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Importance of Sideropenic Anemia in the Diagnosis of Gastrointestinal Tract Tumors

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ORIGINAL PAPER

SUMMARY

Introduction: Sideropenic anemia is a hypochromic, microcytic anemia caused by insufficient iron level in the body. This is the most common anemia. In a large percentage it is the symptom of gastrointestinal tract cancer. Anemia was defined by hemoglobin level <119 g/dl, hematocrit <0.356 for women or hemoglobin level <138 g/dL and hematocrit <0.415 for men. Gastric cancer after lung cancer is the second most common malignant tumor in the world. Frequent localization is the antrum, and less frequently in the cardia and fundus. Definite factors in the development of gastric cancer are chronic atrophic gastritis, H. pylori, intestinal metaplasia, and epithelial dysplasia as a precancerous lesion. Strong link between sideropenic anemia and gastrointestinal tract cancers recommend that patients with sideropenic anemia without a clear indication underwent same gastroscopic and colonoscopy examination. The goals were to prove sideropenic anemia, diagnose and histologically confirm tumors, tumors location and correlates anemia with tumor anemia or show the dependence of anemia on tumor. **Results:** The study included 100 subjects (50 from counseling center for hematology that came due to sideropenic anemia and 50 patients from the Clinic for Gastroenterology who had gastrointestinal tract cancer). Respondents had regular laboratory tests and endoscopic examinations, ultrasound of the abdomen, CT of the abdomen and tumor markers. In the group of patients from Counseling center for hematology with sideropenic anemia was found 11 cancerous processes, mostly in form of gastric and colon cancer. In the group of patients hospitalized at the Clinic for Gastroenterology most cancer process were localized in the stomach and colorectum. **Conclusion:** Tumors of the gastrointestinal tract are the most common cause of sideropenic anemia, due to which the patients often first contact Counseling center for hematology. Sideropenic anemia is more common in men as also the number of digestive tract cancers in men. Sideropenic anemia has a significant place in the diagnosis of gastrointestinal tract tumors. Sideropenic anemia is most common in men after 50 years of age. The most common tumors of the gastrointestinal tube were gastric and colon cancer.

Keywords: sideropenic anemia, gastrointestinal tract cancers.

1. INTRODUCTION

Anemia is defined by reducing hemoglobin level or the erythrocytes volume in the circulation with corresponding decrease in oxygen-carrying capacity (1, 2, 3). States with lower values of hemoglobin are called anemia. Reduction in number of erythrocytes in the is blood are also called anemia (4, 5, 6). Anemia is very common illness or pathological state that may be of hematological or non-hematological origin. Anemia is defined as level of hemoglobin <119 g/dl, and hematocrit <0.356 for women and hemoglobin <138 g/dL and hematocrit <0.415 for men. Anemia can be divided in many ways, but the most useful division for differential diagnosis of anemia is based on the aetiology and pathogenesis.

Anemia division: Anemia due to illness of stem cells; Anemia due to disturbance of proliferation and differentiation; Anemia due to disorders of erythrocytes maturation; Anemia due to unknown or multiple mechanisms; Anemia due to increased or accelerated degradation of erythrocytes; Post hemorrhagic anemia.

Division of anemia according to the size of erythrocytes: Microcytic of anemia Anemia due to impaired maturation of erythrocytes; Anemia due to increased and accelerated degradation of erythrocytes; Normocytic anemia; Macrocytic anemia.

Sideropenic anemia is a hypochromic, microcytic anemia caused by insufficient iron concentration in the body

and anemia due to iron deficiency is the most common form of anemia. Sideropenic anemia can be divided into 3 degrees: 1st degree reduction of iron stores, 2nd degree reduction in erythropoiesis and 3rd degree of anemia. The third degree is the most important and all laboratory parameters of iron are abnormal, while the most important information data are microcytosis, hypochromic anemia.

Anemia due to iron deficiency develops gradually. Each phase correlates well with laboratory findings. The loss of iron can be physiological and pathological. Examples of physiological loss are menstruation and pregnancy. Gastrointestinal tract is the most frequent site for loss of iron. Common causes of iron loss are peptic ulcers, hemorrhoids, colon angiodysplasias and adenocarcinoma of the colon. Gastrointestinal cancer may be primarily presented with clinical symptoms of iron deficiency anemia. Due to the high correlation between sideropenic anemia and gastrointestinal cancers there are recommendations that patients with iron deficiency anemia without obvious indication should undergo gastroscopic and colonoscopic examination. Obligatory is the examination of the gastrointestinal tract for men if the hemoglobin level is <11 g/dL, or for women if the hemoglobin is <10 g/dL. The most common cause of iron deficiency anemia is gastrointestinal bleeding, 11.5% of patients with sideropenic anemia have some form of cancer of the gastrointestinal tract, of which the most common are cancer of the colon and stomach cancer. Predisposing factors for malignancy of gastrointestinal tract with iron deficiency anemia are male gender and older age.

