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## CIRCULAR RESECTION OF THE CENTRAL PART OF THE LARGE DIAGNOSE WITH ONCOLOGICAL STENOSIS (clinical case)

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**Abstract.** Because laryngeal stenosis leads to progressive respiratory failure, most patients with this condition require surgical treatment. Tracheal stenosis can be caused by injuries, infectious diseases, cicatricial strictures developing after tracheostomy or intubation, as well as tracheal tumors. The issue calls for improving surgical treatment methods for tracheal stenosis and refining anesthesiological intervention techniques.

To improve the level of surgical treatment for tracheal stenosis by taking into account the tumor's location, growth direction, length of the narrowing, the risks and benefits of surgical therapy, and the specifics of anesthesiological interventions.

A patient with subglottic carcinoma developed a tracheal stenosis. Airflow through the trachea became severely obstructed, forcing them to breathe on humidified oxygen for several weeks. Due to respiratory failure, he was referred to an oncology clinic and underwent surgical treatment. Tracheoscopy revealed an exophytic tumor measuring 2x3 cm, extending from the mucosa of the lower larynx to the level of the second tracheal ring and occupying more than 80% of the tracheal lumen.

The operation began with intubation under general anesthesia through a tracheostomy tube. After the skin was prepared and the tumor area was completely excised, hemostasis was achieved, and then a circular incision was made below the tumor, including two tracheal rings. Hyperoxemia was achieved before the tracheal incision, and temporary artificial apnea was established during the cut. After the tracheal incision, the endotracheal tube was repositioned below the incision site, and anesthesia was continued. After the tumorous portion of the trachea was completely excised, the endotracheal tube was repositioned. Running sutures were placed between the tracheal rings along the tube, tightened, and secured to create a watertight seal. After an aseptic dressing was applied to the wound, the thyroid cartilage was sutured to the chest skin to prevent tracheal elongation. There are no signs of respiratory insufficiency

The course and outcomes of tracheal circular resection surgery were discussed at the Oncology Center Clinical Conference, highlighting its challenges and successes, as well as the specifics of anesthesia.

Improving the surgical treatment options and anesthesia management for tracheal stenosis caused by cancer or other factors.

**Keywords:** oncology, tracheal stenosis, surgical treatment, respiratory failure, circular resection.

## ОНКОЛОГИЯЛЫҚ НЕГІЗДЕ СТЕНОЗҒА ҰШЫРАҒАН КЕҢІРДЕКТІ ЦИРКУЛЯРЛЫ РЕЗЕКЦИЯЛАУ (клиникалық жағдай)

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**Аңдатпа.** Үдемелі тыныс жетімсіздігіне алып келетіндігіне байланысты кеңірдек стенозымен зардап шегетін науқастардың көбі хирургиялық емге мұқтаж. Кеңірдек стенозына жарақаттар, инфекциялық аурулар, трахеостомиядан, интубациядан кейін дамитын тыртықтық тарылулар сонымен қатар кеңірдек ісіктері де алып келуі мүмкін. Мәселе, кеңірдек стенозын хирургиялық жолмен емдеу тәсілін, анестезиологиялық араласу жолдарын жетілдіруді қажет етеді.

Кеңірдек стенозында ісіктің орналасуын, өсу бағытын, тарылу ұзындығын, оталық емнің тәуекелдері мен артықшылықтарын, анестезиологиялық араласулар ерекшеліктерін ескере отырып, хирургиялық ем деңгейін жетілдіру.

Көмей асты обырымен ауыратын науқаста кеңірдек тарылуы (стриктурасы) дамыған. Кеңірдектен ауа өтуі мүлдем қиындап бірнеше апта ылғалданған оттегімен демалуға мәжбүр болған. Тыныс жетімсіздігіне байланысты онкологиялық диспансерге жолданып, хирургиялық ем қабылдаған. Трахеоскопия арқылы экзофитті өскен ісік көлемі 2х3 см, көмей төменгі бөлігі шырышты қабаты мен 2 кеңірдек сақинасы деңгейінде өскендігін, кеңірдек кеңістігінің 80% астам бөлігін қамтып жатқандығы анықталды.

