PO Box 2345, Beijing 100023, China
Fax: +86-10-85381893
E-mail: wjg@wjgnet.com www.wjgnet.com

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• BRIEF REPORTS •

Effects of bile reflux and intragastric microflora changes on lesions of remnant gastric mucosa after gastric operation

Chao Zhang, Zhan-Kui Liu, Pei-Wu Yu

Chao Zhang, Zhan-Kui Liu, Pei-Wu Yu, Department of General Surgery, Southwest Hospital, Third Military Medical University, Gaotan Yan, Chongqing 400038, China
Correspondence to: Professor, Dr. Chao Zhang, M.D., Department of General Surgery, Southwest Hospital, Third Military Medical University, Gaotan Yan, Chongqing 400038, China. meizhang6688@yahoo.com
Telephone: +86-23-68773074
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Abstract

AIM: To investigate the effects of bile reflux and intragastric microflora changes on lesions of remnant gastric mucosa after gastric operation.

METHODS: Concenration of bile acid and total bacterial counts (TBC) in gastric juice were measured in 49 patients with peptic ulcer before and after gastrectomy. One year after the operation, sample of gastric mucosa taken from all the patients were used for histological examination.

RESULTS: The concentration of gastric bile acid was significantly increased in group B-I, or B-II and SV+A than that in group HSV (P<0.05-0.01). The abnormal histological changes in the remnant gastric mucosa were more common in the first 2 groups than in the last group.

CONCLUSION: The type of gastrtectomy can affect bile reflux. The abnormal histological changes in the remnant gastric mucosa are closely related to the elevation of bile acid concentration and increase of TBC in gastric juice. HSV can effectively prevent bile reflux and keep the gastric physiological functions stable.

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INTRODUCTION

Bile reflux was usually found after routine operation in the treatment of peptic ulcer, and for some patients, it could be found very serious complications, such as epigastric causalgia, obstinate bilious vomiting, body mass descent and so on, its incidence is 5-35%[1-4]. Forty-nine patients with gastric resection in treating peptic ulcer were observed in order to investigate the effects of bile reflux and intragastric microflora changes on lesions of remnant gastric mucosa after gastrectomy gastric resection.

MATERIALS AND METHODS

A total of 49 patients with peptic ulcer (32 male, 17 female, average age 44.3 years) including 14 patients with gastric ulcer, 28 patients with duodenal ulcer and 7 patients with compound ulcer were investigated in a retrospective manner. These patients were divided into 4 groups according to the operation kind: 10 patients with Billroth I (B-I), 14 patients with Billroth II(B-II), 12 patients with selected vagotomy plus antrectomy (SV+A), 13 patients with High selected vagotomy (HSV).

Gastric juice on an empty stomach was been extracted at 3-5 d pre-operation, 7 d post-operation, 3 wk and 1 year post-operation, the bile acid concentration was measured by radio-immunity analysis(RIA), obtained from Wuzhou Institute of Isotope.

A 0.5 mL gastric juice plus 5 mL broth was put into sterilization test tube and cultured at 37 ℃ for 24-48 h, it was defined sterile growth if it had no bacteria growth through observation of 48 h, if bacteria were found, it were separated and evaluated by means of platinum loop.

For pro-operation annual patients, 2 samples of gastric mucosa were fixed by formaldehyde solution, then were observed through light microscope. Diagnosis of gastric ulcer was based on the detection standard of gastric mucosal disease formulated by gastric cancer co-operation group in 1981. The result was indicated by count scores as follow: the normal gastric mucosa was equal to 0; slight-degree, medium-degree, and sever-degree superficial gastritis were 1, 2, and 3; slight - degree, medium-degree, and sever-degree atrophic gastritis were 4, 5, and 6; if gastritis plused slight-degree, medium-degree and severe-degree intestinal metaplasia, the scores would be plus 1, 2, 3.

RESULTS

Bile acid concentration at post-operation 3 wk and 1 year was significantly increased than that at pre-operation in group B-II(P<0.05), and is the same in group B-I(P<0.05) and in group SV+V(P<0.05); Bile acid concentration at post-operation was slight increased (P>0.05). From post-operation 3 wk, bile acid concentration in B-II, B-I and group SV+V were significantly increased than that in group HSV, especially in group B-II(Table 1).

After operation, total bacterial count of gastric juice in group B-II, B-I and group SV+V were significantly increased than that in group HSV(P<0.05-0.01). In this study, 204 samples of gastric juice were cultivated, 88 samples were found bacteria growing in 92 samples that pH was>4.0 and the count of bacteria will be more along the higher of pH(r=0.784, P<0.01). Gram-Negative bacillus were always found after operation, and associated with the level of bile reflux. The rate of finding Gram-Negative bacillus was 64.1% in group B-II, 25.81% in group B-I, 29.62% in SV+A, and 10.25% in group HSV and significantly lower than that in 3 groups (P<0.01, P<0.05, P<0.05). *Escherichia coli* and *Bacillus proteus* were common in group B-II, B-I and group SV+V, but, *Streptococcus* and *Lactobacillus* were common in group HSV.

