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CLINICAL CASE REPORT

Characteristics of anesthetic and surgical tactics in treatment of a patient with a giant thyroid mass in a cancer center (clinical case)

D. A. Rozenko[1], M. A. Engibaryan[1], D. A. Kharagezov[1], M. V. Zhenilo[1,2], N. N. Popova[1,2]✉, M. V. Bauzhadze[1], E. A. Marykov[1]

[1] National Medical Research Centre for Oncology, Rostov-on-Don, Russian Federation
[2] Rostov State Medical University, Rostov-on-Don, Russian Federation
✉ natalyaanest@mail.ru

ABSTRACT

This paper describes an example of radical surgical treatment of a patient with a giant retrosternal goiter complicated by compression of the organs of the neck and mediastinum. Considering all the risks and possible complications, we should take into account the fact that enlarged thyroid (T) body with retrosternal location can cause displacement and stenosis of the trachea and esophagus, and dislocation of large vessels and nerves of the mediastinum. This anatomical specificity is an imminent threat to successful treatment, and it also carries a certain risk of asphyxia and sudden death of the patient. In this clinical case, radical surgical treatment in this patient included sequential mobilization in two pleural cavities, and then the total removal of T through the traditional surgical access. The anesthetic complexity to support the surgical intervention involved both difficult intubation due to tracheal stenosis, and also the required separate ventilation of the lungs to visualize anatomical structures and mobilize a multinodular formation in two pleural cavities. Standard methods of artificial lung ventilation could be ineffective and even dangerous in this case due to the location and size of the tumor. We focused our attention on high-frequency ventilation (HFV), the best method of respiratory support during surgeries for tracheal and bronchial pathologies. The main task of the anesthetic team in this clinical case was to prevent the development of hypercapnia and hypoxia during intubation of the stenotic tracheal segment, and then adequate ventilation of the lungs with reduced area of proper gas exchange due to bilateral surgical pneumothorax. Thus, the full treatment was carried out due to the only safe method of compensating lung ventilation with anesthesia by HFV. The applied HFV method creates an adequate gas exchange in the lungs due to the small ventilation volume and high frequency of respiratory cycles per minute. HFV both prevented the development of threatening complications during intubation of the stenotic tracheal area and ensured an adequate gas exchange during successive thoracoscopic stages of thyroid tumor mobilization.

Keywords: thyroid, multinodular goiter, compression of organs of the neck and mediastinum, thyroidectomy, artificial lung ventilation

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For correspondence: Natalia N. Popova – Cand. Sci. (Med.), MD, anesthesiologist and resuscitator of the Anesthesiology and Resuscitation Department, National Medical Research Centre for Oncology, Rostov-on-Don, Russian Federation; Assistant of the Department of Oncology, Rostov State Medical University, Rostov-on-Don, Russian Federation
Address: 63 14 line, Rostov-on-Don 344037, Russian Federation
E-mail: natalyaanest@mail.ru
ORCID: https://orcid.org/0000-0002-3891-863X
SPIN: 5071-5970, AuthorID: 854895
Scopus Author ID: 57215858399

Compliance with ethical standards: the ethical principles presented by the World Medical Association Declaration of Helsinki, 1964, ed. 2013 were observed in the study. The study was approved by the ethics committee of the National Medical Research Centre for Oncology (extract from the protocol of the meeting No. 19 dated 22/11/2021). Informed consent was received from all participants of the study

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КЛИНИЧЕСКИЙ СЛУЧАЙ

Особенности анестезиологической и хирургической тактики лечения больного с гигантским объемным образованием щитовидной железы в условиях онкологического центра (клинический случай)

Д. А. Розенко[1], М. А. Енгибарян[1], Д. А. Харагезов[1], М. В. Женило[1,2], Н. Н. Попова[1,2]✉, М. В. Баужадзе[1], Е. А. Марыков[1]

[1] ФГБУ «Национальный медицинский исследовательский центр онкологии» Министерства здравоохранения Российской Федерации, г. Ростов-на-Дону, Российская Федерация
[2] ФГБОУ ВО «Ростовский государственный медицинский университет» Министерства здравоохранения Российской Федерации, г. Ростов-на-Дону, Российская Федерация
✉ natalyaanest@mail.ru