Ота трахеостомиялық түтік арқылы интубациялық жансыздандыру аясында басталды. Терісі өңделіп, кесу арқылы ісік аумағы толық аршылып, гемостаз жасалған соң, ісіктің төменгі тұсынан екі кеңірдек сақинасын қоса циркулярлы кесу жасалды. Кеңірдек кесілу алдында гипероксигенация жасалып, кесілу кезінде уақытша жасанды апное жағдайы қалыптастырылды. Кеңірдек кесілген соң интубациялық түтік кеңірдектің кесілген тұсынан төменгі бөлігіне ауыстырылып, наркоз жалғастырылды. Кеңірдектің ісікке ұшыраған тұсы толық сылынып алынған соң, интубациялық түтік бұрынғы орынына қойылды. Түтік бойымен кеңірдек сақиналары арасына түйінді тігіс салынып, тартылып, герметикалық бекітілді. Жараға асептикалық таңғыш қойылғаннан соң кеңірдек созылмас үшін оның йегі төс терісіне тігіліп, бекітілді. Ота нәтижесінде кеңірдектің ауа өткізу қабілеті толық қалыпқа келтірілді. Тыныс жетімсіздігі белгісі жоқ.

Кеңірдектің циркулярлы резекциясы отасының барысы мен нәтижесі онкологиялық орталық клиникалық конференциясында талқыланып, қиындықтары мен жетістіктері, наркоз ерекшеліктері аталып өтті.

Обыр негізінде немесе басқа да себептермен туындаған кеңірдек стенозын оталық емдеу мүмкіншіліктерін, анестезия ерекшеліктерін жетілдіру.

**Түйін сөздер:** онкология, кеңірдек стенозы, хирургиялық ем, тыныс жетімсіздігі, циркулярлы резекция.

## **ЦИРКУЛЯРНАЯ РЕЗЕКЦИЯ ТРАХЕИ ПРИ ОПУХОЛЕВОМ СТЕНОЗЕ (клинический случай)**

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**Аннотация..** Стеноз трахеи, особенно онкологического генеза часто сопровождается с прогрессирующей дыхательной недостаточностью которая требует немедленного хирургическому вмешательству. Причинами стеноза трахеи могут быть травматические, инфекционные, постинтубационные, посттрахеостомические, онкологические и другие факторы. По этому возникает необходимость совершенствовать хирургических методов лечения и анестезиологических подходов. Проанализировать риски и преимущества оперативного вмешательства при циркулярной резекции трахеи, учитывая расположения, характера роста опухоли, степени стеноза и протяженности а так же методов анестезии и интубации трахей.

У больного страдающего раком трахеи, подгортанной области, развивалась стриктура трахеи с дыхательной недостаточностью. Из за чего больной был вынужден принимать дополнительно оксигенацию. При трахеоскопии выявлена экзофитная опухоль размером 2×3 см, распространяющаяся от слизистой оболочки нижнего отдела гортани до уровня второго кольца трахеи и занимающая более 80% просвета трахеи. Больной направлен на хирургическое лечение в онкологический диспансер, где и был оперирован. Операция началась на фоне интубационного обезболивания через трахеостомическую трубку. После обработки кожи, полной мобилизации опухоли и гемостаза, проведена циркулярная резекция, трахеи с удалением два колцеобразных хряща в нижней части опухоли. Учитывая неизбежность временного апноэ во время операции, перед вскрытием трахеи была проведена гипероксигенация. После разреза дистальных колец трахеи, интубационная трубка была заменена на нижнюю часть. Интубационную трубку поставили на прежнее место после того, как опухолевая часть гортани была полностью отсепарирована. Проксимальная и дистальная часть трахеи зашиты узловыми швами, натянута и герметично закреплена. После наложения асептической повязки на рану, во избежание растяжения трахеи, подбородок больного пришит

и закреплён к груди. В послеоперационном периоде клинических проявлений дыхательной недостаточности нет.