During 1 year after operation, the incidence of atrophic gastritis was 35.7% in group B-II, 30% in group B-I, 33.3% in SV+A, 15.4% in group HSV. The incidence of Intestinal metaplasia was 28.6% in group B-II, 20% in group B-I, 25% in SV+A, 7.8% in group HSV. It was found by statistics analysis that the degree of change of gastric remnant

Table 1 Changes of bile acid concentration of gastric juice in different group(C_B / nmol· mL^{-1}, mean±SD)

Group	*n*	Pre-operation	Post-operation		
			1 wk	3 wk	1 yr
B-I	14	21.15±9.36	36.50±25.27	76.60±48.38[b]	59.75±29.80[b]
B-I	10	22.17±7.74	45.13±19.08[a]	52.98±25.04[a]	43.79±9.89[b]
SV+A	12	22.43±10.15	39.04±18.72	54.84±27.49[a]	46.33±14.52[b]
HSV	13	23.54±11.56	30.12±17.24	28.02±16.18	27.68±15.44

[a]$P<0.05$, [b]$P<0.01$ *vs* HSV.

Table 2 Changes of total bacterial count of gastric juice in different groups (log10 / mL, mean±SD)

Group	*n*	Pre-operation	Post-operation		
			1 wk	3 wk	1 yr
B-II	14	1.27±2.14	3.83±2.09[a]	4.86±0.38[b]	3.97±1.97[b]
B-I	10	1.77±2.35	4.30±1.64[a]	4.33±1.55[a]	3.82±1.99[b]
SV+A	12	1.84±2.27	3.90±1.79[a]	4.13±1.68[a]	3.85±2.04[b]
HSV	13	1.26±2.07	2.41±2.35	2.59±2.78	1.56±2.13

[a]$P<0.05$, [b]$P<0.01$ *vs* HSV.

Table 3 Results of histological examination of remnant gastric mucosa 1 year after operation

Group	*n*	Normal	Superficial gatric	Atrophic gastritis			Intestinal metaplasia		
				Slight	Medium	Severe	Slight	Medium	Severe
B-II	14	0	9	2	2	1	1	1	2
B-I	10	0	7	2	1	0	1	0	1
SV+A	12	0	8	1	1	1	1	1	1
HSV	13	0	10	1	1	0	1	0	0

histological abnormality alteration in group B-II, B-I and group SV+V was significantly higher than that in group HSV (*t* values separately were 2.047, 2.025, 2.029, $P<0.05$), and the change of gastric remnant histological abnormality alteration associated with increasing of concentration of gastric juice cholalic acid.

DISCUSSION

Bile reflux was common in gastric post-operation and the mod of operation could affect the degree of bile reflux, generally speaking, it was slight after high selected vogotomy, it was severe after gastrectomy, and it was very common in Billroth II[1]. In our study, the concentration of gastric juice cholalic acid was significantly increased in group B-II, it was higher in group B-I and group SV+V than that in group HSV, There was no significant difference between pre-operation and post-operation in group HSV although it was slight higher after operation, so it suggested that HSV could reduce bile reflux. Traditional gastrectomy and SV+A destructed the normal gastric dissection and deleted the function of Pyloric and innervation, these factors resulted in gastric emptying disorder and dodecadactylon incteased reversed peristalsis, so bile reflux was increased and it could lead to the lesion of gastric mucosa. HSV remained the Pyloric dissection and innervation, it maintained the usual diet passage, and the function of Pyloric is normal, so it could prevent intestines and stomach reflux[2].

Alkaline reflux gastritis was a complex complication after gastric operation, and its mechanism is not yet fully understood. We think when mod of operation was selected, we should excerpt the mod in coincidence to normal physiology function and based on the patient' s specific situation in order to reduce the complication.

The effect of bile reflux on total bacterial count and the changes of remnant gastric mucosa histological Current concepts suggest that gastric acid posses strongly germicidal effect, the count of bacteria of gastric acid was only 10^5/mL, and the denomination of bacteria was similar to that in buccal cavity. Oxyntic cell was deleted or its innervation was broken after gastric operation, so the ability of stomach excreting acid was decreased, the data of pH were creasing, if the small intestinal juice including bile reflux to stomach, the data of pH would be more increased. These factors are advantageous to bacteria growth and breeding, resulted in intragastric bacterial over-growth (IBO), the flora in Lower digestive tract (especially Gram-Negative bacillus and Anaerobe) could reflux to stomach and reproduced here[5-10]. Because of these bacteria, the conjugate cholalic acid changed to freeing cholalic acid which has a strongly toxic effect, and the following could damaged the integrity of gastric mucosa, certain cationic permeability could increased, such as H+ could contra-direction diffuse, and these changes can resulted in Mast cell releasing histamine and 5-sertonin, so it could be found capillary telangiectasia, mucosa hyperemia, edema, bleeding, and superficial Ulceration[11,12].

In our study, the concentration of cholalic acid in gastric juice was higher, the bacterial count of gastric juice was more, and the denomination of flora in intestinal tract was more. Pathological examination found that flaming cell infiltration, atrophic gastritis, and intestinal metaplasia, all these could indicate that the abnormal histological changes of gastric mucosa associated with the increasing concentration of choloalic acid in gastric juice and increasing total bacterial count of gastric juice.

The role of dodecadactylon regurgitation resulting in gastric mucosa precancerous lesion and gastric cancer was though highly, Houghton *et al.* found that follicle cell and DNA count was increased if rat was raised by carcinogens (MNNG) and

at the same time reinforced regurgitation from dodecadactylon to stomach, so the ratio of gastric carcinoma was significantly increased. Freeing cholalic acid was confirmed as carcinogen, it could resulted in stomach carcinoma if it was higher in a long term[13-17]. For patients with higher concentration of cholalic acid in gastric juice, intragastric bacterial over-growth (IBO), and pathological examination finding abnormal changes, should be thought highly of the occurrence of stomach carcinoma.

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