The Influence of the Different Morphological Changes on Gastric Mucosa on Somatostatin Cell Number in Antrum Mucosa and Serum Somatostatin

Silvio Mihaljević1, Miroslava Katičić2, Željko Krznarić3, Branko Dmitrović4, Ivan Karner5, Mario Štefanić5, Ljerka Pinotić6, Marina Samardžija7 and Mirta Benić8

1 «J. J. Strossmayer» University, Osijek University Hospital Center, Department of Gastroenterology and Hepatology, Osijek, Croatia
2 University of Zagreb, «Merkur» University Hospital, Department of Gastroenterology and Hepatology, Zagreb, Croatia
3 University of Zagreb, Zagreb University Hospital Center, Department of Gastroenterology, Zagreb, Croatia
4 «J. J. Strossmayer» University, Osijek University Hospital Center, Department of Pathology, Osijek, Croatia
5 «J. J. Strossmayer» University, Osijek University Hospital Center, Department of Nuclear Medicine, Osijek, Croatia
6 «J. J. Strossmayer» University, Osijek University Hospital Center, Department of Pediatrics, Osijek, Croatia
7 «J. J. Strossmayer» University, Osijek University Hospital Center, Department of Transfusiology, Osijek, Croatia
8 «J. J. Strossmayer» University, Economic Faculty, Department of Mathematics, Osijek, Croatia

ABSTRACT

The aim of our paper was to investigate the influence of the different morphological changes on gastric mucosa on somatostatin D-cell number in antral mucosa and serum Somatostatin. We analyzed according to Sydney classification to what extent the severity of gastritis affect the observed hormonal values. Somatostatin D-cell number in antral mucosa and serum Somatostatin values were compared between three groups of patients; mild, moderate and severe cronic gastritis. The average number of somatostatin cell in biopsy sample of antrum mucosa was 30.41 ± 35.38 (N=17) in the case of middle form, 18.69 ± 26.65 (N=56) in moderate and in severe case of chronic gastritis 5.23 ± 5.93 (N=7) cells in mm² of mucosa. The level of somatostatin in the serum of middle form gastritis were 26.43 ± 28.76, moderate 19.95 ± 35.93 and severe 17.88 ± 17.66 pg/mL. In order to determine the number of somatostatin cells in antrum mucosa and serum somatostatin with present morphological changes of mucosa, it might helpful to exclude the patients with non-ulcer dyspepsia, but with the higher risk of premalignant and malignant changes.

Key words: chronic gastritis, somatostatin D-cell, serum somatostatin

Introduction

Somatostatin is a hormone significantly participating in regulation of stomach secretion. Released somatostatin in antrum mucosa has an inhibitory influence on gastric cells, preventing the gastric acid secretion. Chronic gastritis is as well characterized by inflammatory cell infiltration of lamina propria, accompanied by atrophy of glandular epithelium. Initially, the reaction is rather superficial, but an intense inflammation might infiltrate the whole mucosa causing the development of chronic atrophy gastritis. This type of gastritis can provoke metaplastic changes which are associated with occurrence of intestinal stomach carcinoma. Therefore, we investigated influence of pathological changes, like different gastritis types, and different morphological changes on the number of somatostatin D-cells in stomach antrum, and serum somatoetatin.

Received for publication April 4, 2007
Subjects and Methods

Subjects

The study includes 80 patients underwent endoscopies due to dyspeptic problems like: epigastric pain, heartburn, nausea and vomiting. The patients with acute and chronic organic disease, as well as those taking antibiotics, inhibitory protonic pump or inhibitory histaminic receptor drugs in the last month were excluded.

Endoscopy and biopsy

The endoscopic examination included the biopitic samples, taken on an empty stomach without premedication. The total number of 4 biopitic samples were taken, 1 from the side of the antrum greater curvature and 1 from the side of antrum lesser curvature 2 cm from pylorus, 1 from the side of body of the stomach greater curvature and 1 from the side of body of the stomach lesser curvature for coloring according to Giemsa.

The number of somatostatin D-cells

In order to determine number of somatostatin cells in stomach mucosa, we have used biopsy sample of greater curvature of antrum, taken 1 cm from pylori and the result has been expressed as the number of cells in mucous mucosa millimeter. The histological material was treated with ANTI-SOMATOSTATIN, Dako LSAB kit (CODE NO. N 1551). The primary antibody was 7 mL of rabbit antiserum on somatostatin in 0,05 M Tris pufern pH 7.6. The further methods of sample analysis strictly followed the producer’s guidelines (DACO). The cells were counted using computer program for automatic picture processing, VANS, Zagreb Applications form11. First of all, we have measured the sample surface and then counted the somatostatin cells, in order to obtain an exact number of somatostatin cells in mm² of antrum mucosa. The cells were counted in two samples and presented as an average number of cells for both samples.

Radioimmunoassay of serum somatostatin

In the assay procedure we used a protocol which is similar to previously described by Arimura et al.11. This kit is standardized with Synthetic Somatostatin (SS-14), (INCSTAR Corporation-Stillwater, Minessota, USA).