РЕЗЮМЕ

Описан клинический пример радикального хирургического лечения пациента с гигантским ретростернальным зобом, осложненным компрессией органов шеи и средостения. Рассматривая все риски и возможные осложнения, следует учитывать тот факт, что увеличенная щитовидная железа (ЩЖ) с ретростернальной локализацией может вызывать смещение и стеноз трахеи и пищевода, дислокацию крупных сосудов и нервов средостения. Эта анатомическая специфика является не только неминуемой угрозой успешного лечения, но и несет определенный риск развития асфиксии и внезапной смерти пациента. В нашем клиническом случае радикальное хирургическое лечение у данного пациента предусматривало последовательную мобилизацию в двух плевральных полостях, а затем тотальное удаление ЩЖ из традиционного хирургического доступа. При этом сложность анестезиологического обеспечения хирургического вмешательства представляла не только трудная интубация, обусловленная стенозом трахеи, но и необходимая реализация раздельной вентиляции легких для возможности визуализации анатомических структур и мобилизации многоузлового образования в двух плевральных полостях. Стандартные методики искусственной вентиляции легких из-за особенностей локализации и размеров опухоли в данном случае могли быть малоэффективны и опасны. Наше внимание было направлено на применение метода респираторного обеспечения во время операции – высокочастотной искусственной вентиляции легких (ВЧ ИВЛ), которая занимает лидирующие позиции в обеспечении хирургического лечения патологии трахеи и бронхов. Следует отметить, что в данном клиническом случае основной задачей анестезиологической бригады было предупреждение развития гиперкапнии и гипоксии при интубации стенозирующего сегмента трахеи, а затем адекватная вентиляция легких при снижении площади должного газообмена вследствие двустороннего операционного пневмоторакса. Таким образом, проведение полноценного лечения состоялось благодаря единственно безопасному способу заместительной вентиляции легких во время анестезии методом ВЧ ИВЛ. Применяемый метод ИВЛ создает адекватный газообмен в легких за счет малого вентиляционного объема и высокой частоты дыхательных циклов в минуту. Применение ВЧ ИВЛ позволило не только избежать развития угрожающих осложнений во время интубации стенозирующего участка трахеи, но и обеспечило адекватный газообмен во время последовательных торакоскопических этапов мобилизации опухоли щитовидной железы.

Ключевые слова: щитовидная железа, многоузловой зоб, компрессия органов шеи и средостения, тиреоидэктомия, искусственная вентиляция легких

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Для корреспонденции: Попова Наталья Николаевна – врач анестезиолог-реаниматолог отделения анестезиологии и реанимации, ФГБУ «Национальный медицинский исследовательский центр онкологии» Министерства здравоохранения Российской Федерации; ассистент кафедры онкологии, ФГБОУ ВО «Ростовский государственный медицинский университет» Министерства здравоохранения Российской Федерации, г. Ростов-на-Дону, Российская Федерация
Адрес: 344037, Российская Федерация, г. Ростов-на-Дону, ул. 14-я линия, д. 63
E-mail: natalyaanest@mail.ru
ORCID: https://orcid.org/0000-0002-3891-863X, SPIN: 5071-5970, AuthorID: 854895, Scopus Author ID: 57215858399

Соблюдение этических стандартов: в работе соблюдались этические принципы, предъявляемые Хельсинкской декларацией Всемирной медицинской ассоциации (World Medical Association Declaration of Helsinki, 1964, ред. 2013). Исследование одобрено этическим комитетом
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Конфликт интересов: все авторы заявляют об отсутствии явных и потенциальных конфликтов интересов, связанных с публикацией настоящей статьи

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INTRODUCTION

To date, international and Russian clinical guidelines have been developed for the diagnosis and treatment of thyroid diseases. But as before, patients with giant goiter and manifestations of compression syndrome usually seek medical help in an emergency [1]. The main clinical symptoms of compression of the neck and mediastinal organs are: pathological breathing with obstruction on the inhalation or exhalation in 73.5 % of cases, varying degrees of esophageal dysphagia (8.7 % of cases), superior vena cava syndrome (3.2 % of cases), and in 1 % of patients chronic hypoxia provoked the development of cardiovascular and cerebral insufficiency [2].