Gastric cancer after lung cancer is the second most common malignant tumor in the world. The most often localization of malignant processes are in the antral part, rarely at the cardia and fundus. Macroscopically three forms can be differentiated: polypoid, ulcerative, and infiltrative. Histologically, the most common is adenocarcinoma, rarely mixed, and very rarely the gel scirus cancer. The incidence for the last thirty years, decreasing in Western Europe and the USA. Five-year survival rate ranges between 10 and 20% and did not significantly change during the last thirty years, despite the much greater possibilities in the diagnosis and treatment. Pathogenesis of gastric cancer is multifactorial. Sure factors in the development of gastric cancer are considered to be chronic atrophic gastritis, *H. pylori*, intestinal metaplasia, epithelial dysplasia as a precancerous lesion and gastric adenomas.

Since there is no typical clinical picture of gastric cancer, especially if in early stage it is necessary to refer all patients with suspected problems in the upper abdomen that lasts longer than 20 days to gastroscopy. Endoscopic examination is necessary in all patients who arouse the suspicion of a malignant process of the stomach. Additional tests include X-ray, CT of the stomach and abdomen, endoscopic ultrasound.

2. GOAL

Research goals in this study were: Prove sideropenia; Prove microcytic anemia; Diagnose the tumor and histologically confirm the cancer of digestive system; Locate

the tumor in the gastrointestinal tract; Correlate anemia with tumor or show the dependence of anemia by tumor

3. MATERIAL AND METHODS

The study included 100 subjects who were divided into 2 groups. The first group of 50 subjects consisted of respondents who came to the hematology Counseling center due to sideropenic anemia.

The control group consisted of 50 patients suffering from digestive tract carcinoma hospitalized at the Gastroenterology clinic.

In all cases were monitored the following laboratory parameters (CBC, MCV, MCHC, MCH, HGB, RDW growth, RPI, poikilocytosis, platelets, ferritin levels, iron levels). All patients underwent endoscopic examinations (gastroscopy and colonoscopy), targeted biopsy, ultrasound of the abdomen, abdominal CT scan, X-ray with gastroduodenal passage of the small intestine, and tumor markers.

4. RESULTS

Age structure of male respondents in the group of patients with anemia who came in hematological Counseling center (average 54.58 years) were older than women (average 43.02 years), while women-38 were more numerous than the men- 12. In this group of respondents was found a total of 11 tumors, of which the largest number of total 7 was gastric cancer (63% from total) and 5 cancers localized in the corpus of the stomach and 2 in the antrum, while 2 (18%) were malignant process localized in the colon, then 1 in the sigma (9%) and 1 in the esophagus (9%) (Table 1). Gender analysis of patients with cancer in group of patients with anemia showed a higher prevalence in men 9 (81% of the total number) in relation to two women or 19%. As for the sex distribution of subjects diagnosed with gastric cancer there was more male patients with gastric cancer in our study than women (4 males compared to 1 woman), while the cancer of the antrum was equally represented by 1 man and 1 woman. The average age of patients suffering from gastric cancer was 58.25 years for men and for women 52 years, while for cancer of the antrum the average age for men was 47 years and for women 57 years. In subjects who had been hospitalized at the Gastroenterology clinic there was 15 women (30%) and 35 men (70%) while the average age for women was 72.07 years and 61.48 years for men. All respondents in this group had positive laboratory findings for sideropenic anemia. In this group the largest number of patients the cancer was located in the gastric corpus (16 or 32%), followed by colon (15 or 30%) and antrum (8 or 16%), sigma (5 or 10%) colon transversus (3 or 6%), esophagus (2 or 4%) and small intestine (1 or 2%). In case of cancer of the antrum 7 (87.5%) patients are men and 1 woman (12.5%). One respondent had metastases in the liver (Table 2). The average age of patients with carcinoma of the antrum was 78 years for women and for men 62.42 years. The largest number of cancers in patients hospitalized at the Clinic was localized in the corpus of the stomach and metastases had 4 patients. The age group of patients suffering from gastric cancer suggests that this

	ANTRUM	CORPUS	RECTUM	SIGMA	OESOPHAGUS	COLON TRANSVERSUS	ILLEUM
MALE	7	10	11	5	2	0	0
FEMALE	1	6	4	0	0	3	1
TOTAL	8	16	15	5	2	3	1
PERCENT (%)	16	32	30	10	4	6	2

Table 1. Tumors in the control group

tumor is more represented in old age because the average age for women was 75.3 years and 59.8 years for men. Of the total number of patients with gastric cancer-16, 10 of them were male (65%) and 6 female (35%).

