Rabeprazole’s influence on duodenal ulcer patients’ serum levels of gastrointestinal peptide hormone and neurotransmitter

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Objective: To observe the effects of rabeprazole of duodenal ulcer, and its influence on the serum levels of gastrointestinal peptide hormone and neurotransmitter. Methods: 180 patients with duodenal ulcer were randomly divided into control group and observation group, each group had 90 cases, patients in control group were given routine treatment, and those in observation group were treated with rabeprazole 20 mg/time, 2 times/d, treatment for 4 weeks based on routine treatment. Then gastroscopy and 14C- urea breath test were took before and after treatment for comparison of efficacy between the two groups, and the serum levels of gastrointestinal hormone such as gastrin (Gas), motilin (MTL), somatostatin (SS) and calcitonin gene related peptide (CGRP) and neurotransmitter such as 5- serotonin (5-HT), substance P (SP), nitric oxide (NO), vasoactive intestinal peptide (VIP) of two groups before and after treatment were detected and compared. Results: 3, 5 weeks after treatment, the stomach integral of observation group was lower than that of the control group, stomach pain relief time was shorter than control group, Hp eradication rate was higher than control group, the curative effect of observation group was significantly better than the control group. 3, 5 weeks after treatment, the serum levels of Gas, AM, MTL and 5-HT, SP, NO, VIP level of observation group were significantly lower than that of the control group, while the SS and CGRP were higher than the control group. Conclusion: Rabeprazole can effectively regulate the expression of gastrointestinal peptide hormone and neurotransmitter of patients with duodenal ulcer, shorten the recovery time and improve the curative effect.

1. Introduction

Duodenal ulcer is a clinically prevalent and frequently occurring disease, as well as a common type of peptic ulcers. Duodenal ulcer usually happens in duodenal bulb and is correlated with various factors, comprising the abnormality of gastric acid secretion, Helicobacter pylori (Hp) infection, unhealthy life and diet habits, taking non-steroidal anti-inflammatory drug in a long term, psychological factors, etc[1,2]. At present, clinical treatment for duodenal ulcer mainly aims to control clinical symptoms, accelerate ulcer healing and prevent its recurrence. The frequently used medication for this treatment consists of gastric acid secretion inhibitors, protective agents for gastric mucosa and prokinetic agents. For those patients concurrently having Hp positive, they need to accept Hp eradication for extra treatment apart from the above medication. Rabeprazole is agents for resisting gastric acid, belonging to proton pump inhibitors, and currently the primary medication for duodenal ulcer treatment, with the advantages of quick and good efficacy. Research shows that the evident changes of duodenal ulcer patients’ serum level of gastrointestinal hormone and neurotransmitter level are related to the severity level of the disease. However, there are not sufficient clinical research on Rabeprazole’s influence on duodenal ulcer patients’ serum level of gastrointestinal hormone and neurotransmitter level, thus,
this study reports on these as follows.

2. Material and methods

2.1. General information

Duodenal ulcer patients, who had been treated in our hospital from January 2012 to July 2014, were collected. The inclusion criteria: (1) Duodenal ulcer was examined to be in active stage by electronic gastroscope and its diameter was 3–20 mm. (2) 14C–urea breath test showed a positive result. (3) There was localized and deep tenderness on upper abdomen during physical examination. (4) There was rhythmically and chronically upper abdominal pain with chronic phase and periodic recurrence. Taking food and antacids could relieve this pain. (5) The patients’ age were 18–65 years old and they volunteered to participate in this study. The exclusion criteria: (1) The cases had taken antibiotics, proton pump inhibitors, bismuth subcitrate, h–receptor blocking agent in the recent three months and were taking other medications. (2) The duodenal ulcer cases had gastrinoma or gastric cancer. (3) The duodenal ulcer patients had primary diseases of hearts, livers and kidneys, etc. (4) The cases had suffered from upper gastrointestinal bleeding in the recent three months. (5) The cases had the unhealthy diet habits of excessive drinking, smoking, taking spicy food, etc.

The collected patients, amounting to 180 cases, were randomly divided into two groups, the control group and the observational group, with 90 cases in each. The control group consisted of 49 male and 41 female cases and their average age was \((42.53 \pm 12.76)\) years old. The course of the disease in this group was \((5.21 \pm 2.98)\) years and the diameter of their ulcer was \((11.35 \pm 5.63)\) mm. As for the observational group, it comprised 46 male and 44 female cases and their average age was \((43.87 \pm 12.10)\) years old. The course of the disease in this group was \((5.06 \pm 2.56)\) years and their ulcer diameter was \((11.87 \pm 5.41)\) mm. Through the statistical analysis, these two groups possessed comparability, as there was no significant difference between the two groups in terms of their baseline data, including gender, age, the course of disease, the ulcer diameter, etc \((P>0.05)\).