Nontoxic multinodular goiter (E04.2) is a clinical concept that includes all detectable focal thyroid formations, which are characterized by various morphological features. On average, according to statistics in the Russian Federation, the incidence of nodular goiter is 31 % [3]. In 20 % of cases, goiter has a cervical-thoracic localization, of which 80 % of cases are diagnosed in the anterior mediastinum. The peculiarity of this tumor topography is the delayed growth, late diagnosis and complicated course of the disease [4]. According to the diagnostic criteria of the Bethesda classification (2016), with a diffuse increase in both lobes of the thyroid gland, as well as with suspected malignant tumor, surgical intervention in the volume of hemithyroidectomy or thyroidectomy is necessary [2, 5]. It should be noted that the proportion of thyroid cancer in relation to benign nodules ranges from 2 to 30 %, according to various data. The prognosis of the disease largely depends on early diagnosis, which, in some cases, is out of time and is due to prolonged tumor growth against the background of other thyroid diseases [6].

Considering all the risks and possible complications, one should take into account the fact that an enlarged thyroid gland with retrosternal localization can cause displacement and stenosis of the trachea and esophagus, as well as dislocation of large vessels and nerves of the mediastinum. This anatomical specificity is not only an imminent threat to successful treatment, but also carries a certain risk of asphyxia and sudden death of the patient [7].

To carry out adequate and safe anesthesia during radical surgical removal of a giant thyroid neoplasm, the anesthesiologist must provide for all complications of the intra- and early postoperative period, with the possibility of emergency measures to restore the patency of the upper respiratory tract. The degree of tracheal stenosis according to the Cotton-Mayer classification serves as a determining factor in choosing the tactics of intubation and ensuring adequate ventilation during surgery. Thus, at grade I, when tracheal obstruction is less than 50 %, standard patient management is possible, and at grade II, obstruction is from 51 % to 70 %, at grade III 71–90 % stenosis and grade IV complete stenosis, anesthesia tactics using endoscopic methods should be individually determined [8].

In fact, acute violation of the patency of the respiratory tract in chest goiter with compression syndrome and tracheal stenosis can occur at any stage of anesthesiological support, during induction of anesthesia or intubation of the trachea, as well as during mobilization and removal of tumor formation [7]. For adequate visualization of the mediastinal organs and mobilization of the thyroid gland in the pleural cavities, it is necessary to ensure lung collapse on the side of the operation. This is done through the technical reception of general anesthesia using single-lung ventilation [9]. At the same time, tracheal intubation should be performed with a two-light endotracheal tube for separate ventilation of the lungs. The complexity of this manipulation, even in typical conditions, is not always safe for patients, and in some cases cannot be performed at all [10]. The giant thyroid gland aggravates the situation, located in the mediastinum, it leads to significant changes in the anatomy of the trachea and bronchi, displacement and compression of their lumen, which undoubtedly complicates the separation of the lungs for ventilation. In our patient, intubation with a double-light tube was immediately excluded. The presence of tracheal stenosis of more than 70 % does not allow for unhindered intubation of the patient, even with a single-light endotracheal tube, much smaller in diameter. Thus, the only safe method of replacement ventilation during anesthesia in this patient was the use of high-frequency ventilation. The main value of the method used is to ensure adequate gas exchange in the lungs due to the small ventilation volume and high frequency of respiratory cycles per minute. At the same time, the diameter of the adapted catheter, which is used instead of an intubation tube, is much smaller than the size

of the stenosing section of the trachea. Prolonged compression of the trachea caused by enlarged thyroid gland leads to degenerative cartilage atrophy and tracheomalacia, as it was observed in our patient [11]. And at this point, of particular importance is the fact that for high-frequency (HF) artificial lung ventilation (ventilator), a thin and elastic adapted catheter is used, which does not create additional pressure on the trachea. It follows from the above that the absence of a traumatic factor will avoid additional damage and rupture of the trachea, which already has an initially altered architectonics of blood supply and deformation of the fibrous ring. In addition, the preservation of the integrity of the tracheal tissue, under these conditions of lung ventilation, will prevent the development of a detrimental complication, which is mediastinitis. The total spread of the inflammatory process in the mediastinum and, as a result, the progression of the systemic inflammatory reaction of the body, will inevitably lead to adverse treatment results and fatal consequences for the patient.

The purpose of the study was to demonstrate by this clinical case the possibility of safe and adequate provision of ventilation by HF ventilation to a patient with a giant retrosternal goiter complicated by compression of the neck and mediastinal organs during a single-stage operation consisting of three stages of mobilization, in the right and then in the left pleural cavity, followed by total removal of the thyroid gland from the median cervical access.

Clinical case

64 years old patient M, was admitted to the Department of Head and Neck tumors of National Medical Research Centre for Oncology in November 2022 with complaints about difficulty breathing with minimal physical exertion and during sleep, persistent cough, difficulty passing solid food through the esophagus, facial swelling. He considers himself ill since October 2022, when the above-mentioned complaints appeared. The patient was further examined and diagnosed with a thyroid tumor with a retrosternal spread.

