Systemic Disorders, Comorbid Pathology and Gastric Function in Patients with Type 2 Diabetes Mellitus

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ABSTRACT

In this work, a study of the motor evacuation function of the stomach, the prevalence of pathology of the gastrointestinal tract, the state of autonomic regulatory mechanisms in patients with type 2 diabetes mellitus was conducted. An assessment was made of the relationship of disorders of general vegetative mechanisms and regulation of gastric function with the duration of the disease, compensation of carbohydrate metabolism and the labile course of diabetes. The obtained results clearly demonstrate the need to assess the state of motor evacuation function of the stomach in patients with type 2 diabetes mellitus, regardless of the age of the disease, for subsequent correction of the identified disorders in order to improve diabetes compensation and prevent hypoglycemic conditions.

Keywords: Diabetes mellitus, gastric function, vegetative status

Type 2 diabetes mellitus is currently a classic example of comorbid pathology, since already at the time of diagnosis, numerous late complications of diabetes are detected, including autonomic neuropathy, which contribute to the development of somatic pathology. On the other hand, when carbohydrate metabolism disorders are first detected in patients with type 2 diabetes, concomitant diseases of certain organs or systems are already observed. According to various authors, diseases of the gastrointestinal tract occur in patients with diabetes mellitus in 30-75% of cases [10, 11, 12, 13, 14]. According to our previous studies, in the structure of comorbid pathology in patients with type 2 diabetes mellitus, diseases of the digestive system are in 2nd place after cardiovascular diseases [1, 3, 4, 7, 8]. When diabetes is layered on an existing disease, the classical clinical picture of the disease, its morphological and laboratory signs change [10, 11, 12, 13, 14]. Concomitant diseases of the digestive system can, in turn, change the course of diabetes mellitus, aggravate the prognosis of the disease, and reduce patients' adherence to treatment [1, 3, 4, 7, 8].

The purpose of the study: to study the motor evacuation function of the stomach, the structure of somatic pathology on the part of the digestive organs and the state of the autonomic nervous system in patients with type 2 diabetes mellitus.

Materials and methods: A comprehensive examination of 44 patients with type 2 diabetes mellitus (35 women, 9 men) was conducted. The duration of diabetes ranged from 2 years to 25 years (9.41±5.59 years). All patients were divided into three groups depending on the age of diabetes: the first group

(under 5 years) – 12 people (27.27%), the second (6-10 years) – 13 (29.5%), the third (over 11 years) -19 people (43.2%). The average age was 52.8±6.51 years. Almost half (21 people – 47.72%) of the examined patients received combination therapy (insulin+ oral hypoglycemic agents), 16 people (36.36%) received only insulin therapy, 7 people (15.9%) took tablet hypoglycemic agents. Clinical and metabolic compensation of diabetes (HbA1c<7%) was observed in 6 people (13.6%), decompensation of carbohydrate metabolism in 38 people (86.4%). The labile course of diabetes mellitus (daily hypoglycemia) was observed in 5 people (11.36%). The state of vegetative tone was assessed by calculating the vegetative index of Kerdo (VI) [2]. In order to assess the motor evacuation function of the stomach, dynamic gastroscintigraphy was performed [9]. To identify somatic pathology on the part of the gastrointestinal tract, anamnesis data, outpatient patient records were taken into account, a comprehensive examination of the digestive system was performed, including fibrogastroduodenoscopy, ultrasound examination of the abdominal organs. Depending on the number of diseases of the digestive system, the comorbidity coefficient (CC for gastrointestinal pathology) was calculated for each examined patient. All patients signed an informed consent to participate in the study.

Results and discussion: A comprehensive and targeted examination of 44 patients with type 2 diabetes mellitus showed a high prevalence of pathology of the gastrointestinal tract. Thus, the coefficient of comorbidity (CC) for the pathology of the digestive system ranged from 1 to 8 diseases per person. Among the identified diseases of the digestive system (according to anamnesis, laboratory and instrumental research methods), pathology of the pancreas and hepatobiliary system prevailed. Diseases of the gastroduodenal zone were in second place.

