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Acute Gastroduodenal Mucosal Lesions in Obstructive Jaundice: An Overview of Clinical and Pathogenetic Problems

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Abstract

Fourteen patients with obstructive jaundice were investigated. We have investigated the mucous membrane (by fibrogastroduodenoscopy) of the stomach and the duodenum, the fasting gastric juice pH and level of serum gastrin (by radioimmunoassay method). The study showed a high incidence (71.4%) of gastroduodenal mucosal changes; 57% had gastritis, 14% had duodenitis; mucosal haemorrhages were in 7% and, peptic ulceration of the stomach in 7%. However, 14% were symptomless. The level of fasting gastric juice pH was between 1-3 in this group. In four patients, we did not find any changes of stomach and duodenum, they had fasting gastric juice pH more than 3.Serum gastrin level, which is stimulated by gastric secretion, is high in 42.8% of patients and shows positive correlation ($r = 0.639$, $p < 0.001$) with the duration of the obstruction.Thus patients with obstructive jaundice and with normal or increased acidity is the group of risk for acute lesions of mucous membrane of stomach and duodenum. This may be the result of preventing the flow of bile and the pancreatic juice into the intestine which plays a role in the pathogenesis of this defect. Particularly this provokes the interaction in circuit of gastrointestinal hormones. These patients need early prophylaxis and treatment of these lesions.

Introduction

DESCRIPTION on obstructive jaundice and acute upper gastrointestinal haemorrthage have long been attracting the attention, starting in 1855 when Berg and Jobling [1] had found the complication of gastroduodenal ulcer in autopsied cases of obstructive jaundice in high frequency

Moreover, many experimental models [2], reported the production of gastric and duodenal ulcer by interference of the flow of bile into the intestine. These significant changes were respected as a cause of peptic ulcer disease in man. As a result, the indication of an operation for the cases of obstructive jaundice has been widened, and the results of operations have been improved. On the other hand, acute gastroduodenal mucosal changes, a serious complication of obstructive jaundice, is more recognized, and more detailed clarification and more suitable counter-measures for these changes have been awaited.

With a view to elucidating the clinical endoscopic appearance and some pathogenetic mechanisms of the acute gastroduodenal mucosal changes associated with obstructive jaundice, the present study was performed.

Material and methods

This study included 14 patients with obstructive jaundice, 6 males and 8 females. These patients were admitted in the department of General Medicine, El-Minia University Hospital and were subjected to: History taking and clinical examination : Patients with past history suggestive of peptic ulcer disease, antirheumatic drug users, smokers and patients with chronic liver or pulmonary diseases were excluded from the study. The following liver function tests were done: serum bilirubin [3] ; serum transaminases [4]; serum alkaline phosphatase [5]; serum proteins [6] and prothrombin time [7]. Abdominal ultrasonography using a real time machine (Hitachi EUB 240], linear array scanner with 3.5 MHZ transducer. Upper gastrointestinal endoscopy was done using the Olympus G.I.F. type XQ 20 fibroscope. Pre-medication was done by xylocain spray (10%) only. Collection of fasting gastric juice was made by pump suction through a nasogastric tube. Acid was measured by autotitration.

Fasting serum gastrin hormone assay was done bydouble-antibody ^{125}I radioimmunoassay [8] using kits from Diagnostic products corporation (5700 West 96th street, Los angeles, CH 900 45).

Results

Fourteen patients with obstructive jaundice, 11 cases with surgical obstruction and 3 with medical intrahepatic obstruction. Medical records were reviewed for symptomatology. Epigastric pain was present in 3 cases associated with vomiting in 2 cases and heartburn in one patient.

Abdominal sonography showed dilated common bile duct and intrahepatic biliary radicles in patients with surgical obstructive jaundice. Distended gall bladder was found in five cases.

Table (1) showed the clinical characters and the laboratory investigations of patients with obstructive jaundice.

The mean ± SD value of serum gastrin level in the patients group was 102.9 ±

Table (1): Clinical Charachers and Laboratory Investigions with Obstructive Jaundice.