Findings during physical examination revealed: height 176 cm, weight 94 kg, body mass index is 30.35 kg/m^2. The patient's condition is satisfactory. Patient is conscious. The skin is of normal color, the body complexity is normosthenical, the nutrition is satisfactory. There are no peripheral edema, soft tissue turgor is reduced. The temperature is within the normal range. Blood pressure indicators on both brachial arteries are 150/90 mmHg, heart rate is 96 per minute, pulse of satisfactory tension filling, there is no pulse deficit. Auscultation reveals: shortness of breath of a mixed nature, respiratory rate 20–22 per minute, vesicular breathing, no wheezing, rhythmic muffled heart tones. There were no pathological changes on the behalf of other organs. Significant comorbidity, in addition to hypertension, was not detected (therapy with beta-blockers and antiaggregant drugs). According to the patient, he did not take thyrostatic therapy. Examination: the neck is deformed due to tumor formation of the thyroid gland with a retrosternal spread (II degree according to WHO), the thyroid gland is painless, soft, non-mobile, there is swelling of subcutaneous fat in the supraclavicular areas on both sides.

According to ultrasound of the thyroid gland, it was revealed: the volume of the right lobe is 60.5 cm^3, the left lobe is 44 cm^3, the total volume is 104.5 cm^3; the parenchyma has solid multiple isoechogenic nodules with hypoechoic contours and dimensions on the right are 15 × 10 × 15 mm, on the left – 31 × 19 × 28 mm, which corresponds to the EU TIRADS category 4 [12]; regional lymph nodes enlarged to 5–7 mm, pronounced vascularization, no hyperechoic inclusions. Ultrasound conclusion: thyromegaly, pronounced diffuse changes in the type of thyroiditis, diffuse nodular goiter EU TIRADS 4, nodular formations of both lobes of the thyroid gland with intracoracic distribution; lymphadenopathy of the parotid lymph nodes on the right, multiple thyroid nodes with intracoracic distribution, it is categorically impossible to exclude tumor genesis. To verify the process, a fine needle aspiration biopsy of the thyroid gland was performed. Cytological conclusion: the material was obtained from the site of the cell goiter of the left and right lobes, which corresponds to the II diagnostic category according to the Bethesda classification (2016) [5]. Computed tomography of the neck and thoracic cavity organs with intravenous bolus contrast, multiplanar and three-dimensional reconstruction of the neck revealed a significant increase in the thyroid gland with a spread to the mediastinum, a volumetric effect and compression of the trachea (lumen narrowed to 6 mm), hyperplasia of the lymph nodes of the neck (Fig. 1). According to fi-

broscopy data, it was revealed that, starting from the second cartilage, the trachea deviates to the right, its lumen spirally unevenly narrows (up to 6 mm) due to external pressure along the lateral and membranous walls to the level of tracheal bifurcation, the mucous membrane is hyperemic throughout.

A clinical diagnosis was made: a thyroid tumor with a retrosternal spread. Complication of the underlying disease: compression syndrome of the neck and mediastinal organs (compression of the trachea up to 6 mm). Concomitant diseases: hypertension stage 2, hypertension grade II, risk 4.

The council decided to perform radical surgical treatment in this patient with sequential mobilization in two pleural cavities, and then total removal of the thyroid gland from the traditional surgical access for this pathology. Anesthesiological support should be carried out using the method of high-frequency artificial lung ventilation (HFV).

