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Original Article

A Prospective Study of the Incidence of Upper Gastrointestinal Lesions and Bleed in Burn Injuries – An Endoscopic Evaluation in a Tertiary Care Hospital

Sura Anitha[1], Baliram Chikte[2], Subodh Kumar Arige[3]

[1]Assistant Professor, Department of Plastic Surgery, Gandhi Medical College and Hospital, Secunderabad, Telangana, India, [2]Associate Professor, Department of Plastic Surgery, Gandhi Medical College and Hospital, Secunderabad, Telangana, India, [3]Professor, Department of Plastic Surgery, Gandhi Medical College and Hospital, Secunderabad, Telangana, India

Abstract

Introduction: Acute gastroduodenal ulceration (Curling's ulcer) is the most life-threatening gastrointestinal complication that can follow thermal burns. Prospective, serial endoscopic evaluation is the best method to know the exact location and incidence and behavior of these lesions, and also the influence of medication on such lesions.

Aim of the Study: The aim of the study was to study the incidence of the upper gastrointestinal lesions and bleed in patients with burns and to observe the influence of PANTOPRAZOLE and SUCRALFATE on the lesions.

Materials and Methods: A total of 70 patients were taken into this study and grouped into two of 35 each of pantoprazole and sucralfate. Ethical committee Reg No: SS 15080312.

Statistical Analysis System: The analysis was performed by Proposition test, Chi-square test, and Fisher's exact test. "*P*" < 0.05 was considered significant.

Results and Discussion: About 44.28% of the patients had lesions on endoscopy. Erosions were the common lesions at 77.41%. About 48.75% of patients had lesions in the pantoprazole group and 40.0% had lesions in the sucralfate group. About 51.42% patients had burns between 41% and 50% TBSA. Among them, 58.33% had lesions.

Conclusions: Incidence of lesions has a direct relation to the percentage of burns. There is no significant difference in the incidence between pantoprazole and sucralfate group. Sucralfate has a better healing of lesions and also helped in preventing erosions from progressing to ulcers than pantoprazole.

Key words: Endoscopy, Lesions, Pantoprazole, Percentage of burns, Sucralfate

INTRODUCTION

Acute gastroduodenal ulceration (Curling's ulcers) is the most life-threatening gastrointestinal complication that can follow thermal burns.

Curling's ulceration of the stomach and duodenum is due to a decrease in mucus production by the stomach and is related to the magnitude of the burn. Gastrointestinal erosions occur within 5 h of injury in 80% of all patients with severe burns. These erosions cause only minor upper gastrointestinal bleeding, but within 72 h many of these may progress to frank gastrointestinal ulcerations (Curling's ulcer) result in major hemorrhage. Although not common, perforation and hemorrhage are always potentially fatal complications. Prophylactic treatment with antacids or H_2-receptor antagonists has dramatically reduced the incidence of gastrointestinal bleeding in many burn units. Disruption of gastric mucosal barrier and increased gastric acid secretion is primarily implicated as causes of gastrointestinal lesions in burns patients.[1] Successive and serial upper gastrointestinal endoscopic evaluation is a good method to know the exact incidence and behavior of these lesions, and also helps in

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Corresponding Author: Dr. Baliram Chikte, Flat No 402, Prabhat Apartments, East Maredpally, Secunderabad - 500 026, Telangana, India

observing the influence of medication on such lesions. To determine the effectiveness of gastric acid neutralization and their efficacy in prevention of gastrointestinal lesions and clinical complication of the selected drugs, burn patients were randomly divided between sucralfate and proton pump inhibitor (PPI) therapy.

The symptoms of gastrointestinal lesions vary from pain and tenderness to pressure on the epigastrium, to improper digestion and vomiting. When ulceration ensues, the stools are dark and bloody. In very acute instances, either hemorrhage or perforation may be the initial sign, and there may be no symptoms at all. In addition to the local pathology, there are inevitable systemic and constitutional complications characterized primarily by pain and shock. The first concern in management of these lesions is to prevent formation of these lesions and avoid complications.