No.	Age (year)	Sex (M-F)	Cause of obstruction	Duration of obstruction (days)	PT*	Serum total (mg/dL)	Bilirubin direct (mg/dL)	Alkalin phosph. (K.A.U.)	Liverenzymes SGOT (IU/L)	Liverenzymes SGOT (IU/L)	Serum Total (gm/dL)	Proteins Albmin (gm/dL)
1	60	F	Calcular	60	30	17.9	13.6	123	91	42	6.4	2.4
2	46	M	Maligant	40	80	12.1	8.6	105	26	43	7.4	2.8
3	52	F	B Cirrh.	730	61	15.0	13.0	53	43	15	8.2	2.1
4	48	M	IHO	90	65	15.0	10.0	86	29	20	7.0	3.8
5	20	M	Malignant	90	60	19.7	15.2	59	39	14	6.4	2.4
6	6	M	Malignant	40	70	16.0	13.0	40	15	20	6.5	4.0
7	60	M	Malignant	50	60	17.0	4.0	40	20	30	7.0	4.0
8	80	M	Malignant	30	62	20.0	16.0	87	19	13	7.5	3.9
9	45	F	Calcular	30	65	18.0	14.0	60	20	15	4.7	4.1
10	65	M	Malignant	60	82	8.6	6.9	45	46	90	8.0	4.0
11	50	F	Maligant	45	100	20.0	13.0	93	89	25	8.2	3.9
12	75	M	Calcular	30	80	15.0	12.0	95	20	12	8.0	4.0
1	50	F	IHO	20	70	13.2	9.0	45	108	77	8.0	4.1
14	45	M	Malignant	45	80	12.0	11.0	60	20	18	7.4	3.1
x	35.36			97.14	70.36	15.68	12.9	70.79	41.79	31.00	7.39	3.47
SD	14.59			138.35	15.8	3.39	2.65	26.87	31.15	24.49	0.65	0.74
SE	3.90			49.00	4.2	0.91	0.71	7.18	8.32	6.54	0.17	0.20

* P.T.= Prothrombin Time .

70.7 compared to 54.7 ± 6.7 Pgm/ml in the control group. The difference was highly ($p < 0.001$) significant (Table 2). Moreover, there is highly significant correlation (r=0.63, $p < 0.001$) between the level of serum gastrin level and duration of obstruction while no significant correlation was found between serum gastrin and biochemical parameters of liver function tests (Fig., 1).

Table (2) : Serum Gastrin Level (Pg/ml): Comparison Between Patients with Obstructive Janudice and Control group

No	Serum gastrin (pg/mL)	
	Patient's group	Control group
1	61.00	59.71
2	42.14	65.00
3	255.14	50.43
4	178.00	48.86
5	92.14	66.14
6	59.86	45.57
7	111.71	51.86
8	65.43	50.14
9	25.00	53.86
10	42.14	46.86
11	61.75	-
12	212.86	-
13	43.43	-
14	164.29	-
Range	42.14-255.14	46.86-66.14
X	102.98	54.74
SD	70.77	6.71
SE	18.91	2.12
t	1.87	
p	<0.02	