On 01/16/2023, planned surgical intervention was performed in the following volume: video thoracoscopy on the right, video thoracoscopy on the left, mobilization of tumor formation, thyroidectomy. After premedication, patient M. was taken to the operating unit of National Medical Research Centre for Oncology for elective surgery. Initial functional data: blood pressure 146/96 mmHg, heart rate 104 per minute, respiratory rate (RR) 20 per minute, blood saturation 93 %. A puncture and catheterization of the cubital vein was performed. Intraoperative monitoring of the patient's functional state corresponded to the Harvard standard (cardiac monitoring, control of blood gas composition, assessment of the bispectral index and neuromuscular conduction). The operation started at 10:10am and ended at 3:50 pm. After preoxygenation with oxygen through a facial mask, induction of anesthesia with fentanyl 2.5 mg/kg, propofol at a dose of 3.0 mg/kg and rocuronium bromide 0.8 mg/kg was initiated. On the first attempt, under visual control (using the 840XDL video laryngoscope (Karl Storz – Endoscope, Germany) unhindered, an HF ventilator catheter was inserted into the trachea beyond the stenosis area. The HF ventilator mode is a jet catheter (artificial lung ventilation device high–frequency jet ventilator-HF/100 "ZisLine"). Also, an extraordinary situation was envisaged, which could arise if it was impossible to carry a ventilation catheter through the stenosing segment of the trachea due to mucosal edema or obstruction of the respiratory tract by sputum. In this case, it was envisaged to use an RF ventilator in injection mode. To do this, it was necessary to conduct a single-light endotracheal tube, using a video laryngoscope, behind the glottis, to the tracheal stenosis site and begin forced ventilation of the lungs. The injection mode also provides adequate ventilation, but, in our opinion, is less safe for this patient. This is explained by the three-fold change of the patient's position on the operating table during surgery (on the left side, on the right side and on the back). Displacement of the endotracheal intubation tube during the patient's movement, even if well fixed, has a high probability. The use of jet

Fig. 1. Spiral X-ray computed tomography (SCT) of the neck and chest organs

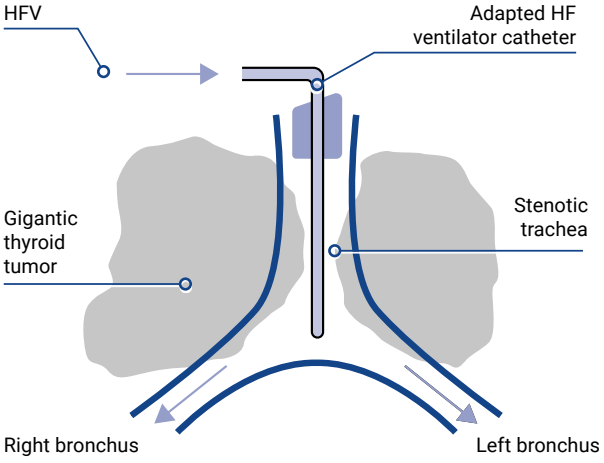

Fig. 2. The scheme of the HF ventilation

catheter ventilation completely eliminates the risk of dislocation of the adapted ventilation catheter. The mode of ventilation indicators at the time of the start of the operation was: minute ventilation frequency – 160 per minute, minute volume of ventilation (MV) – 11.5 l/min, tidal volume (Vt) – 140 ml. With HF ventilation, there is no possibility of spirometric determination of the required volume of minute ventilation or MV. Therefore, this parameter was calculated using the standard formula of T. M. Darbinyan:

MOD (l) = BM (kg) / 10 + 1,

where BM (kg) stands for body mass.

Determining the proper MV allows you to individually adjust the parameters of the HF ventilator in accordance with the respiratory needs of the patient and avoid the development of hypercapnia. The adequacy of ventilation and the replacement of respiratory function in full was confirmed by the data of the gas analyzer. The scheme of the HF ventilation is shown in figure 2.

The course of the operation. In the patient's position on the left side, a port and a video camera are inserted into the pleural cavity in the 7th intercostal space along the posterior axial line on the right. Under visual control, additional trocars were inserted through additional incisions in the 5th and 6th intercostal space along the anterior and posterior axillary lines and in the 7th intercostal space along the mid-axillary line. During the revision of the right pleural cavity, it was revealed that the thyroid gland is in the posterior mediastinum, the tumor shifts the esophagus and trachea to the right. The first stage of the operation was decided to mobilize the tumor. With the help of ultrasonic scissors, the parietal pleura was dissected with the mobilization of nodular formation from the trachea and esophagus. The lower edge of the tumor is located 0.5 cm above the anterior pulmonary trunk. Due to the inability to visualize the lower edge of the tumor with a surgical suturing device, v. Azygos was stitched and crossed, thorough hemostasis, drainage and layered suturing of the wound were performed. Then the patient was transposed to the right side. In the patient's position on the right side, a port was inserted into the pleural cavity in the 6th intercostal space along the antero-axillary line on the left, then a video camera was inserted and, under visual control, through additional incisions in the 5th and 6th intercostal space along the middle axillary and posterior axillary lines, as well as in the 9th intercostal space Additional trocars have been introduced along the rear-axillary line. The parietal pleura was opened in the posterior mediastinum above the aortic arch, and the tumor was mobilized from the left pleural cavity. The pleural cavity is sutured. Next, an arcuate incision of the neck skin was made 1 cm above the jugular sternum, the skin flaps were separated, the rectus muscles of the neck were dissected between the clamps. The revision revealed: the right lobe of the thyroid gland is enlarged, the gland tissue is totally replaced by a tumor of a tightly elastic consistency, the left lobe is large, the gland tissue is totally replaced by a multi-node tumor. The lower edge of the right lobe is located behind the sternum up to 8 cm away at the level of the tracheal bifurcation, closely adheres to the lower wall of the trachea. The right lobe of the thyroid gland was removed in blunt and acute ways, while the right recurrent laryngeal nerve was preserved. The left recurrent nerve was also visualized and isolated. Then the left lobe of the thyroid gland, the upper and lower vascular bundles are crossed and bandaged from 2 sides. Hemostasis, drainage, and layered suturing of the wound were performed. The operation was performed radically (Fig. 3, 4).