Sucralfate

Sucralfate is composed of sucrose octa sulfate and aluminum hydroxide, which dissociates in the acid environment of the stomach and is polymerized to a viscous sticky substance that binds to the proteinaceous exudate usually found at ulcer sites.[2] Sucralfate prevents hydrogen ion back-diffusion, protects the ulcer against pepsin and bile, and therefore promotes ulcer healing. Apart from formation of a protective physical barrier there is stimulation of mucosal defense and reparative mechanisms related to stimulation of local Prostaglandin E_2 and Prostaglandin I_2 production.[3]

Pantoprazole

Pantoprazole is a PPIs. Under acidic conditions in parietal cells, the sulfhydryl bond irreversibly inactivates the pump, rendering it incapable of secreting gastric acid. PPIs s inhibit both histamine induced and vagally mediated gastric acid secretion.[3]

MATERIALS AND METHODS

A prospective study is undertaken over a period of 26 months with 70 patients included in the study. These patients were divided into two equal groups of 35 each: Group I (Pantoprazole) and Group II (Sucralfate). Ethical committee clearance and consent from the patients were taken. Burn patients after admission were assessed for percentage and those with burns between 15% and 55% are taken into study group with following inclusion and exclusion criteria.

Inclusion Criteria

The following criteria were included in the study:

- Patients presenting with burns of 15%–55%,
- Both genders
- Ages between 18 and 60 years.

Exclusion Criteria

The following criteria were excluded from the study:

- Patients under 18 years and above 60 years
- Habitual alcoholics and smokers
- Pregnant women
- Those with facial/respiratory burns
- Chemical burns
- Those with history of acid peptic disease, or significant medical illnesses.
- Group I: These patients were given injection pantoprazole at a dose of 40 mg intravenously once daily from the time of admission
- Group II: These patients were given syrup sucralfate at a dose of 2 g every 4th hourly from the time of admission orally or through nasogastric tube.

All the patients were followed up with clinical symptoms and their regular assessment. Serial endoscopies were done in selected patients at an interval of 2 weeks till the lesions healed if noted on initial endoscopy.

RESULTS

Relationship of Percentage of Burns to Number of Patients

The study group comprised 70 patients. The patients with burns between 15% and 55% were taken in to study. Among the 70 patients, 13 (18.57%) patients had burns of 15–30%, 21 (30.0%) patients were admitted with burns of 31–40%, and 36 (51.42%) patients had burns of 41–55%.

On doing upper gastrointestinal endoscopies in these patients in the 1st week of burns, lesions were noted in 31 patients out of the study group of a total of 70 [Figure 1].

The Incidence of Endoscopic Lesions

Diagram 2 shows the incidence of lesions in this study. During this study, endoscopies were started in the 1st week of burns among the selected patients in each group. Lesions were noted in 31 patients out of the study group of a total of 70 [Figure 2].

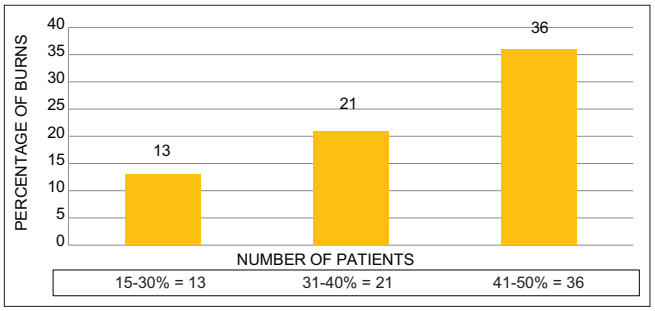

Figure 1: Relationship of percentage of burns to number of patients

Relation of Percentage of Burns to Lesions

Among the 13 patients admitted with 15–30% burns, two (15.38%) patients had endoscopic lesions. In 21 patients admitted with 31–40% burns, eight (38.09%) patients showed lesions on endoscopy and of the 36 patients admitted with 41–55% burns, and 21 (58.33%) patients had endoscopic lesions [Table 1].

The "*P*" value here is 0.022 which is significant.

Incidence of Lesions in Each Group

In Group I (Pantoprazole, n = 35), endoscopic lesions were seen in 17 (48.57%) patients. In Group II (Sucralfate, n = 35), endoscopic lesions were seen in 14 (40%) patients. "*P*" = 0.631 is not significant [Table 2].