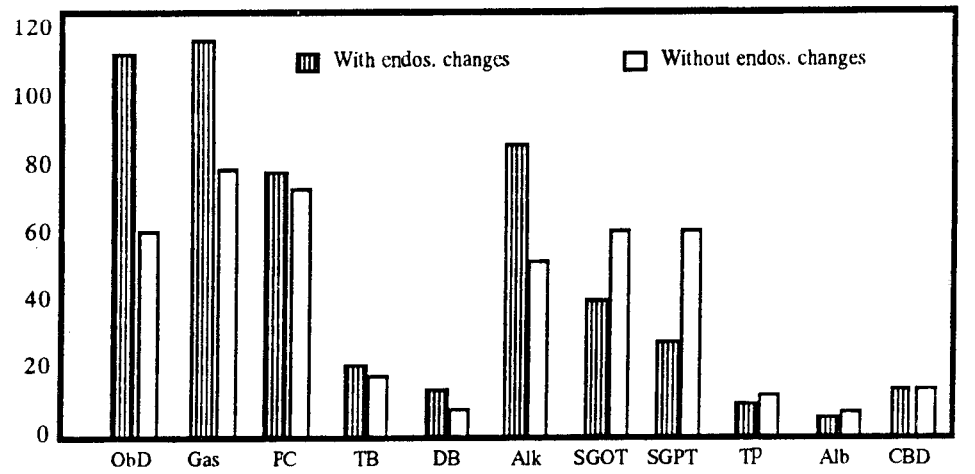
Upper gastroduodenal mucosal changes (Fig. 2,3,4) were reported in 72% of cases whereas 28% had no abnormality (Table 3).

Table (4) presents the comparison of the duration of obstruction, serum gastrin level and liver function tests between cases with endoscopic mucosal changes and those without. There is highly significant increase ($p < 0.02$) of serum alkaline phosphatase and significant decrease ($p < 0.01$) in SGPT in patients with endoscopic mucosal changes compared to the other group.

Table(3):The different Macroscopic (endoscopic) Findings in the Stomach and Duodenum in patients with Obstructive Jaundice.

Macroscopic (endodcopic) mucosal changes	No.of cases	Percentage
Gastritis	8	57%
Gastric errosison	2	14%
Erosive gastritis	2	14%
Body hyperemia	2	14%
Acute gastric ulcer	1	7%
Fundal hyperemia	1	7%
Diffuse hyperemia	0	0%
Mucosal haemorrhage	1	7%
pyloric sphincter	1	7%
(abnor.)	2	14%
Duodenal ulcer	0	0%
N.A.D.	4	28%

Fig .1 : Comparison of differnt parameters (duration of obstruction , serum gastrin level and liver function tests and common bile duct diameter) between patients with and without endoscopic changes.



Ob D= Duration of obstruction (days)
PC = Prothrombin concentration (%)
TB = Total bilirubin (mg/dL)
Alk = Alkaline phosphatase (K.A.U./dL)
TP = Total protein (gm/dL)
CBD = Common bile duct dilatation (mm)

Gas = Serum gastrin level (Pg/mL)
DB = Direct bilrubin (mg/dL)
SGPT = (IU/mL) SGPT = (IU/mL)
Alb = Serum albumin (gm/dL)

Table (4): Comparison of Different Parameters (Duration of Obstruction, Serum Gastrin Level and Liver Function Tests) between Patients with and without Endoscopic Changes.

	Mean value ± SD		*P*
	with endosc. changes (No.=10)	Without changes (No. =4)	
Duration of obstruction (days)	114.0±217.2	55.00±28.87	N.S
Serum gastrin (pg/ml)	115.2±76.99	72.36±35.07	N.S
Prothrombin concentr. (%)	71.3±18.01	68.00±10.46	N.S
Total bilirubin (mg/dL)	16.1±2.86	14.63±4.82	N.S
Direct bilirubin (mg/dL)	12.42±2.12	11.28±3.96	N.S
Alk phosphatse (K.A.U.)	80.2±25.99	47.25±8.18	<0.02
SGOT (IU/l)	37.2±28.9	53.25±38.12	N.S
SGPT (IU/l)	22.3±11.3	522.75±36.49	0.01
Total protein (gm/dL)	7.4±0.63	7.35±00.79	N.S
Albumin (gm/dL)	3.41±0.75	3.63±00.82	N.S

Fig. (2): Endoscopic view of gastritis with multiple erosions and mucosal haemorhages.

Fig. (3): Alkaline reflux gastritis with incompetent pylorus in patients with obstructive jaundice.

Fig. ( ) ...odenitis with multiple erosions.