Statistics

We have used Mann-Whitney U-test (Wicoxon Scores), Medijan test for independent samples, Kruskal-Wallis test and Komogor-Smirna test, whereas we have applied Savage Scope test for analysis of homogeneity. The statistical data analysis was done according to the program packages of SAS (SAS Institute) and Mathematical (Wolfram Research).

Ethical considerations

All patients have signed written consent to our study. The study was approved by the Ethics Committee of the Internal Clinic, »J. J. Strossmayer» University.

Results

Applying Sydney classification, patients with chronic gastritis were divided in three types; mild moderate and severe case. The average number of somatostatin cell in biopsy sample of antrum mucosa was 30.41±35.38 (N=17) in the case of mild form, 18.69±26.65 (N=56) in moderate and in severe case of chronic gastritis 5.23±5.93 (N=7) cells in mm² of mucosa (Figure 1). The results show that the number of somatostatin cells in biopsy sample significantly decreases depending on the severity of gastritis type (p<0.05). The diffuse gastritis type had 66 patients (84.62%) and antral type 12 (15.38%). The average number of somatostatin cells in biopsy sample of stomach antrum in the case of diffuse gastritis type was 17.95±25.19 and in the antral type 32.88±41.83 cells in mm² (Figure 2). There is a statistically significant increase of somatostatin cells in antral type in comparison to diffuse type (p<0.05). The level of somatostatin in the serum of middle form gastritis were 26.43±28.76, moderate 19.95±35.93 and severe 17.88±17.66 pg/mL (Figure 3). The results show that value of serum somatostatin significantly decreases depending on the severity of inflammation. The occurrence of intestinal metaplasia and atrophy of stomach mucosa as a consequence of the se-
Discussion

The gastric acid has an extremely aggressive influence on stomach mucosa, what was recognized at the beginning of the last century and therefore so many studies have done pathophisiological analysis of stomach secretion disorders. Analyzing numerous studies, Calam has concluded that gastric G-cells are under the constant control, actually suppressed by somatostatin D-cells of antrum mucosa and its special products. Several studies have analyzed alteration of antrum somatostatin D-cell number depending on endoscopically visible changes like: erosion, tumor or ulcers. Our study is focused on the changes occurring among the patients with dyspepsia. Applying Sydney classification of chronic gastritis, we have inestigated influence of the grade and type of gastritis on somatostatin cell number of stomach antrum and serum somatostatin. The results indicate a strong impact of gastritis severity on somatostatin cell number in antrum. The similar results were obtained by Konturek and Bjelanski. The chronic inflammation of stomach mucosa reduces the number of somatostatin cells and serum somatostatin values, but increases serum gastrin value and stimulates stomach acid secretion. Furthermore, we would have an increase of intestinal metaplasia and stomach mucosa atrophy, as described by Sipponen and Kuipers. Therefore, preventing the deterioration of gastritis type is very important as well as early detection and prevention of potential premalignant changes. The number of somatostatin cells in antrum mucosa in diffuse gastritis type is much smaller than in antral gastritis type, what can be explained with the fact that antral gastritis is milder type in comparison to diffuse type which infiltrates bigger surface, provoking bigger pathophisiological changes. In order to determine the number of somatostatin cells in antrum mucosa with present morphological mucosal changes, it might be helpful to exclude the patients with non-ulcer dyspepsia, but with the higher risk of premalignant and malignant changes.

References


Silvio Mihaljević

Researcher, University of Osijek Hospital Center, Department of Internal Medicine, Osijek, Croatia

E-mail: mihaljevic.silvio@kbo.hr
U ovom radu istražili smo utjecaj različitih morfoloških promjena želučane sluznice na broj somatostatinskih stanica sluznice antruma želuca i serumski somatostatin. Prema Sydneyjskoj klasifikaciji gastritisa analizirali smo koliko jačina upalnih promjena sluznice želuca utječe na promatrane vrijednosti hormona. Broj somatostatinskih D stanica u sluznici antruma želuca i vrijednosti serumskog somatostatina usporedivali smo kod tri grupe pacijenata: s blagim, umjerenim i teškim kroničnim gastritisom. Prosječni broj somatostatinskih stanica u bioptičkom uzorku sluznice antruma bio je 30,41±35,38 (N=17) u blagom gastritisu, 18,69±26,65 (N=56) u umjereno teškom i 5,23±5,93 (N=7) stanica u mm² sluznice. Vrijednosti serumskog somatostatina u blagom gastritisu bile su 26,43±28,76, umjerenom 19,95±35,93 i teškom obliku 17,88±17,66 pg/mL. Određivanje broja somatostatinskih stanica sluznice antruma želuca i serumskog somatostatina kod određenih morfoloških promjena želučane sluznice može nam pomoći da izdvojimo pacijente s neulkusnom dispepsiom te one koji imaju veliki rizik od razvoja premalignih i malignih promjena.