Relationship of Percentage of Burns to Lesions in Each Group

Among 13 patients admitted with 15-30% burns, two (14.28%) patients of Group II (Sucralfate) had endoscopic lesions. In 21 patients admitted with burns of 31-40%, five (29.41%) patients of Group I (Pantoprazole) and three (21.42%) patients of Group II (Sucralfate) had endoscopic lesions. And of the 36 patients admitted with 41%–55% burns, 12 (70.58%) patients in Group I (Pantoprazole) and nine (64.28%) of Group II (Sucralfate) had endoscopic lesions [Table 3].

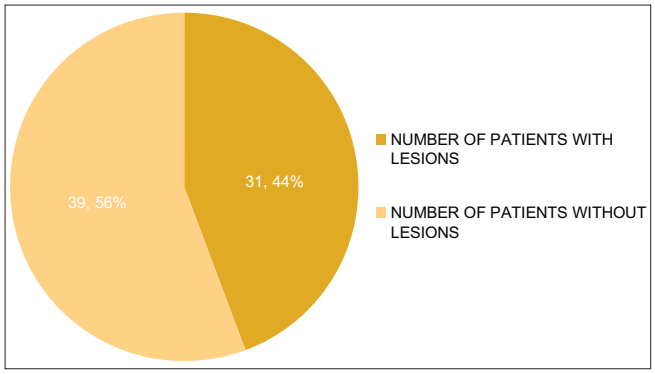

Figure 2: The incidence of endoscopic lesions

Table 1: Relation of percentage of burns to lesions

Percentage of burns	Number of patients	Number of patients with lesions	Percentage
15–30	13	2	15.38
31–40	21	8	38.09
41–55	36	21	58.33

Table 2: Incidence of lesions in each group

Group	Total number of patients	Patients with lesions	Percentage
Group I (pantoprazole)	35	17	48.57
Group II (sucralfate)	35	14	40.0

Type of Endoscopic Lesion (n = 31)

The study was done in 70 patients with burns, of which 31 patients had endoscopic lesions. Twenty-four of the 31 (77.41%) patients had erosions on endoscopy, and seven of 31 (22.6%) patients developed ulcers [Table 4].

Relationship between Age, Percentage of Burns, and Lesions

Maximum number of burn patients, 46 of 70 (65.71%), was in the age group of 18–30 years. Furthermore, most of the lesions, (erosions-18+ulcers-3), 21 of the 31 (67.74%) are noted in this age group [Table 5].

Type of Lesions in Each Group

Erosions (n = 24): Among the 24/70 (77.41%) patients who had only erosions on endoscopy during this study, 11 of the 35 (31.43%) patients of Group I (Pantoprazole) showed erosions, while in a total of 35 patients in Group II (Sucralfate) 13 (37.14%) patients had erosions.

Ulcers (n = 7): During this study, we noticed ulcers in seven out of 70 (22.6%) patients on endoscopy. These ulcers were seen in six (17.14%) patients out of 35 in Group I (Pantoprazole), while only one (2.86%) patient out of 35 in Group II (Sucralfate) developed ulcer. "*P*" = 0.094 shows that there is no significant association between erosions and ulcers among groups [Table 6].

Site of Endoscopic Lesions in Upper Gastrointestinal Tract

Erosions (n = 24): Of the 24 (34.28%) patients who had erosions on endoscopy, 4.28% patients had erosions in esophagus, 24.28% patients had them in stomach, and 5.71% patients had erosions in duodenum.

Ulcers (n = 7): Among the total 70 patients who underwent endoscopies, seven (10%) patients had ulcers. None was in esophagus. In 2.85% patients, ulcers were seen in stomach. And in five 7.14% patients, ulcers were in duodenum [Table 7].

