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**RATIONALE OF THE USE OF GLYCOPROTEIN A2 - GLOBULIN
FRACTION FOR THE PREVENTION OF RECURRENCE OF CANCER OF
THE UPPER RESPIRATORY TRACT**

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In Ukraine there is a steady increase in morbidity and mortality from cancer of the upper respiratory tract. The cancer process is accompanied by homeostasis disorders and purulent-septic postoperative complications associated with severe cancer and chemoradiation intoxication, which leads to the depletion of the antioxidant system, holding and enhancing the process of neoplastic immortalization, that is, the endless division of the cancer cell.

Under such conditions, the protective mechanisms of the body require the active use of highly active antioxidants, which could provide a low concentration of aggressive free oxidative radicals due to neutralization.

Purpose of the study: to evaluate the effect of the antioxidant glycoprotein ceruloplasmin on the indicators of exogenous and endogenous intoxication, as well as on clinical semiotics in the postoperative and relapse-free periods.

Materials and methods: 75 male patients with laryngopharyngeal cancer aged 56 to 70 years were examined and operated on. According to the TNM system, patients were in II, III and IV stages of the disease and previously received a full course of radiation therapy. Patients of the 1st and 2nd groups received the accompanying therapy with biocerulin at all stages

of treatment. In the control group, treatment was carried out without biocerulin.

Results and Discussion: The reported results of a biochemical study of blood serum in patients with laryngopharyngeal cancer confirmed the presence of intoxication of varying degrees.

Conclusions: studies have shown that the use of biocerulin for detoxification of patients led to the neutralization of aggressive free oxidative radicals, which made it possible to carry out surgical treatment without complications and to achieve an improvement in the quality of life of patients of the 1st and 2nd groups in comparison with the control group. The relapse-free period in patients of the 1st and 2nd groups was more than 5 years.

Key words: Biocerulin (cerupoplasmin), pharynx, upper respiratory tract, laryngopharyngeal cancer, tonsils, surgical treatment, relapse-free period, quality of life.

In Ukraine the level of morbidity and mortality from cancer of the upper respiratory tract is currently rising.

According to the cancer registry of Ukraine, up to 160,000 people (0.32%) get cancer of the laryngopharynx every year and about 100,000 (0.2%) die from cancer. ENT cancer incidence is approximately 7,000 cases (4.4%) of all detected oncopathology. The share of laryngopharyngeal cancer is from 1% to 8% of the total oncological pathology and ranks first among the oncological incidence of ENT organs. The recurrence of the disease in the first year after the treatment is over 50% in the second year 22-25%. The five-year survival rate of patients in Ukraine is low, it doesn't exceed 36% of treated patients. It is known that in conditions of relative health, i.e. normal functioning of the body, the antioxidant system ensures a balanced flow of oxidative and reduction

processes, and therefore the use of exogenous highly active antioxidants is impractical.

Clinical observations have shown that in patients with cancer of the upper respiratory tract in stages III-IV, and especially in unresectable cases, there are pronounced effects of homotoxicosis (due to tumor metabolism, disturbances in redox processes and failure of the surgical wound in irradiated and debilitated patients). In addition, in patients with *weakened* immune systems, chemoradiotherapy leads to increased symptoms and phenomena of endogenous intoxication (due to radiation epithelitis and the chemotherapy drugs). In some patients treated with radiation, the surgical treatment at the second stage is accompanied by purulent-septic complications with the formation of pharyngeal and esophageal fistulas [3, 4].

Thus, the observed violations of homeostasis and postoperative complications associated with severe cancer and chemoradiation intoxication lead to the depletion of the antioxidant system, which supports and enhances the process of neoplastic immortalization, i.e. the endless division of the cancer cell.

Under such conditions, the protective mechanisms of the body require the use of highly active antioxidants, which could provide a low concentration of free oxidative radicals due to their neutralization. Antioxidants, providing neutralization of aggressive oxidative radicals, trigger the mechanism of apoptosis, i.e. programmed death of a cancer cell, which is manifested by an increase in the relapse-free period [3-6].

In our clinic for 12 years, in order to neutralize the accumulating aggressive oxidative radicals, the antioxidant glycoprotein a₂ of the globulin fraction ceruloplasmin (Biocerulin) of donor blood has been used in the form of intravenous drip as an accompaniment to radiation therapy, postoperative management and, if necessary, at the stage of dynamic observation.

PURPOSE OF THE STUDY

To estimate the effect of the antioxidant glycoprotein ceruloplasmin (CP) on the indicators of exogenous and endogenous intoxication, as well as on clinical semiotics in the postoperative and relapse-free periods.

In this regard, we formulated the following research objectives: to conduct a comparative clinical and biochemical assessment of the reduction in the phenomena of endogenous intoxication when using the antioxidant Biocerulin at all stages of treatment of patients with tumors of the upper respiratory tract.

MATERIALS AND METHODS

From 2010 to 2020 under our supervision there were 75 male patients with laryngopharyngeal cancer, aged 56 to 70 years. According to the TNM system, patients were in II, III and IV stages of the disease and previously received a full course of radiation therapy. Radiation treatment was carried out without antioxidant therapy at a dose of 65 Gy, 2.5 Gy per day.

