

## CASE STUDY

## COMPLETE THORACIC ESOPHAGUS OBLITERATION: CLINICAL CASE REPORT

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**Serhii O. Savvi<sup>1,2</sup>, Alla Yu. Korolevska<sup>1,2</sup>, Serhii Yu. Bityak<sup>1</sup>, Yevhen A. Novikov<sup>3</sup>**<sup>1</sup>KHARKIV NATIONAL MEDICAL UNIVERSITY, KHARKIV, UKRAINE<sup>2</sup>SI «ZAYCEV V. T. INSTITUTE OF GENERAL AND URGENT SURGERY OF NATIONAL ACADEMY OF MEDICAL SCIENCE OF UKRAINE», KHARKIV, UKRAINE<sup>3</sup>KARAZIN V. N. KHARKIV NATIONAL UNIVERSITY, KHARKIV, UKRAINE

### ABSTRACT

Using the example of a clinical case, to present the management features of a patient with complete esophageal obliteration as a chemical burn result, the surgical intervention features in case of a non-standard situation during the operation, and the treatment results analyze.

It was described a clinical case of 41-year-old patient with thoracic esophagus obliteration due to extended post-burn cicatricial esophageal stricture, dysphagia of IV degree in very severe general condition. Stamm-Senn-Kader's gastrostomy was performed as a first step of surgical treatment. Angiography and embolization of the right colic artery and it's branches was performed in 8 months while preserving the middle colic artery. In 20 days the cologastroanastomosis and feeding colostomy on the right chest wall were performed. In 10 days after the colostomy was disattached from the chest wall, the end-to-side esophagocoloanastomosis was performed intrapleurally. In one month after the third surgery and restoration of the food passage by the natural way, closure of the contact gastrostomy was performed. During the observation over the patient (8 years) the postoperative complications were not observed. The patient survived. The proposed staged surgical treatment tactics of patients with complete esophageal obliteration due to post-burn esophageal stricture, dysphagia of IV degree presents effective treatment results and a significant improvement in the patient's life quality.

**KEY WORDS:** complete obliteration of the thoracic esophagus, esophageal strictures, esophagocoloplasty, colon interponate

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### INTRODUCTION

Treatment of patients with extended post-burn cicatricial esophageal strictures is currently considered an unresolved issue that requires further in-depth study to improve treatment outcomes and the patient's life quality [1, 2, 3]. It is primarily connected with the large number of patients with this pathology and complex, long-term treatment, and often it needs to perform difficult reconstructive surgeries, which does not exclude the disability of patients. Very often, patients are employable age people [3, 4, 5]. It emphasizes the social importance of the problem of the diagnostic and treatment management of such patients [1, 2, 3, 6].

For reconstructive surgery of the esophagus, when choosing an interponate, an anatomically and physiologically grounded preference is given to the stomach [1, 6, 7, 8]. «Easing» the complexity of surgery performance for the surgeon and the severity of the operation of esophagogastroplasty is provided by reducing the number of formed anastomoses [1, 6]. For this purpose in case of total esophagectomy, it is possible to perform esophagoplasty by forming a single esophagogastronastomosis on the neck [1, 6]. According to some authors, esophagogastroplasty is performed in 95% of cases [1, 5, 6, 8].

The stomach can't be used as an interponate in 5% cases of severe extended scarring process in the stomach due to corrosive injuries (chemical burn) or gastric surgeries in

anamnesis. In such situations, the colon is used for esophagoplasty [5, 9, 10, 11, 12, 13].

In recent years, esophagoenteroplasty was not performed, as evidenced by the lack of published data and our own experience [1, 2, 3, 6, 14]. This is associated with a higher incidence of postoperative complications and mortality after esophagoenteroplasty, which can be explained by the peculiarities of the vascularization of the small intestine [1, 2, 3, 6, 14].