The parameters of the HF ventilator were changed depending on the stages of the operation, considering surgical manipulations in the right or left pleural cavities. At the time of surgical pneumothorax and in the absence of tightness of the pleural cavity, the minute ventilation frequency was increased to 200 per minute. Visually, the lung is partially collapsed, while the gas exchange area is preserved. According to pulse oximetry, blood oxygen saturation was 100 %. The presented frame of the video recording of the operation shows that the lung, reduced in size, does not interfere with the visualization and mobilization of thyroid tumor formation in the mediastinum (Fig. 5).

During the entire period of anesthesia, no cardiorespiratory disorders were recorded. At the end of the operation, with complete restoration of muscle tone and consciousness, as well as with adequate indicators of blood oxygen saturation, the ventilation catheter was removed unhindered. Postoperative monitoring of the gas composition of arterial blood revealed no serious violations: pCO_2 41.2 mmHg, pO2 120 mmHg, pH 7,250, BE 2.4 mmol/l, HCO_3 29.2 mmol/L, SO_2 97 %, Na+

139.0 mmol/L, K+ 3.9 mmol/L, SI – 101.0 mmol/l, Ca^{2+} ion – 2.01 mmol/l. On the 1st day after surgery, the patient's condition corresponded to the timing of postoperative treatment. With constant oxygen insufflation through a nasal catheter, the gas composition of arterial blood corresponded to normal values. On the 2nd day after the operation, the patient was transferred to the surgical department under the supervision of the attending physician. Postoperative therapy met the standards of medical care, which included antibiotic therapy, prevention of thrombogenic complications, and inhalation with mucolytics. Patient M. was discharged from the hospital on the 14th day, which corresponds to the standards of surgical treatment for uncomplicated thyroidectomy.

Description of the macro specimen: the right lobe of the thyroid gland, totally replaced by a multi-nodular tumor, of dense elastic consistency, nodes 2.5–3 cm in size; the left lobe of the thyroid gland is totally replaced by a multi-nodular tumor of dense consistency, nodes 2.5–7.5 cm in size (Fig. 6). Histological analysis No. 3778/23: morphological changes in the tissue of both lobes of the thyroid gland are distinctive for nodular follicular disease / multi-nodular goiter.

DISCUSSION

The incidence of thyroid tumor pathology in our country and the world remains high. In accordance with Russian clinical guidelines, radioactive iodine therapy or thyroidectomy are among the main methods of treating multi-node thyroid diseases [3]. Some patients seek medical help in an emergency, when, as a rule, clinical symptoms rapidly increase with decompensated compression of the tumor formation