	ANTRUM	CORPUS	RECTUM	SIGMA	OESOPHAGUS
MALE	2	4	1	1	1
FEMALE	1	1	0	0	0
TOTAL	3	5	1	1	1
PERCENT (%)	27	45	9	9	9

Table 2. Tumors in group of patients with anemia

5. DISCUSSION

In a study of the National Institute of Health, which included 100 patients with sideropenic anemia, anemia was defined as a clinical condition characterized by reduced hemoglobin concentration. Subjects were studied in detail, accompanied by the following parameters: total iron, TIBC, serum ferritin. The study results showed that 68% of patients had sideropenic anemia. Women have been affected more than men. A large proportion of respondents had between 21 and 60 years of age (1).

In our study, laboratory parameters were determined (erythrocytes, hemoglobin, hematocrit, MCV, MCHC, MCH, and total serum iron and ferritin) for the diagnosis of anemia. Conclusion of previous study that women are more affected is the same as results of our study where of 50 patients who came to Counseling center 38 were female while the remaining 12 were male. According to the World Health Organization recommendations for sideropenic anemia it is characterized by low levels of serum iron, low ferritin, and elevated TIBC and UIBC and the index of reduced saturation. Sideropenic anemia is characterized by low serum iron levels below 10 mmol/L (2). The average value of the iron in our study group of patients with sideropenic was 9.23 mmol/L, and for the group of patients from Gastroenterology clinic 10.23 mmol/L. Both groups of patients had increased values of TIBC and UIBC and lower level of the saturation index. parameters of the World Health Organization established to define sideropenic anemia in our study were analyzed by appropriate statistical methods and statistical correlation was obtained between the iron levels values in both groups at a significance level of $p=0.1$, while the level of statistical association or significance of 5% ($p=0.05$) was found for values of TIBC. According to the guide for sideropenic anemia, British Society of Gastroenterology serum markers of iron deficiency are ferritin, low iron, increased TIBC, ferritin below 12 $\mu\text{gr/dL}$ is diagnostically relevant iron deficiency, if the value of serum ferritin is between 12 and 15 $\mu\text{gr/dL}$ in sideropenic patients, then those patients with anemia in a high percentage of probability have chronic inflammation,

a tumor (usually a tumor of gastrointestinal tract and high percentage of stomach cancer or colon) (3).

All patients in our study who were at the hematology Counseling center was during the study determined serum ferritin, in nearly all who had the tumor the concentration of serum ferritin was between 10 and 20 $\mu\text{gr/dL}$, and patients from the Gastroenterology clinic had an average value of ferritin less than 20 $\mu\text{gr/dL}$. Upper and lower gastrointestinal tract should be examined in all menopausal women and women with sideropenic anemia. In this study by examining gastrointestinal tract in case of sideropenic anemia was found 10% of the tumor process of gastrointestinal tract in more cases of colon cancer in relation to gastric cancer and tumor localization of these two processes are represented in more than 90% of all tumors of gastrointestinal tract (4), Our study showed that 22% of respondents with sideropenic anemia has a digestive system cancers and more often cancers of the stomach compared to colon cancer. The study by Kepzcyk and associates which included 98 patients found the following risk factors for cancer of gastrointestinal tract: male gender, older age and lower mean corpuscular volume (5). Our study confirmed the results of the aforementioned study because in our study factors were male gender, decreased erythrocyte volume and older age. The study, which lasted three years and which deals with the causes of sideropenic anemia and factors that contribute to the development of anemia found results that 11% of cases showed that the cause of sideropenic anemia is tumor process in gastrointestinal tract (6). The results of our research showed a greater percentage (22%) that the cause of sideropenic anemia is tumor gastrointestinal tract.

6. CONCLUSION

By processing and analysis of research results in this study we have come to the following conclusions: Tumors of the gastrointestinal tract are the most common cause of sideropenic anemia; Sideropenic anemia caused by tumors of digestive system was more frequent in males; Sideropenic anemia is often the first symptom of gastrointestinal tract cancer; The most common tumors of the gastrointestinal tract are cancers of the stomach and colon; Sideropenic anemia have great importance and very important role in the diagnosis of gastrointestinal tract tumors; Sideropenic anemia occurs in all age groups, but most commonly in men after 50 years of age and in women after 40 years of age.

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