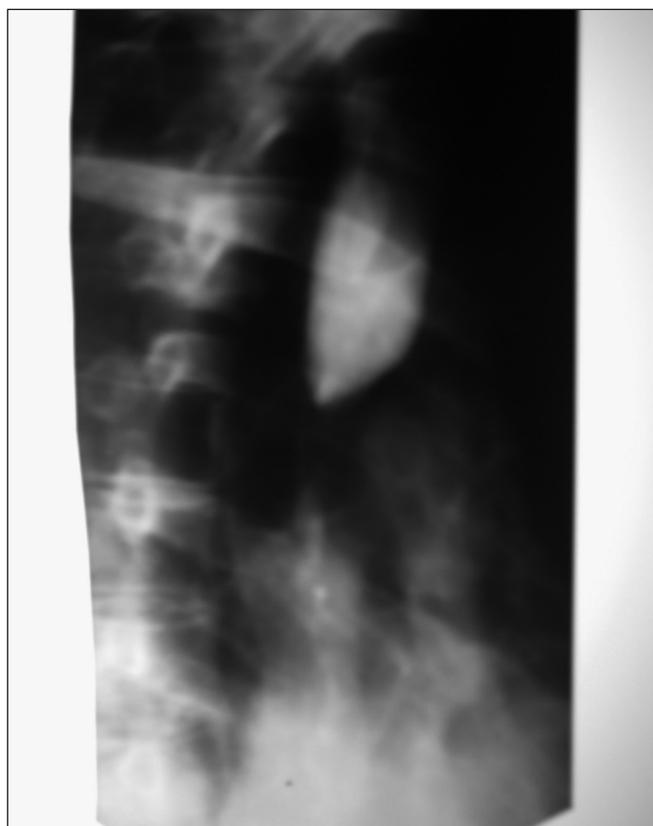
Using the example of a clinical case, to present the management features of a patient with complete esophageal obliteration as a result of a chemical burn, the features of surgical intervention in case of a non-standard situation during the operation, and the treatment results analyze.

The patient, whose clinical case is described in the presented article, signed an "informed consent" for the processing and the use of personal data.

It was described a clinical case of 41-year-old patient, female, who was admitted to the SI «Zaycev V.T. IGUS NAMSU» with a diagnosis of extended post-burn cicatricial stricture of the thoracic esophagus, dysphagia of IV degree.

### CASE REPORT

In the anamnesis 2 months before admission to the hospital, the patient drank aggressive fluid (concentrated



**Fig. 1.** X-ray examination of the upper part of GIT

alkaline solution) by mistake, as a result of which she underwent symptomatic infusion therapy at regional hospital. Gradually, the dysphagia progressed, in connection with which the patient was transferred to the SI «Zaycev V.T. IGUS NAMSU». At the time of the first admission to our hospital the patient was in very severe general condition. The patient complained of inability of liquid drinking, weight loss, weakness, dizziness. The patient's weight was 38 kg. The body mass index (BMI) was 16.9 kg/m<sup>2</sup> [15, 16]. Nutritional status was very poor. The patient was exhausted. There was not observed any comorbidity in such case.

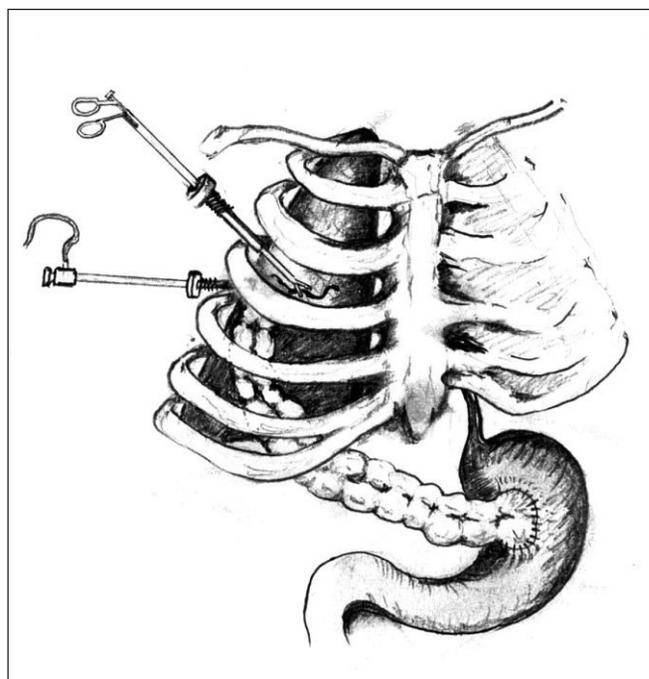
In the department the patient had got the adequate infusional therapy to restore the homeostatic parameters and parenteral nutrition by intravenous feeding through the central venous catheter.