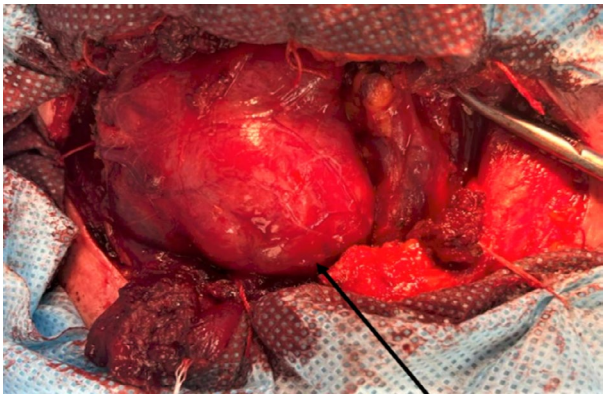

Fig. 3. The right lobe of the thyroid gland

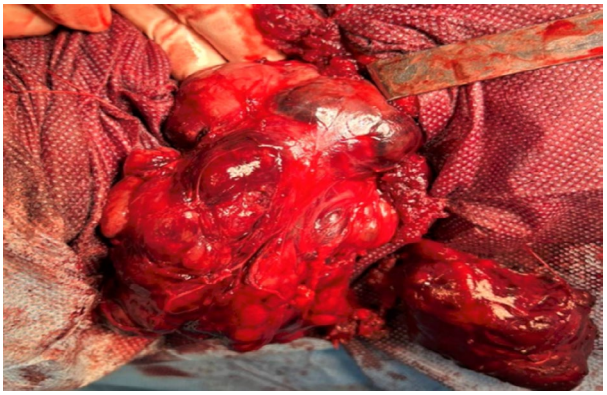

Fig. 4. The left lobe of the thyroid gland

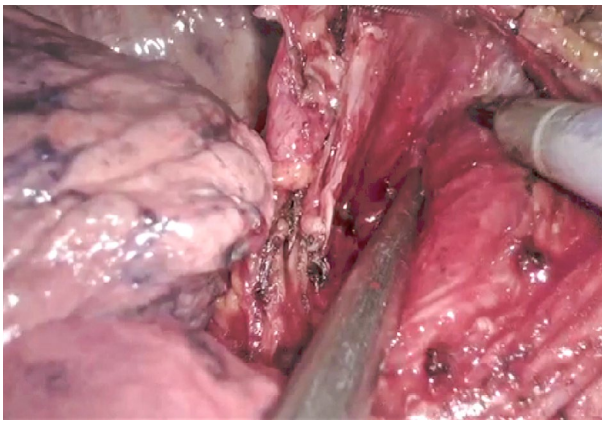

Fig. 5. Mobilization of the thyroid gland and partial lung collapse under conditions of HF V

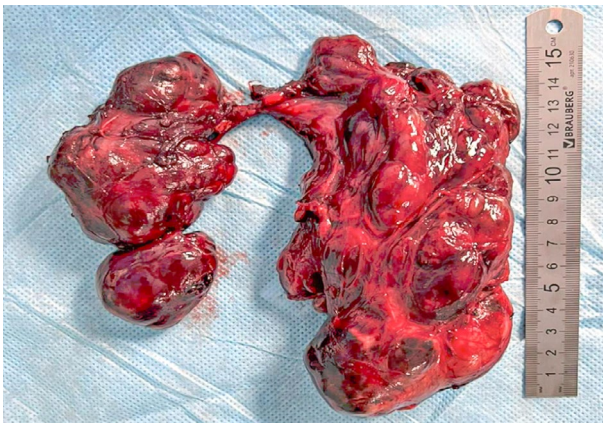

Fig. 6. Macro specimen: thyroid gland (two lobes with tumor nodes)

of the thyroid gland of the trachea, esophagus, vessels, and nerves of the mediastinum. Compression syndrome is one of the most difficult and unpredictable complications of nodular goiter. Mechanical compression of the trachea from the outside by a giant nodular formation of the thyroid gland is the cause of the development of respiratory failure of varying degrees of compensation. Preventing the development of asphyxia in a patient is the main indication for surgical treatment [1, 13].

The tactics of anesthesia with significant volume formation of the thyroid gland, and clinical signs of tracheal stenosis are determined by the risk of obviously difficult intubation. To overcome this factor, various technical possibilities are used: intubation using endoscopic equipment or the use of a videolaryngoscope. In our clinical case, the complexity of anesthesiological provision of radical surgical intervention was represented not only by difficult intubation due to tracheal stenosis, but also by the necessary implementation of separate ventilation of the lungs to enable visualization of anatomical structures and mobilization of a multi-node formation in two pleural cavities.

Standard methods of artificial lung ventilation, due to the peculiarities of the localization and size of the tumor in this case, could be ineffective and dangerous. Our attention was focused on the use of the respiratory support method during surgery – HF ventilation, which occupies a leading position in providing surgical treatment of pathology of the trachea and bronchi. The peculiarity of HF ventilation is the absence of the need to comply with the conditions of tightness – "respirator-patient", the technique is carried out on the principle of "open circuit". The high rate of respiratory cycles per minute guarantees the introduction of sufficient gas flow to create maximum respiratory support for the patient. In addition, according to a number of studies, a high level of oxygenating ability of the HF ventilator was noted in comparison with the standard ventilator. This is explained from the position of creating an increased partial pressure of oxygen in the composition of the alveolar gas, which is manifested by an increase in arterial oxygenation with preserved CO_2 elimination. Attention was also drawn to the fact that in conditions of jet HF ventilation in the ventilation-perfusion ratio, ventilation prevails over perfusion, unlike standard ventilation with a significant predominance of perfusion over ventilation, which contributes to increased oxygenation [9]. In this context, the use of HF ventilation is actively used in thoracic surgery not only for elective surgical interventions, but also in urgent situations such as lung abscess, massive pulmonary bleeding, and reconstructive operations for bronchopleural fistulas [14].