2.2. Methods

2.2.1. Methods of treatment

All the patients orally took clarithromycin dispersible tablets 0.5 g/time and 2 times/d, hydrotalcite tablets 2 pills/time, 3 times/d, rabeprazole enteric–coated capsules, 20 mg/time, 2 times/d, being continuously treated for 7 d. The observational group continued taking rabeprazole enteric–coated capsules after the 7–day treatment, 20 mg/time, once/d, being continually treated for 28 d.

2.2.2. The observation indexes

The two groups were compared in terms of curative effects, stomach pain relief time, H pylori eradication rate and curative effects of gastroscopy. Gastroscopy test was conducted in four weeks after grouping and the completion of the treatment course. The evaluation criteria for curative effects of gastroscopy were established with reference to literature and could be divided into four grades, clinical cure, marked effect, effectiveness, and infectiveness. Clinical cure meant ulcers and the surrounding inflammation completely disappeared; marked effect referred to completely disappearing ulcers yet with inflammation; effectiveness represented that the ulcer area was reduced by over 50%; and infectiveness referred to those that did not reach the above criteria. Total effective rate = (clinical cure+marked effect+effectiveness)/total number \(\times 100\%\).

Before treatment and in 2 and 5 weeks after treatment, 5mL of fasting venous blood were drawn and centrifuged for 5 min, 3 000 r/m; and the serum was separated to await for test. Serum levels of gastrointestinal hormone, such as gastrin (Gas), adrenomedullin (AM), motilin (MTL), somatostatin (SS) and calcitonin gene related peptide (CGRP), and levels of neurotransmitter, such as 5–serotonin (5–HT), substance P (SP), nitric oxide (NO) and vasoactive intestinal peptide (VIP) were tested by ELISA kit method.

2.3 Statistical analysis

The statistical software, SPSS 17.0 was adopted to statistically analyze all the data, and t test was utilized for the comparison of the variable data, stomach pain relief time, serum levels of gastrointestinal peptide hormone, neurotransmitter levels, etc. Other data was regarded as attribute data and analyzed by chi–square test. \(P<0.05\) meant that the difference had statistical significance.

3. Results

3.1. The comparison of clinically curative effects of two groups

In 3 and 5 weeks after treatment, the stomach pain scores of the observational group were respectively \((1.26 \pm 0.53)\)
and (0.41±0.29), which was evidently lower than that of the control group. (2.15±0.79) and (1.86±0.74) respectively. In addition, stomach pain relief time of the observational group was (7.82±2.13) and shorter than that of the control group, (9.68±2.32). As for the Hp eradication rate, the observational group was 91.11% and distinctly higher than the control group, 80.22%. These differences were of statistical significance (P<0.05).

In 4 weeks after the treatment, there was obvious difference on curative effects of gastroscopy between two groups. The clinical cure rate and total effective rate of the observational group were 63.33% and 97.78% and better than that of the control group, 46.67% and 84.44% respectively. This difference had statistical significance (P<0.05).

3.3. Comparison of the serum levels of neurotransmitter between two groups before and after treatment

Comparing the serum levels of gastrointestinal peptide hormone between two groups before treatment, the difference had no statistical significance (P>0.05). In 3 and 5 weeks after treatment, the observational group’s serum levels of Gas, AM, MTL were obviously lower than the control group, 80.22%. These differences were of statistical significance (P<0.05).

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Table 1.
The comparison of the serum levels of gastrointestinal peptide hormone between two groups before and after treatment (n=90, pg/mL).

<table>
<thead>
<tr>
<th>Group</th>
<th>Gas</th>
<th>AM</th>
<th>MTL</th>
<th>SS</th>
<th>CGRP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Before</td>
<td>119.80±21.36</td>
<td>106.98±23.65</td>
<td>512.36±87.23</td>
<td>7.62±2.37</td>
<td>7.08±4.63</td>
</tr>
<tr>
<td>3 weeks after</td>
<td>93.45±14.62</td>
<td>79.65±12.63</td>
<td>453.27±72.56</td>
<td>9.36±3.15</td>
<td>10.57±5.62</td>
</tr>
<tr>
<td>5 weeks after</td>
<td>78.15±15.21</td>
<td>58.71±12.36</td>
<td>371.45±73.69</td>
<td>10.69±3.42</td>
<td>21.70±6.31</td>
</tr>
<tr>
<td>Observational Before</td>
<td>118.12±20.60</td>
<td>108.73±23.41</td>
<td>506.94±81.32</td>
<td>7.69±2.41</td>
<td>3.76±4.51</td>
</tr>
<tr>
<td>3 weeks after</td>
<td>78.72±15.65*</td>
<td>65.14±12.56*</td>
<td>362.79±72.36*</td>
<td>10.06±3.33*</td>
<td>16.24±6.53*</td>
</tr>
<tr>
<td>5 weeks after</td>
<td>62.03±14.23*</td>
<td>49.38±11.20*</td>
<td>315.62±74.16*</td>
<td>12.58±3.65*</td>
<td>29.83±6.71*</td>
</tr>
</tbody>
</table>

Note: Compared with the control group, *P<0.05.