On X-ray examination of the esophagus it was revealed complete obliteration of the thoracic esophagus, starting from the upper thoracic region (Figure 1).

It should be noted that the radiopaque solution agent evacuation even in 24 hours after the beginning of this diagnostic procedure did not occur.

Due to the severe condition of the patient and her exhaustion, Stamm-Senn-Kader's gastrostomy was performed under the local anesthesia, like a first step of surgical treatment. Intraoperatively the assessment of the stomach and duodenum was performed. Their affection in this case was not observed.

The providing of enteral nutrition was started immediately at the same day of surgery. As an initial enteral



**Fig. 2.** Thoracoscopic translocation of the proximal part of the mobilized colon interponate

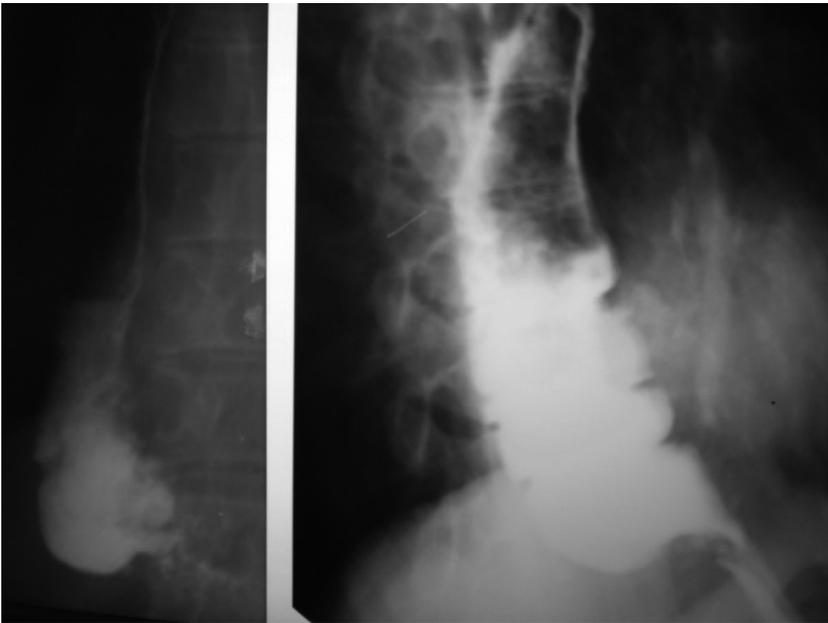
nutrition we used 5% Glucose and 0,9% NaCl solutions, and enteral feeding solutions.

There were no complications in the postoperative period after Stamm-Senn-Kader's gastrostomy. The patient was discharged from the hospital on the fifth postoperative day with a significant improvement of her general condition. The patient was instructed how to take care over the gastrostomy and how adequately to feed herself with support of fluid and electrolyte and nutritional balance. After that the dilatational procedures were performed during eight months after gastrostomy formation. But it was ineffectiveness.

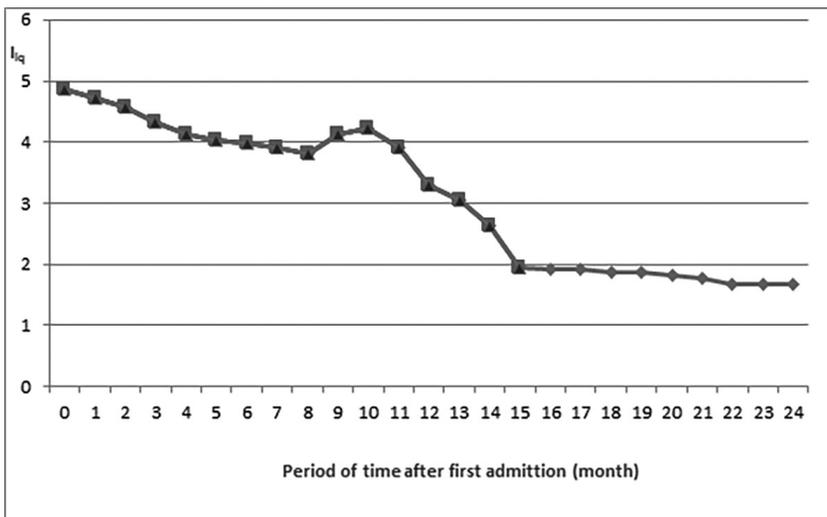
The management features for such patient included every months medical check-ups with passing life quality assessment questionnaire (Patent of Ukraine №103176: method of the life quality and treatment effectiveness assessment of patients with gastrointestinal diseases) [17].

