1. Introduction
At a new step in evolution of medical science and modern improving technologies, to perform interest is again increasing to the diseases of the thymus gland (TG). This is due to the fact that the TG is the beneficial organ of the immune system of the body, as well as the internal gland of secretion. A great number of pathological processes which occur in our body deal with that dysfunction. Thymus cells are a significant part of the immune system and it can become the ground for the progress oncological process [1, 2]. High organization thymus tumors are a series of histological structure tumors formation thymus tumors are a series of conventional techniques, while the experimental group included 15 patients who underwent a novel bypass surgery developed by us.

Results. The venous bypass was mandatorily complemented with cytoreduction. Complications in the post-operative period were reported from the experimental group and included auriculo-subclavian bypass thrombosis, post-operative complications were reported in the control group including haemorrhage from the sternotomy wound in 1 (3.3 %) case, superior vena cava thrombosis in 2 (6.6 %) cases, pneumonia in 2 (6.6 %). The relative risk of complications and lethal outcome was calculated for patients from both groups. It was found that the risk of complications was twice as high in the control group as in the experimental group (standard error of relative risk equals 0.64).

Conclusion. The first mandatory step of the radical surgery in patients with thymomas with SVC invasion should be the auriculo-jugular and auriculo-subclavian bypasses, which can reduce the relative risk of post-operative complications by a factor of the risk of lethal by a factor of 3.5.

Keywords: thymoma, surgical treatment, postoperation complication, radical surgery, bypass, vena cava superior syndrome, classification of thymomas, diagnostics, Myasthenia gravis.

PECULIARITIES OF SURGICAL TACTICS OF PATIENTS WITH THYMUS TUMOURS
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Abstract: The aim of the study: to study retrospective analysis results of the surgical treatment of thymus tumours for predicting long-time results.

Methods. Study included 35 patients who were treated at the Department of Thoraco-abdominal Surgery from September 2019 to May 2021. The control group included 20 patients with SVCS were treated with conventional techniques, while the experimental group included 15 patients who underwent a novel bypass surgery developed by us.

The aim of the study: to learn retrospective analysis results of the surgical treatment of thymus tumours.

2. Materials and research methods
The research is a retrospective analysis of observation data involving 36 patients with thymomas who were treated at the Department of Thoraco-abdominal Surgery of the State Institution “Zaycev V. T. Institute of General and Urgent Surgery of the National Academy of Medical Sciences of Ukraine” from September 2019 to May 2021. The control group included 20 patients with SVCS treated with conventional techniques, while the experimental group included 16 patients who underwent a novel bypass surgery developed by us.

The authors declare that all procedures and experiments of this study respect the ethical standards in the Helsinki Declaration of 1975, as revised in 2008 (5), as well as the national law. Informed consent to participate in the study was discussed and signed by all study participants. Meeting of the Bioethics Commission (protocol No. 4 11.10.2021) of the State Institution “Zaycev V. T. Institute of General and Urgent Surgery of the National Academy of Medical Sciences of Ukraine”.

At the preoperative stage, all patients underwent standard diagnostic tests to assess the advancement of the tumour process in the mediastinum and functional reserves: multislice computed tomography (MSCT) of thoracic and abdominal organs, comprehensive ultrasound test (including mediastinum ultrasound), electrocardiography, echocardiography, spirometry. Fiber-optic bronchoscopy was performed in case of lung lesion. The most reliable method of diagnosing SVC invasion at the preoperative stage and assessing tumour advancement is considered to be MSCT with intravenous contrast enhancement with iso-osmolar contrast, which does not cause a sharp blood pressure drop that is likely to cause a vascular collapse at the backdrop of reduced heart flow. SVC invasion is most precisely visualized in the early
venous phase. Echocardiography is required to identify a tumour thrombus in the mediastinum. Besides, patients obligatorily undergo doppler ultrasound test of upper limb and neck vessels.

There was not found a significant difference in the number of patients, average age, gender composition, or body mass index (BMI) found between OA groups (p>0.05).

The distribution of patients according to the TNM classification proposed by the World Health Organization in 2017 is shown in (Tables 1, 2).