Healing of Lesions

In Group I (Pantoprazole) of the 35 patients, 17 (48.57%) patients had endoscopic lesions in the form of erosions and

Table 3: Relationship of percentage of burns to lesions in each group

Groups	Number of patients with lesions	Number of patients with lesions in each percentage range of burns		
		15%–30% (n=13), n (%)	31%–40% (n=21), n (%)	41%–55% (n=36), n (%)
Group I (Pantoprazole)	17	-	5 (29.41)	12 (70.58)
Group II (Sucralfate)	14	2 (14.28)	3 (21.42)	9 (64.28)

ulcers. In 14 patients, that is, 82.35% the lesions healed in 4 weeks. However, it took 6 weeks for the lesions to heal in three, that is, 17.64% of patients.

In Group II (Sucralfate), of the 35 selected patients, 14 patients had endoscopic lesions. Nine (64.28%) patients showed healed lesions in 4 weeks at serial endoscopies. However, in five (35.71%) patients it took 6 weeks to heal the lesions [Table 8] $P = 0.413$. "*P*" value states that the association between lesions and healing time is not significant.

Incidence of Endoscopic Bleed

A total of four in 70 (5.71%) patients showed evidence of endoscopic bleed.

In Group I (Pantoprazole), three (3/35) patients, that is, 8.57% had evidence of endoscopic bleed. While only one (1/35) patient 2.85% from Group II (Sucralfate) showed bleeding on endoscopy [Table 9] $P = 0.60$ There is no significant association between groups and bleeding lesions on endoscopy.

Type of Bleeding Lesions in Each Group

Bleeding erosions: In a total of 13 patients who had erosions from Group II (Sucralfate), one patient with erosion, that is 7.69%, showed bleeding on endoscopy. In Group I (Pantoprazole) one out of 11 (9.09%) patients with erosions had bleeding.

Bleeding ulcers: Of the six patients who had ulcers in Group I (Pantoprazole), two patients, that is, (2/6) 33.33% patients had bleeding from the ulcers on endoscopy [Table 10] $P = 0.333$, there is no significant association between bleeding erosions and bleeding ulcers among groups.

Incidence of Clinical Bleed

Only one patient 2.85% out of 35 patients in Group I (Pantoprazole), presented with hematemesis and melena.

Table 4: Type of endoscopic lesion

Total number of patients	Number of patients with lesions, *n* (%)	Erosions, *n* (%)	Ulcers, *n* (%)
70	31 (44.28)	24 (77.41)	7 (22.6)

Table 5: Relationship between age, percentage of burns, and lesions

Age group	Number of patients, *n* (%)	Range of burn percentage	Type of lesion
18–30	46 (65.71)	20–45	Erosions - 18, Ulcers - 3
31–45	17 (24.28)	27–48	Erosions - 4, Ulcers - 4
46–60	7 (10)	20–50	Erosions - 2, Ulcers - 0

DISCUSSION

Stress-related mucosal damage (SRMD) is an erosive process of the gastroduodenal mucosa that occurs with abnormally high physiologic demands such as burns. Within hours of the onset of critical illness, macroscopic mucosal damage is apparent as subepithelial petechiae. Endoscopic evidence of stress gastritis occurs within 24 h of admission to an intensive care unit and may progress rapidly to erosive ulceration.[3]

Superficial mucosal erosions are asymptomatic but become symptomatic with exposure of superficial vessels presenting as hematochezia, melena, hematemesis, and bloody or coffee ground aspirates. Clinically significant bleeding is caused by deep ulceration into the submucosa and muscularis propria where erosion of larger vessels occurs, producing hemodynamic changes.

The rate of overt bleeding from SRMD varies between 0.1% and 39% in patients not receiving prophylaxis. Clinically significant bleeding from SRMD is associated with increased morbidity, lengthened hospital stays, and mortality rates >50%.[3]

To avert morbidity and mortality associated with clinically significant bleeding from SRMD, current recommendations are to provide stress ulcer prophylaxis with an antacid,

Table 6: Type of lesions in each group

Group	Total number of patients (*n*=70)	Patients with lesions (*n*=31), *n* (%)	Erosions (*n*=24), *n* (%)	Ulcers (*n*=7), *n* (%)
Group I (pantoprazole)	35	17 (48.57)	11 (31.43)	6 (17.14)
Group II (sucralfate)	35	14 (40.0)	13 (37.14)	1 (2.86)