In eight months after the gastrostomy formation and relative restoration of the nutritional status, the patient was admitted into SI «Zaycev V.T. IGUS NAMSU». The patient had inability to drink the liquids per os. She provided the enteral feeding and drinking per gastrostoma by herself. Her body weight was restored to 55,2 kg, the BMI – 24,5 kg/m<sup>2</sup> [15, 16]. This parameter control helped to present the changing of BMI Category from “Moderate Thinness” on the first admitting to our Institution to category “Normal” BMI during eight months (according to the World Health Organization's (WHO) body weight recommendations based on BMI values for adults) [15, 16, 18, 19, 20, 21].

After additional examination it was defined that due to the previously formed gastrostomy and followed stomach deformation by the cicatricial process, the stomach could not be considered as an interponate for the affected esopha-



**Fig.3.** X-ray examination of the esophagocoloplasty segment



**Fig. 4.** Dynamics of Ilq (the integral indicator of the patient's life quality)

gus replacement. It was decided to perform esophagoplasty with the right colon on the feeding pedicle from the middle colon vessels with the conducting of the interponate in the isoperistaltic direction intrapleurally.

To clarify the anatomical features of the colon angioarchitectonics before the elective reconstructive surgery, the patient underwent an angiographic study, which aimed to specify the type of the colon blood supply, as well as preventive partial sealing of the supplying colon vessels (by embolization) for the development of the main collateral arterial arcade and adaptation of the colon segment, selected for the interponate mobilization, to the new conditions of blood supply [22]. Angiographic examination was performed according to the classical method of Seldinger through the femoral artery with the introduction of catheters into the superior and inferior mesenteric arteries. The type of structure, condition and course of the superior mesenteric artery, iliac, right, middle and left colic and sigmoid arteries, the presence and state of intervascular

anastomoses were evaluated. Occlusion of the right colic artery and its branches was performed with the help of polyurethane foam balls, Gianturco spirals and crushed pieces of foam while preserving the middle colic artery. No complications due to this intervention were observed.

In 20 days, after the adaptation of the colon interponate to the esophagocoloplasty, the next step of surgical treatment was performed. After laparotomy, the right colon was mobilized with preservation of interponate blood supply by the middle colic artery. Also due to the right colon mobilization, distally side-to-side ileo-transversoanastomosis was formed. After the cologastroanastomosis formation and diaphragmotomy, the proximal part of the mobilized colon interponate was translocated from the abdominal cavity to the right pleural cavity using additional thoracoscopic accesses. Then feeding colostomy was formed from the proximal end of the mobilized colon interponate on the right chest wall (Figure 2).

This technique provides the ability to assess the viability of the proximal end of the colon interponate.

After stabilization of the patient's condition, namely in 10 days after the formation of a colostomy on the right anterolateral chest wall, for the next step of surgical treatment, right anterolateral thoracotomy was performed. During the assessment, the preserved viability of the entire colon interponate was observed. Then, affected by scarring process, obliterated part of esophagus was mobilized. The azygos vein was ligated. The esophagus was resected within healthy tissues. The colostomy was disattached from the chest wall. The end-to-side esophagocoloanastomosis was performed intrapleurally.

The postoperative period was favorable. The control X-ray examination on the ninth day after reconstructive surgery was performed (Figures 3).

The radiopaque solution passes freely through the interponate. The evacuation of the radiopaque solution through the upper gastrointestinal tract was timely, signs of esophago-colo- and colo-gastro-anastomoses leakages were not observed (Figure 3).

In one month after the third surgery and restoration of the food passage by the natural way, closure of the contact gastrostomy was performed.

We estimated the life quality of this patient by the assessment method of the treatment effectiveness of the patients with gastrointestinal diseases (Patent of Ukraine № 103176) [17]. According to this method, the patient was a subject to this study at different times of treatment: at the first admission to the surgical hospital and then monthly from the moment of the first hospitalization.