Analysis of clinical data showed that only 7 patients (15.9%) did not have any complaints from the digestive system. Most patients with type 2 diabetes presented numerous complaints of gastric, intestinal dyspepsia and pain in various parts of the anterior abdominal wall (Fig.1). Complaints of heartburn (z=1,144, p=0.253), pain in the right hypochondrium (z=0.113, p=0.910) and diarrhea (z=-0.183, p=0.855). When assessing the vegetative status according to the level of the vegetative index, Kerdo draws attention to the fact that already at the time of diagnosis of diabetes mellitus, patients in this group have a violation of vegetative equilibrium with a predominance of hyperparasympathicotonia. The same pattern is observed in the group of patients with diabetes from 6 to 10 years old. In patients with a disease history of more than 10 years, manifestations of hypersympathicotonia and hyperparasympathicoticotonia were observed with the same frequency.

The data of dynamic gastroscintigraphy (Table 3.4) showed that, regardless of the prescription of diabetes, most patients had delayed motor evacuation function of the stomach in terms of T1\2, which did not correspond to the tone of the autonomic nervous system and indicated gross and prolonged violations of the regulation mechanism. The stomach shape was hypotonic in 38.46% of patients, hypertensive in 30.76%, and normotonic in 30.76% of patients. Accelerated intake of the first portions of RFP into the intestine was observed more often in 11 people (42.3%), in 8 people (30.76%) there was a delayed intake, in 1 patient (3.84%) it was normal. Gastroesophageal reflux was observed in 8 people (30.7%), duodenogastric reflux was observed in one patient (3.84%). The time of maximum accumulation of RFP in the stomach, which depends on the tone and shape of the stomach, was delayed in most patients in all three groups.

Conclusion: The intake from the esophagus is satisfactory – the maximum accumulation is achieved for 6 minutes. The motor evacuation function of the stomach is not changed (T1/2 =47.3 min.). The shape of the stomach is normotonic in tone. Isolated gastroesophageal reflux is observed. There is an accelerated intake of RFP into the intestine by 13.3 minutes.) Intake from the esophagus is delayed – the maximum accumulation is achieved by 18 minutes. The motor evacuation

function of the stomach is delayed (T1/290 min.). The shape of the stomach is hypotonic in tone. There is a normal intake of RFP into the intestine (for 26 minutes).

The intake from the esophagus is satisfactory – the maximum accumulation is achieved for 1 min. The motor evacuation function of the stomach is accelerated (T1/2 =24.1 min.). The shape of the stomach is hypertensive in tone. 15.9% of patients had no complaints from the organs of the gastroduodenal zone, while 80% of them had delayed motor evacuation function of the stomach (T1/2sr.=81.2min), 20% – within normal limits.

Mathematical modeling with the construction of 3D graphs made it possible to identify the relationship between the motor evacuation function of the stomach, the prescription of diabetes and the presence of hypoglycemia, namely, with an elongation of T1/2 (stagnation of food in the stomach), the frequency of hypoglycemia increases, and with an increase in the duration of diabetes mellitus, the evacuation of a trial breakfast from the stomach is even more delayed.

As shown by cluster analysis, there is a strong relationship between the number of diseases of the digestive system, the duration of diabetes mellitus and the level of compensation for carbohydrate metabolism. This triad, in turn, is associated with gastric tone (T max.) and vegetative status. Based on the above, during the statistical analysis, we obtained a relationship between the quality of diabetes compensation and manifestations of comorbid pathology associated with the digestive organs, as well as manifestations of disorders of the motor evacuation function of the stomach and the prevalence of hypoglycemia. Thus, the combined course of gastroenterological and endocrine pathology is an urgent topic for modern medicine and at the present time. According to the data of dynamic gastroscintigraphy, violations of the motor evacuation function of the stomach were revealed in most of the examined patients, which was combined with a disorder of autonomic regulation. In some patients, violations of the motor evacuation function of the stomach were asymptomatic. Delayed evacuation function of the stomach may be one of the causes of hypoglycemia. Concomitant pathology of the gastrointestinal tract in patients with type 2 diabetes mellitus can affect the compensation of carbohydrate metabolism and depends on the duration of diabetes and the state of the autonomic nervous system.

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