Table 7: Site of endoscopic lesions in the upper gastrointestinal tract

Type of lesion	Total number of patients, *n* (%)	Esophagus, *n* (%)	Stomach, *n* (%)	Duodenum, *n* (%)
Erosion	24 (34.28)	3 (4.28)	17 (24.28)	4 (5.71)
Ulcer	7 (10)	-	2 (2.85)	5 (7.14)

Table 8: Healing of lesions

Group	Number of patients with lesions	Lesions healing in 4 weeks, *n* (%)	Lesions healing in 6 weeks, *n* (%)
Group I	17	14 (82.35)	3 (17.64)
Group II	14	9 (64.28)	5 (35.71)

Table 9: Incidence of endoscopic bleed

Group	Patients with lesions	Number of bleeding lesions on endoscopy, *n* (%)	Number of lesions which did not bleed
Group I	17	3 (8.57)	14
Group II	14	1 (2.85)	13

Table 10: Type of bleeding lesions in each group

Group	Patients with lesions	Bleeding erosions, *n* (%)	Bleeding ulcers, *n* (%)
Group I	17	1 (9.09)	2 (33.33)
Group II	14	1 (7.69)	-

a histamine2-receptor antagonist, or sucralfate.[3] PPIs maintain intragastric pH ≥4 for prolonged periods and have few adverse effects.

PANTOPRAZOLE is a PPIs acting on gastric parietal cells inhibiting acid hypersecretion.

SUCRALFATE is aluminum magnesium suspension which coats the gastric mucosa and protects it from the adverse effects of acid hypersecretion.

During this study, the earliest endoscopy was done on 4th day and erosion was observed appearing as early as 4th day after burns. It was also noted that as the percentage of total body surface area of burns increases, the number of patients who develop endoscopic lesions has increased. Pruitt' *et al* revealed similar findings that the incidence of Curling's ulcer increased with increasing burn percentage.[4]

The youngest patient was 18 years old while the oldest was of 56 years. Upper gastrointestinal lesions were found in nearly half of the study group that is 31 patients out of a total of 70 patients. All the patients with lesions were followed up with serial endoscopies at 2 weeks interval. The incidence of lesions in this study is 44.28%. Kumar and Sudhakar[5] in their study reported an incidence of 45.7%.

More number of burn patients, 46/70 (65.71%), were in the age group of 18–30 with21/31 (67.74%) showing lesions. Although the range of TSAB is similar to those of age group between 46 and 60, the more number of patients can be ascribed to the suicidal burns in this group compared to accidental cause in elderly.

The clinical presentation of the patients with lesions was upper abdominal pain and discomfort, sometimes with hematemesis and coffee colored aspirates from nasogastric tube. Once the treatment is started in each group, symptoms decreased. Lesions appeared in the groups in the form of either erosions or ulcers. In pantoprazole group, incidence of lesions was 48.57% and in sucralfate group the incidence is 40%.

The incidence of lesions in Group II (Sucralfate) was only marginally less than Group I (Pantoprazole) which can be explained for the reason that PPIs are effective in decreasing acid hypersecretions when started early in treatment. Sucralfate, on the other hand, effectively coats and protects the mucosal layer thus preventing the hyperacidity due to burns from further damaging the ischemic areas due to shock. However, the patient compliance in adhering to the dose quantity and frequency is of also significant for efficacy of the drug.

Common lesion observed was erosion, seen in a total 77.41% of 70 patients of which 31.43% were in pantoprazole group while 37.14% of sucralfate group had lesions. Ulcers were seen in 10%, most of them in duodenum, six in pantoprazole group, and one in sucralfate group. From this study, we could asses that though erosions were seen most in sucralfate group, very few progressed to ulcers. This enabled us to conclude that sucralfate is efficacious in preventing erosions from progressing to Curling's ulcers.

Observations regarding healing of lesions were that all the lesions took between 4 and 6 weeks to heal. Most of them healed by 4 weeks that is 82.35% of Group I and 64.28% of Group II. In 17.64% of Group I and 35.71% from Group II it took 6 weeks for the lesions to heal. Although the PPIs have revolutionized the treatment of acid peptic disorders and also as prophylactic drug in stress induced upper gastrointestinal lesions, this study could not conclude significant difference in the data between pantoprazole and sucralfate. Moreover, the superiority of one over the other is not clearly established.