It should be noted that in this clinical case, the main task of the anesthesiological team was to prevent the development of hypercapnia and hypoxia during intubation of the stenosing segment of the trachea, and then adequate ventilation of the lungs with a decrease in proper gas exchange due to bilateral surgical pneumothorax. This was ensured by the effective use of the RF ventilator potential and made it possible to minimize tracheal injury and optimize functional gas exchange in our patient.

CONCLUSION

Based on the presented clinical data, it can be noted that the possibility of using modern technologies for anesthesiological ventilation in patients with giant thyroid tumors and compression syndrome makes it possible to carry out surgical treatment in full and avoid the development of life-threatening complications in patients. The presented clinical case demonstrated that this technique is not only effective and safe, but also the only correct one in a patient with a complicated course of retrosternal goiter. It should be noted that the success of the treatment completely depended on the professionalism of the staff of the cancer center, the well-coordinated work of the multidisciplinary team made it possible to provide specialized care and minimize complications and risks in this patient.

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Information about authors:
Dmitriy A. Rozenko – Cand. Sci. (Med.), chief of the Anesthesiology and Resuscitation Department, National Medical Research Centre for Oncology, Rostov-on-Don, Russian Federation
ORCID: https://orcid.org/0000-0002-5563-484X, SPIN: 4658-5058, AuthorID: 917988

Marina A. Engibaryan – Dr. Sci. (Med.), head of Department of Head and Neck Tumors, National Medical Research Centre for Oncology, Rostov-on-Don, Russian Federation
ORCID: https://orcid.org/0000-0001-7293-2358, SPIN: 1764-0276, AuthorID: 318503

Dmitriy A. Kharagezov – Cand. Sci. (Med.), MD, chief of the Thoracic Surgery Department, National Medical Research Centre for Oncology, Rostov-on-Don, Russian Federation
ORCID: https://orcid.org/0000-0003-0640-2994, SPIN: 5120-0561, AuthorID: 733789

Mikhail V. Zhenilo – Cand. Sci. (Med.), National Medical Research Centre for Oncology, Rostov-on-Don, Russian Federation; Associate Professor of the Anesthesiology and Resuscitation Department, Rostov State Medical University, Rostov-on-Don, Russian Federation
ORCID: https://orcid.org/0000-0002-6251-8628, SPIN: 6325-7280, AuthorID: 321469

Natalia N. Popova ✉ – Cand. Sci. (Med.), MD, anesthesiologist and resuscitator of the Anesthesiology and Resuscitation Department, National Medical Research Centre for Oncology, Rostov-on-Don, Russian Federation; assistant of the Department of Oncology, Rostov State Medical University, Rostov-on-Don, Russian Federation
ORCID: https://orcid.org/0000-0002-3891-863X, SPIN: 5071-5970, AuthorID: 854895, Scopus Author ID: 57215858399

Mamuka V. Bauzhadze – Cand. Sci. (Med.), oncologist of the Department of Head and Neck Tumors, National Medical Research Centre for Oncology, Rostov-on-Don, Russian Federation
ORCID: https://orcid.org/0000-0002-9765-8612, SPIN: 5315-3382, AuthorID: 734578

Egor A. Marykov – MD, anesthesiologist and resuscitator of the Anesthesiology and Resuscitation Department, National Medical Research Centre for Oncology, Rostov-on-Don, Russian Federation
ORCID: https://orcid.org/0000-0001-8516-9646, SPIN: 5134-6589, AuthorID: 1103822

Contribution of the authors:
Rozenko D. A. – manuscript writing;
Engibaryan M. A. – scientific editing;
Kharagezov D. A. – study design;
Zhenilo M. V. – statement of the study purpose;
Popova N. N. – clinical support of the study;
Bauzhadze M. V. – analysis of results;
Marykov E. A. – clinical support of the study.