Discussion

Anatomically and functionally the biliary ducts belong to the duodenal connection system and in their disease they adequately influence liver, pancreas, duodenum, stomach and esophagus, as they on the other hand not infrequently are affected by diseases of these organs. Particularly the coincidence of diseases of the biliary duct and the liver and of diseases of biliary ducts and pancreas, respectively, are observed [9]. Numerous investigators [2] observed the occurrence of peptic ulcers in animals following diversion of duodenal secretions, and attributed the development of these lesions to the loss of the neutralizing influence of the alkaline duodenal fluids on the acid gastric juice.

Complete diversion of bile to the jejunum has been claimed to be associated with an increased incidence of peptic ulcer disease in man and in experimental animals. In hepatojejunostomy. Roux-en-Y, bile is completely diverted from the duodenum and the most proximal part of the jejunum. The reported incidence of peptic ulcer disease ranges from 2 to 22% [10]. In the present study, patients with obstructive jaundice had a high prevalence of acute gastroduodenal mucosal lesions ranging from simple gastritis and duodenitis to peptic ulcer disease. These changes included gastritis (57%), duodenitis (7%), mucosal haemorhages (7%) and peptic ulceration of the stomach (7%). These results were in agreement with previous reports [11,12]. Other authors [13] reported 27.1% acute erosive-ulcerative injuries of the mucosa of the gastroduodenal zone in patients with obstructive jaundice. However, previous experimental studies on obstructive jaundice model [14] reported a rather high incidence of acute gastric mucosal lesions of 35%-39% in the 3-and 4-week of the jaundice group.

More detailed clarifications and more suitable-counter measures were searched for the onset of the acute gastroduodenal lesions. Numerous investigators observed the occurrence of peptic ulcer due to the loss of the neutralizing influence of the alkaline duodenal fluids on the acid gastric juice [1]. Moreover, gastric hypersecretion, decreased serum secretin and elevated levels of serum gastrin has been observed in patients with obstructive jaundice [15]. Complex study of the gastric acid-producing activity and the condition of the gastroduodenal mucosa in patients with obstructive jaundice was done by some authors [13]. They reported that the appearance of acute erosive-ulcerative injuries of the mucosa of the gastroduodenal zone depended on the increase of activity of the peptic factor of the gastric medium namely hyperacidity and high level of blood gastrin. Stimulated peptic factor is evidently linked with secretin deficiency (absence of the effect of bile on the secretin producing S-cells) leading to weakened inhibiting effect of secretin on the serum gastrin content, which results in hypergastrinaemia and hyperacidity.

In the present study, patients with obstructive jaundice with increased acidity is the group of risk for acute lesions of mucous membrane of stomach and duodenum. Besides, hypergastrinaemia plays a significant role in the development of these complications.

Other aetiological factor of gastroduodenal changes may result from impaired active ion transport in the gastric mucosal cells with gastric acid secretion and increased serum bile acids, which were improved after biliary drainage, was reported in experimental obstructive jaundice [16]. In addition, the disturbance of gastric mucosal microcirculation due to reduction of histamine and serotonine contents of the gastric mucosa was reported to occur in rats with obstructive jaundice under cold restrient stress [17]. It was suggested that the storage and release of histamine and 5-HT caused gastric mucosal microcirculatory disturbance, thus associating with the onset of acute gastric mucosal lesions. It was reported that four weeks of biliary obstruction was the critical duration for occurrence of the gastroduodenal lesions in experimental animals and biliary drainage could not imporve the preparatory state for these lesions [14]. In the present study we found that acute gastroduodenal ulcerative lesion in obstructive jaundice patients was related to increased duration of obstruction with significant increase in serum gastrin level.

In conclusion, acute ulcerative gastroduodenal mucosal lesion is a complication of obstructive jaundice. These lesions are related to the duration of biliary obstruction and depend on the increase of activity of the peptic factor of the gastric medium, which results in hypergastrinaemia and hyperacidity. It was suggested therefore that patients with obstructive jaundice should be examined endoscopically for early detection of acute gastroduodenal lesions for early prophylaxis and management. Moreover, early surgical biliary drainage to release the obstruction is recomnended.