An overall of four patients in the two groups had bleeding from the lesions, three from Group I and one from Group II. These bleeds were seen on 8th day in 51% burns patient, on 11th day in patient with 45% burns, and on 15th post burns day in patient with 48% burns. Two were erosions that bled and one was from ulcer. Only one patient in Group I (pantoprazole) showed clinical signs of bleed and presented with hematemesis and coffee ground aspirates from nasogastric tube.

In this study, there were three deaths out of 70 patients (4.28%). Sepsis is a major cause of death in burn patients. Inadequate volume replacement in the presence of hypovolemia and shock with or without sepsis is known to cause ischemia of the bowel mucosa[6] which leads to translocation of bowel pathogens into the systemic circulation causing septicemia and multiorgan failure. Early and vigorous fluid resuscitation plays an important role in the prophylaxis of ischemic mucosal injury and stress ulcers.

The "*P*" values of percentage of the burns to the number of patients with lesions are significant 0.022 which asserts the finding made by Kirksey and Pruitt[7] that Curling's ulceration of the stomach and duodenum is the most prevalent problem and is related to the magnitude of the burn. Furthermore, "*P*" = 0.018 of common site of lesion being stomach in the upper gastrointestinal tract is significant with similar observation made in another study.

CONCLUSIONS

The conclusions drawn from this study are as follows:

1. The study results have revealed a significant association between percentage of burns to the number of patients
2. Incidence of the upper gastrointestinal lesions has a direct relation to the percentage of burns. Incidence of lesions increases with the increase in total body surface area of burns (15–30% had two patients with lesions, 31–40% had eight patients with lesions, and 41–55% had 21 patients with lesions)
3. The incidence of lesions in this study is 44.28%. The lesions appeared as early as 4 post-burn day
4. Erosions 24/31(77.41%) were the most common lesions observed than ulcers 7/31 (22.6%)
5. Adult population of age 18–30 years are commonly affected with burns (65.71%) and gastrointestinal lesions are also commonly seen (67.74%) in them
6. The lesions which bled on endoscopy are more in pantoprazole group 3/17(8.57%) than in sucralfate group 1/14(2.85%)
7. Erosions were predominantly seen in stomach 17/70 (24.28%) and ulcers frequented 5/70 (7.14%) in duodenum
8. There is a difference in the incidence of lesions in pantoprazole group 17/35 (48.57%) and sucralfate group 14/35(40.0%)
9. The superiority of one drug over the other in preventing occurrence of lesions is not established
10. Sucralfate showed a better healing of lesions and also helped in preventing erosions from progressing to ulcers than pantoprazole
11. There was less number of patients with ulcers in sucralfate group 1/7 (2.85%) than pantoprazole group 6/7 (17.14%).

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REFERENCES

1. McAlhany JC Jr., Colmic L, Czaja AJ, Pruitt BA Jr. Antacid control of complications from acute gastroduodenal disease after burns. J Trauma 1976;16:645-8.
2. Spirt MJ. Spirt Stress-related mucosal disease. Curr Treat Options Gastroenterol 2003;6:135-45.
3. Jung R, MacLaren R. Proton-pump inhibitors for stress ulcer prophylaxis in critically ill patients. Ann Pharmacother 2002;36:1929-37.
4. Pruitt BA Jr., Foley FD, Moncrief JA. Curling's ulcer: A clinical-pathology study of 323 cases. Ann Surg 1970;172:523-39.
5. Kumar AS, Sudhakar GV. Upper gastrointestinal lesions and bleed in burn injuries: An endoscopic evaluation. Indian J Burns 2014;22:72-8.
6. Czaja AJ, McAlhany JC, Pruitt BA. Acute duodenitis and duodenal ulceration after burns. JAMA 1975;232:621-6.
7. Kirksey TD, Pruitt BA. Gastrointestinal complications in burns. Am J Surg 1968;116:627-33.

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