Patients were divided into three groups of 25 patients depending on the differentiation of the tumor (G) and the accompanying therapy. In the first group there were 25 patients with tumor differentiation G1, the second also included 25 patients with G2 and the third - 25 patients with G1 and G2. All patients underwent similar operations in terms of the volume of surgical intervention (variants of extended extirpation of the larynx) in the head and neck oncology department. Patients of the first and second groups (G1 and G2) received Biocerulin before surgery, during surgery and in the postoperative period. Biocerulin was administered intravenously, drip by 0.2 g per 400.0 solution of 0.90% w/v of NaCl for 5 days before surgery 1 time per day and 5 days after surgery 2 times a day. The dose of Biocerulin depended on the patient's body weight and the severity of endogenous intoxication.

Patients of the control group (25 patients) were prescribed 5% glucose 400.0 + 4 ml of ascorbic acid intravenously as preparation for 3 days before the operation, as well as rheosorbilact 200.0 in the next 5 days after the operation. We took into account the following indicators of homeostasis: complete blood count (ESR), biochemical blood test (creatinine, activity of arginase, ornithine decarboxylase and endogenous antioxidant ceruloplasmin in blood serum). Studies were performed before surgery and on the 7th day after surgery in order to assess the state of homeostasis of the patient and the viability of the surgical wound at the time of suture removal.

RESULTS AND DISCUSSION

The use of Biocerulin (ceruloplasmin) in patients of the main group at the preoperative stage made it possible to significantly reduce endogenous intoxication and homeostasis indicators in comparison with the control group.

Patients treated with Biocerulin noted an improvement in their general condition, an increase in appetite, and the appearance of a pink tint of the skin was objectively noted. In patients of the main group who received the antioxidant ceruloplasmin, ESR decreased before surgery from 45-52 to 20-22 mm/h and significantly decreased by 7th day after surgery (15-18 mm/h). In patients of the 1st and 2nd groups, there was a significant decrease in the content of ceruloplasmin already at the time of the operation and remained on the 7th day after the operation at the same level ($232.4 \pm 6.1^{**}$).

After preoperative preparation, ESR in the control group was 45-55 mm/hr and only slightly decreased on the 7th day after surgery (30-32 mm/hr). The level of CP in the blood serum of the control group of patients before and after preparation for surgery remained at the same level ($357.47 \pm 4.2^*$), and there was a tendency to increase, obviously due to operational stress (normal 190.8 ± 7.96 mg /l).

Serum arginase activity (norm 1.33 ± 0.08 mmol/l) in the control group was significantly reduced, and the decrease persisted on the 7th day after surgery ($0.40 \pm 0.07^*$). In patients of the main group, this indicator significantly increased by 2 times and amounted to $0.86 \pm 0.08^{**}$.

The activity of ornithine decarboxylase (norm 1.96 ± 0.09 n/cat/l) in patients of the control group was also reduced and remained in the postoperative period ($0.84 \pm 0.04^*$, while in patients of the main group it significantly increased and approached the values healthy individuals ($1.66 \pm 0.06^{**}$).

Creatinine values (normal 44.0-117 μ mmol/l) were slightly increased in both groups and amounted to 137.0-162.1 μ mmol/l. After the preoperative preparation in patients of the control group, this indicator didn't change, while in patients of the main group it decreased and amounted to 51.2-122.0 μ mmol/l.

The analysis of clinical and biochemical blood serum indicators in patients showed pronounced symptoms of intoxication. The results of a comparative analysis of preoperative preparation carried out in the main and control groups of patients demonstrate a statistically significant decrease in serum CP and an increase in the activity of arginase and ornithine decarboxylase in the main group. In this group, CP neutralized the effects of intoxication, which made it possible to carry out surgical intervention without complications. Additionally, the following course of the postoperative period can be noted: a satisfactory condition of patients, primary wound healing and the absence of purulent-septic complications. Analysis of the clinical course of the postoperative period in patients of the control group showed that 6% of them had a failure of the postoperative wound with the formation of fistulas communicating with the pharynx, i.e. the postoperative period was accompanied by purulent-septic complications.

All of the above shows that the multifunctional enzyme ceruloplasmin, containing copper, glycoprotein a₂ of the globulin fraction of donor blood, used at the stages of treatment of patients with malignant tumors of the upper respiratory tract, had a pronounced antioxidant, detoxifying and stimulating hematopoiesis effect.

We believe that scientific research in this direction is perspective and requires further research on the use of ceruloplasmin in head and neck oncology.

Conclusions

1. In patients with laryngopharyngeal cancer, the antioxidant system is disturbed and intoxication phenomena are pronounced: the activity of endogenous CP and the level of creatinine are increased, and the activity of arginase and ornithine decarboxylase of blood serum is reduced.
2. The use of Biocerulin (ceruloplasmin) in patients with laryngopharyngeal cancer contributed to:- neutralization of aggressive oxidative radicals, restoring the imbalance between redox processes at the preoperative stage;- inhibition of immortalization processes and increased induction of apoptosis (no recurrence in the main group);- improving the reparative capacity of tissues in the postoperative wound (the absence of purulent-septic complications).

References:

1. Leonidas C. Plataniias, M.D., Ph.D, Director, Robert H. (2021). Lurie Comprehensive Cancer Center, Northwestern University Professor of Medicine (Hematology and Oncology) and Biochemistry and Molecular Genetics Advances in Oncology, 1st Edition.
2. John E. Niederhuber & James O. Armitage & James H Doroshow & Michael B. Kastan & Joel E. (2019). Tepper Abel off's Clinical Oncology, 6th Edition.

3. John Ridge Head and Neck Cancer, An Issue of Surgical Oncology Clinics of North America 2015.
4. Oncology (textbook) (2019). V.I. Starikov, A.S. Khodak, I.Y. Galaychuk, Ukraine.

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