been observed that ranitidine mean gastric volume is more decrease than omeprazole and famotidine. But in their study they given single dose of these drug three hour prior to surgery due to might be that there results are not compared with present study, as in present study we used the two doses of ranitidine, omeprazole , pantoprazole and esomeprazole .

In Sachin Sadawarte et al[5] studied the effect of single dose intravenous esomeprazole with single dose of pantoprazole on gastric fluid properties on lower abdominal surgery under general anesthesia. They concluded that single dose of esomeprazole when given one hour prior to surgery decreases gastric volume and increases gastric pH than pantoprazole.

Also in our study we found ranitidine increase gastric pH more than omeprazole, pantoprazole and esomeprazole which result compared with David Morison et al[4], AnandSagar et al[8], F.Escalano,J.Castano et al[7] , K.Nisnina et al[9] and Sachin Sadawarte et al[5].

From result it is seen that ranitidine increase more gastric pH than omeprazole, pantoprazole and esomeprazole, but esomeprazole cause both increase in gastric pH and decrease in gastric volume so it is more effective for prevention of acid aspiration .

V. Conclusions

Based on result of this study we can concluded that ranitidine increases gastric pH more compared to omeprazole, pantoprazole and esomeprazole. Esomeprazole reduces gastric volume more compared to pantoprazole, omeprazole and ranitidine, among the proton pump inhibitor esomeprazole increases gastric pH and decreases gastric volume more than omeprazole and pantoprazole. As esomeprazole increases gastric pH and also decreases gastric volumesignificantly, it is more effective drug than all other available drugs used for prevention of acid aspiration.

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