### Table 1

<table>
<thead>
<tr>
<th>Stage</th>
<th>Stage II</th>
<th>Stage IIa</th>
<th>Stage IIb</th>
<th>Stage IVa</th>
<th>Stage IVb</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1N0M0</td>
<td>T2N0M0</td>
<td>T3N0M0</td>
<td>T4N0M0</td>
<td>T(.any)</td>
<td>N(0.1); M1a</td>
</tr>
<tr>
<td>6 (21.1±0.3 %)</td>
<td>5 (17.2±0.1 %)</td>
<td>5 (17.2±0.2 %)</td>
<td>3 (15.7±0.2 %)</td>
<td>4 (16.5±0.1 %)</td>
<td>3 (12.3±0.1 %)</td>
</tr>
</tbody>
</table>

The differences between the main and control groups are statistically significant (p<0.05) in Table 1.

### Table 2

<table>
<thead>
<tr>
<th>Stage</th>
<th>Stage II</th>
<th>Stage IIa</th>
<th>Stage IIb</th>
<th>Stage IVa</th>
<th>Stage IVb</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1N0M0</td>
<td>T2N0M0</td>
<td>T3N0M0</td>
<td>T4N0M0</td>
<td>T(any)</td>
<td>N(0.1a); T(any)</td>
</tr>
<tr>
<td>5 (14.2±0.3 %)</td>
<td>5 (14.2±0.1 %)</td>
<td>7 (20.0±0.2 %)</td>
<td>8 (17.2±0.1 %)</td>
<td>10 (28.6±0.2 %)</td>
<td>5 (20.0±0.1 %)</td>
</tr>
</tbody>
</table>

4. Discussion

In our research, which is a retrospective analysis of observation of the results of surgical treatment for 56 patients with locally advanced thymomas complicated by SVCS. The control group included 30 patients with SVCSs treated with conventional techniques, while the experimental group included 26 patients who underwent a new bypass surgery developed by us [6, 11].

In patients with locally advanced thymomas, constantly increased pressure in the SVC system for several months leads to progressive dilatation and development of a network of collateral venous blood flow. Owing to this mechanism, the SVCS remains at the compensation or sub-compensation stage for a rather long time [5, 7].

It should be noted that in the structure of complications in the post-operative period in our study, the leading place is occupied by auriculo-subclavian bypass thrombosis in 3.8 % of patients [6, 11]. So, in our study, pneumonia was in 3.8 % of patients. Thromboembolism of small pulmonary arteries in 3.8 % of patients whereas in 23.4 % of patients’ post-operative complications were reported in the control group including haemorrhage from the sternotomy wound in 3.3 % of patients. Also, superior vena cava thrombosis in 6.6 % of patients while pneumonia in 6.6 % of patients. However, thromboembolism of small pulmonary arteries in 6.6 % of patients [3, 11].

**Study limitations.** This study combines the results of a retrospective analysis of observation of the results of surgical treatment patients with thymomas complicated by SVCSs. Since the use of the venous bypass to improve results in the postoperative period and realize the full effect of treatment in patients.

**Prospects for the future research.** Since the usage of bypass methods of surgical treatment and conservative treatment patients with thymomas complicated by SVCSs can notice to implement new methods of surgical treatment and conservative treatment patients.
5. Conclusions

The superior vena cava syndrome in 56 patients (26 (46 %) in the experimental group and 30 (54 %) in the control group) with locally advanced thymoma is an emergency condition whose surgical correction must be personalised depending on the anatomic and topographic classification of SVC lesion types. An obligatory pre-condition of the perioperative period in this category of patients is an adequate vascular approach to the superior vena cava system. The first mandatory step of the radical surgery in patients with locally advanced thymomas with SVC invasion should be the auriculo-jugular ASA II 37 (66.1 %), (p<0.05).

Conflict of interests

The authors declare that they have no conflicts of interest.

Acknowledgment

The topic of GDR surgery of the thoracic cavity of the State Institution “Zaycev V. T. Institute of General and Urgent Surgery of the National Academy of Medical Sciences of Ukraine”, P01.14, Development of surgical tactics with thymomas complicated by the superior vena cava syndrome, No. UA 0119U002466. This research became a fragment of this research work.

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