The study of assessment the treatment effectiveness of patients and their life quality involves three stages in each case: the patient fills in a questionnaire of subjective data (20 questions) and the calculation of the subjective component of life quality –  $I_{sub.c.}$ ; filling in a questionnaire of objective data by a doctor (10 questions) and calculation of the objective component of quality of life –  $I_{ob.c.}$ ; integral indicator of life quality –  $I_{iq}$  (according to the formula:  $I_{iq} = (I_{ob.c.} + I_{sub.c.}) * 0,5$ ) [17].

The patient's examination at different stages of treatment allows us to assess not only the patient's life quality, but also to quantify the treatment effectiveness.

An inverse scale is used to assess life quality, which allows to interpret the results of its quantitative assessment [17]: higher values (1 to 5) obtained on the scale correspond to more pronounced symptoms of the disease, more severe physical and/or psychological condition of the patient and, accordingly, a rather low life quality [17].

Reducing the severity of the patient's condition is reflected in the value decrease of the indicator obtained on the scale. The decrease in the scale reflects the improvement of the patient's condition, reducing symptoms, attenuation of pathological processes. It indicates the improvement of patient's health and respectively, it's life quality [17].

The dynamics of the integral indicator of the patient's life quality ( $I_{iq}$ ) at different stages of observation depending on the initial admission into the surgical hospital is presented on the graph (Figure 4).

At the time of the patient's first admission to the surgical hospital  $I_{iq}$  reflected a «very low life quality» due to the se-

verity of the general physical and psychological conditions of the patient and her exhaustion. After the formation of a contact gastrostomy during the first eight months of the observation, a steady improvement of  $I_{iq}$  was observed. At this stage, the patient was admitted for a more thorough examination and preparation for the next surgical steps, the implementation of which during the period from 8 to 10 months explains the temporary deterioration of  $I_{iq}$  to «very low life quality» at the time of recovery after complex staged surgical treatment. It should be noted that  $I_{sub.c.}$  throughout the study up to 11 months after the beginning of the observation «suffered» due to the presence of stoma and psychological discomfort provoked by it, and with further observation, the indicator  $I_{sub.c.}$  markedly was improved after the closure of the stoma. From the 11th to the 14th month there was a constant improvement of  $I_{iq}$  to «low quality of life», and from the 15th month (the graph shows the absence of red color) there was a stabilization of the patient's general condition and  $I_{iq}$  improvement to «satisfactory life quality» (Figure 4).

The graph reflects, that as the treatment course result, the patient showed corresponding changes in both objective and subjective components and an integral indicator of life quality at each stage during the observation. After all stages of surgical treatment, a stable, even improvement in life quality to a satisfactory level was reflected. The treatment had a positive effect and the life quality gradually was improved. The treatment course can be regarded as effective.

The patient was under the observation for 8 years, no complications were detected, the nutritional status of the patient was completely restored.

Patients with complete esophageal obliteration due to the extended post-burn cicatricial esophageal strictures and, dysphagia grade IV are admitted into surgical department in a state of exhaustion, sometimes cachexia. Radical restoration of the food passage in a natural way at this stage is impossible due to the severity of the general condition, which necessitates two- and sometimes three-step surgical treatment. Theoretically in such situations, surgeons consider a two-step approach to the treatment tactic [23]. At the first stage, gastro- or enterostomy is performed to provide enteral nutrition, restore nutritional status and stabilize the general condition. In our practice, we give the preference to the contact gastrostomy formation in such cases. Gastrostomy provides a more physiological digestion while maintaining the anatomical sequence of the food bolus passage through the gastrointestinal tract, which allows for a more efficient and faster restoration of the patient's nutritional and general status. In the presented clinical case, the patient needed an enteral nutrition. It was decided to perform Stamm-Senn-Kader's gastrostomy, considering the early terms of cicatricial changes and the incompleteness of the pathological process of scarring of the esophagus, as well as the inability to assess the degree of stenosis of the esophageal lumen in the future. Also, in this situation, the option of performing a gastrostomy with the simultaneous formation of a gastric interponate was not considered, since this type of surgery is performed under general anesthesia (laparoscopic or laparotomy) and

the general condition of the patient did not allow this type of operation to be performed.

It should be noted that such patients, after the gastrostomy formation, are subject to dilatational procedures. The effectiveness of dilatational procedures determines the implementation of the next step of surgical tactics. In case of restoration of the esophageal patency and nutritional status, the patient does not need surgical treatment, and in this situation, the second step of surgical treatment is the contact gastrostomy closure (without additional surgery). It leads to achievement of the ultimate goal of patient's treatment – the food passage restoration by the natural way.