References

1. BERG, B. N. and JOBLING, J. W.: Biliary and hepatic factors in peptic ulcers. Arch. Surg., 20: 997-1015, 1930.

2. MANN, F. C. and WILIAMSON, C. S.: The experimental production of peptic ulcer. Ann. Surg., 77:420, 1923.

3. JENDRASSIK. L.: Quantitative methods for measuring serum bilirubin. Biochemistry, 297: 81, 1938.

4. REITMAN, S. and FRANKEL, S.: Am. J. Clin. Path., 28: 56, 1957.

5. WILKNSON, J. H.: The principle and practice of diagnostic enzymology. In: Fundamentals of clinical chemistry. Edward Arnold, London, 1978.

6. GORNALL, A. G.; BARDVILL, C. G. and DAVID, M. M. : Determination of serum proteins by means of the biuret reaction. J. Biol. Chem., 177:751-766 (English Abstract), 1949.

7. OWREN, P. A.: Thrombostat, a new method for controlling anticoagulant Therapy. Lancet, 2: 754, 1959.

8. LINDSTEDT, G., Olbe L., KILANDER A. F., ARMBRECHT U., JAGENBURG R., RUNSTEEN D. LUNDBERG P. A.: Analytical and clinical evaluation of a radioimmunoassay for gastrin. Clin. Chem., 31:76 - 82, 1985.

9. BOSSECKERT, H. : Relation of the biliary tract to other upper abdominal organs. Gesamte. Inn. Med., 35 (16): 672-676, 1980.

10. NIELSEN, M. L.; JENSEN, S. L.; MALMASTROM, J. and NIELSEN. O. V. : Gastrin and gastric acid secretion. In hepaticojejunostomy Roux-EN-Y. Surg. Gyn. Obst., 150: 61 - 64, 1980.

11. KATO, Y.: Experimental studies on ulceration mechanism of acute haemorrhagic gastroduodenal ulcer complicated by obstructive jaundice. Med. J. Hiroshima Univ., 26: 15 - 44, 1978.

12. KODAMA, M.; TAKEUCHI, H.; KODAMA, O.; ITO, N.; TANAKA, T.; TANAKA, T.; HRADA. M.; SEIKOH, R. and EZAKI, H.: Comparative study on acute gastric mucosal lesion in experimental obstructive jaundice and biliary models. Hiroshima J. Med. Sec., 32 : 479 - 484, 1983.

13. UPYREV, A. V.; GUSEV, E.I.U.; ICHEV, V. A.; GORCHAKOV, V. K. and MURATOVA, O. A.: Acute peptic lesions of the gastroduodenal mucosa in patients with obstructive jaundice. Khirurgiia (Mosk): 64 (1): 42 - 46 (English abstract), 1989.

14. TAKEUCHI, H.; KODAMA, O.; OGAWA, Y.; ITO, N.; TANAKA, T.; HARADA, M.; SEIKOH. R. and EXAKI, H. : Experimental studies on acute Gastric mucosal lesion in obstructive jaundice and biliary models with emphasis on the changes of histamine and serotonin in the gastric mucosa. Hiroshima J. Med. Sci., 33 (3): 341 - 347, 1984.

15. MALMSTORM, J.; STADTT, F. and REHFELD, J. F.: Gastrins in serum. Gastroenterol., 70: 695 - 702, 1976.

16. KAMIYAMA, Y.: Effect of obstructive jaundice on the electrophysiological characteristics of the gastric mucosa and gastric acid secretion in rats. Nippon Gekkai Zasshi; 91 (4): 494 - 471 (English Absuact), 1990.

17. KODOMA, O. TAKEUCHI, H.; ITO, N.; TANAKA, T.; SEIKOH, R.; LCHIBA, Y. and EZAKI, H. : Experimental studies on acute gastritis : Mainly on the changes of amine contents in the gastric mucosa on cold restraint stress. Hiroshima J. Med. Sci., 34 (1): 75 - 79, 1985.