4. Discussion

Duodenal ulcer and gastric ulcer are commonly initiated by Hp infection and in the recent years young people have a tendency to be attacked by these diseases. They can result in ulcer bleeding if the diseases become severe, which not only seriously influences the life quality of the patients, but also threatens their lives. The pathogenesis of duodenal ulcer lies on the infected Hp staying in the duodenal mucosa, which leads to mucosa tissue getting damaged and generating chronic inflammation; and owing to that, it was readily eroded by gastric acid with high concentration and this give rise to ulceration[4]. Therefore, in clinical treatment Hp eradication medication and acid-inhibitory drugs are mainly employed to treat duodenal ulcer, and among these acid-inhibitory drugs, proton-pump inhibitors are commonly used and proved by a number of clinical researches that their healing rate of peptic ulcer can be above 90%[5]. Rabeprazole is the replacement of Benzmimidazole, without anti-cholinergic and anti-histamine H2 properties, and inhibits secretion of gastric acid through adhering to the surface of gastric parietal cells and suppressing the enzyme, H+/K+ -ATP. Our study results showed that the effectiveness rate of the treatment applied to the observation group of the patients, who continued taking after being treated with, was up to 97.88%, evidently higher than that of the control group., This proved the application value of rebeprazole in duodenal ulcer treatment.

In physiological conditions, gastrointestinal hormone has the protective and regulatory effects against the invasion from the external environment, and research discovers that there is a close correlation between the abnormality of gastrointestinal hormone secretion in gastric ulcer patients and the occurrence of digestive ulcer[7]. Gastrin is a type of gastrointestinal hormone secreted from gastric antrum and duodenal G cells, and it can stimulate gastric acid secreting; also, the gastrin level in gastric ulcer patients’ gastric juice is higher than that in normal and healthy people’s; thus after the gastric mucosa lesion, gastrin accesses into blood by the capillary...
of gastric mucosa, causing it also remaining a high level in blood; therefore, gastrin is also clinically applied to the auxiliary diagnosis of digestive ulcer[8,9]. Motilin can induce stomach intensive contraction and the evidently intestinal segmentation movement, and gastric acid hypersecretion can stimulate motilin secretion[10]. Adrenomedullin (ADM), prevalently existing in intestinal tissue, can antagonize endothelin’s vasoconstriction, lead to vasodilation and thus influence the ulcer healing; therefore, the down-regulation of ADM is beneficial to duodenal ulcer healing[11]. Somatostatin can inhibit G cells secreting gastrin, while CGRP has the dual inhibitory effects against gastric acid secretion and gastrointestinal motility[13]; hence, the reduction of Somatostatin and CGRP secretion may induce or aggravate the ulceration. Our study results demonstrated that in 3 and 5 weeks after the treatment with rebeprazole, serum Gas, AM, MTL levels in the observational group were distinctly lower than that in the control group, while SS and CGRP levels in the observational group were higher than that in the control group (P < 0.05), which further verified that rebeprazole can inhibit gastric acid secretion and facilitate the ulcer healing.

The correlation of neurotransmitter and digestive ulcer has been of concern. 5-HT and SP can bring about excitatory gastrointestinal tract and play major roles in the regulation of gastrointestinal sensory system. In disease state, the increase of NO and VIP content in muscular layers of digestive tract can result in the attenuation of gastrointestinal tract’s systolic function and the delay of gastric emptying[14,15]. Our study also displayed that in 3 and 5 weeks after the treatment with rebeprazole, serum 5-HT, SP, NO, VIP levels in the observational group were evidently lower than that in the control group, with the difference having statistic significance (P < 0.05). This showed that after the amelioration of gastric ulcer, digestive tract function can be further strengthened, which is advantageous to the digestion and absorption of nutrients.

In conclusion, rebeprazole can effectively regulate duodenal ulcer patients’ gastrointestinal peptide hormone and neurotransmitter secretion, shorten gastric ulcer patients’ recovery time and enhance the curative effect.

References