But in case of residual dysphagia on the base of ineffective dilatational procedures at the second step, resection of the affected esophagus and esophagoplasty, closure of the stoma are performed.

The irreversible loss of the colon interponate is a rare cause of tremendous consequences for the patient. The main cause for the colon interponate loss is its ischemic necrosis in the early postoperative period. The colon interponate necrosis has been reported in 4% to 8% of patients after esophagocoloplasty. It is typically diagnosed between second and seventh postoperative days in a not doing well patient without apparent reason [5, 9, 10, 11]. Emergency management includes removal of the necrotic segment and a cervical esophagostomy formation. Less common conditions that may lead to colon interponate loss include its diffuse ischemic stenosis [4, 5], operative trauma, colon interponate necrosis after incarceration due to colon interponate translocation into the pleural cavity [4, 5], and repeated aggressive liquids (caustic, acidic, etc.) injuries [4, 5, 12].

Since the second step of surgical tactics carries the great risks of development intra- and postoperative complications (sometimes fatal), we divide its implementation in the time interval according to the anatomical and physiological grounds into several stages. This decision about the amount of stages is made individually in each case.

During the second step of surgical treatment, due to the risks of ischemia of the colon interponate, it is decided as additional surgical step to form colostomy on the anterolateral right chest wall for observation over the interponate. This approach allows to prevent the occurrence of fatal, irreversible complications in case of development of critical ischemic changes in the form of interponate necrosis. While the observing the state of the colon interponate for about 2 weeks after this surgery, the presence of convincing data on the viability and sufficient adequate blood supply of the colon interponate allows to make a decision about the next step of reconstructive surgical treatment.

This surgery includes the closure of the colostomy and the formation of an esophagocoloanastomosis. It provides the restoration of the food passage by the natural way. Control X-ray examination in early postoperative period make it possible to track the possible development of esophagocoloanastomotic complications. The reconstructive stage of the surgical treatment in the presented clinical case was performed without the gastrostomy closure. Formed at the first step of the surgical treatment, the contact gastrostomy that was used up to this

point as a so-called “insurance” and provided enteral nutrition. During the early postoperative period, the gastrostomy continued to perform its functions. The main goal of the gastrostomy preservation at this stage was to provide enteral nutrition in the early postoperative period, especially in the case of postoperative esophagocoloanastomotic complications, such as anastomosis with dysphagia, partial or complete esophagocoloanastomotic leakage. In the presented clinical case, the complications in postoperative period after the reconstructive stage of surgical treatment were not observed. At this step in one month after esophagocoloanastomosis formation the contact gastrostomy was closed.

During the observation over the patient the postoperative complications after each step of surgical treatment were not observed. The patient survived.

Treatment tactics of patients with complete esophageal obliteration due to the extended post-burn cicatricial esophageal strictures until recently remains complex and controversial and requires an individual approach in each case for a long period of time.

## CONCLUSIONS

The proposed staged approach in the surgical treatment tactics of patients with complete esophageal obliteration due to extended post-burn cicatricial stricture of the thoracic esophagus, dysphagia of IV degree presents effective treatment results and a significant improvement in the patient's life quality. This retrospective research showed good postoperative results and need to be continued.

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#### ORCID and contributionship:

Serhii O. Savvi: 0000-0002-3636-5875 <sup>A,E,F</sup>  
 Alla Yu. Korolevska: 0000-0003-2903-205X <sup>A,C,D</sup>  
 Serhii Yu. Bityak: 0000-0002-6012-2048 <sup>B,C,E</sup>  
 Yevhen A. Novikov: 0000-0002-5039-5114 <sup>D,E,F</sup>

#### Conflict of interest:

*The Authors declare no conflict of interest.*

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#### CORRESPONDING AUTHOR

**Alla Yu. Korolevska**

SI “Zaitsev V.T. IGUS of NAMSU”

1 Balakireva vjizd, 61103 Kharkiv, Ukraine

tel: +38-067-37-93-118

e-mail: korolevska@ukr.net

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**A** – Work concept and design, **B** – Data collection and analysis, **C** – Responsibility for statistical analysis, **D** – Writing the article, **E** – Critical review, **F** – Final approval of the article