Ход и результаты операции по циркулярной резекции гортани были обсуждены на клинической конференции онкологического центра, где были отмечены трудности и достижения, особенности наркоза. Основной целью работы является совершенствование возможности оперативного лечения стеноза трахеи, вызванных раком или другими причинами и особенностей анестезии.

**Ключевые слова:** онкология, стеноз трахеи, хирургическое лечение, дыхательная недостаточность, циркулярная резекция.

## Introduction

**1 Purpose of the study.** Tracheal stenosis, particularly when caused by cancer, is often accompanied by progressive respiratory failure, which requires immediate surgical intervention.

To improve the level of surgical treatment for tracheal stenosis by taking into account the tumor's location, growth direction, length of the narrowing, the risks and benefits of operative therapy, and the specifics of anesthesiological interventions.

A patient who had undergone tracheal reconstruction 30 years earlier using a neck skin flap presented with clinical signs of tracheal stenosis and underwent surgical treatment. A successful circular tracheal resection was performed; histological analysis of the specimen revealed a keratinizing squamous cell carcinoma that had developed from the mucosal lining of the skin flap used during the initial surgery. The postoperative period was uneventful. The authors note that detecting a tumor arising from the skin flap during the postoperative period is particularly challenging [1]. Kokshetau's surgical oncologists report that during the surgical treatment of a locally advanced thyroid gland tumor, four rings of the trachea were successfully resected. The doctors recommend closely monitoring the anastomosis site after surgery, keeping it clean, and performing regular decontamination to prevent infectious complications [2]. The following authors, through a retrospective review of the records of 84 patients who underwent surgical treatment for cicatricial tracheal stenosis between 2018 and 2023, examined the preoperative stenosis level, patients' age, sex, comorbidities, and recommend preventing potential subsequent complications [3].

The following authors, who performed surgery on six patients with tracheal stenosis by means of a circular resection, recommended wearing a special neck orthosis for 7–13 days postoperatively. It immobilizes the neck, helping to prevent the tracheal sutures from tearing apart due to neck movement. None of the six patients developed suture insufficiency [4]. The surgeons of the Russian Scientific Center for Child Health report that, after surgically treating 26 children with tracheal stenosis for various reasons, they achieved the following results. Of the 26 children who underwent surgery for tracheal stenosis for various reasons, 24 (92.3%) had good outcomes, while 2 patients (7.69%) died from postoperative complications. The authors noted that the effectiveness of tracheal resection largely depends on the length of the stricture [5].

A 75-year-old patient presented with complaints of respiratory insufficiency. Examination (CT) revealed a tumor located 8 cm above the tracheal bifurcation, occupying approximately 90% of the tracheal lumen. The patient successfully underwent an endoscopic procedure - specifically, recanalization using a neodymium-YAG laser. The authors advocate for the effectiveness of this approach in cases where open surgery is contraindicated [6].



In analyzing the causes of 98 patients with tracheal stenosis, Yu.S. Yesakov and colleagues found that 58 of them developed after tracheostomy, 31 after intubation, 6 patients due to trauma, 2 patients due to tumoral stenosis, and 1 patient developed a postoperative stricture [7]. It is clear that neoplastic stenosis of the trachea is a relatively rare condition (2%). This is because various congenital stenoses develop mainly on the basis of fetal malformations, while acquired ones develop as a result of various injuries of the trachea (most often iatrogenic; through intubation, tracheostomy tubes), chronic inflammation, and infectious processes [5,8]. Considering the level (location) of the tracheal stenosis, in 61 patients the stenosis was located in the Figure

1: Tumor appearance on computed tomography

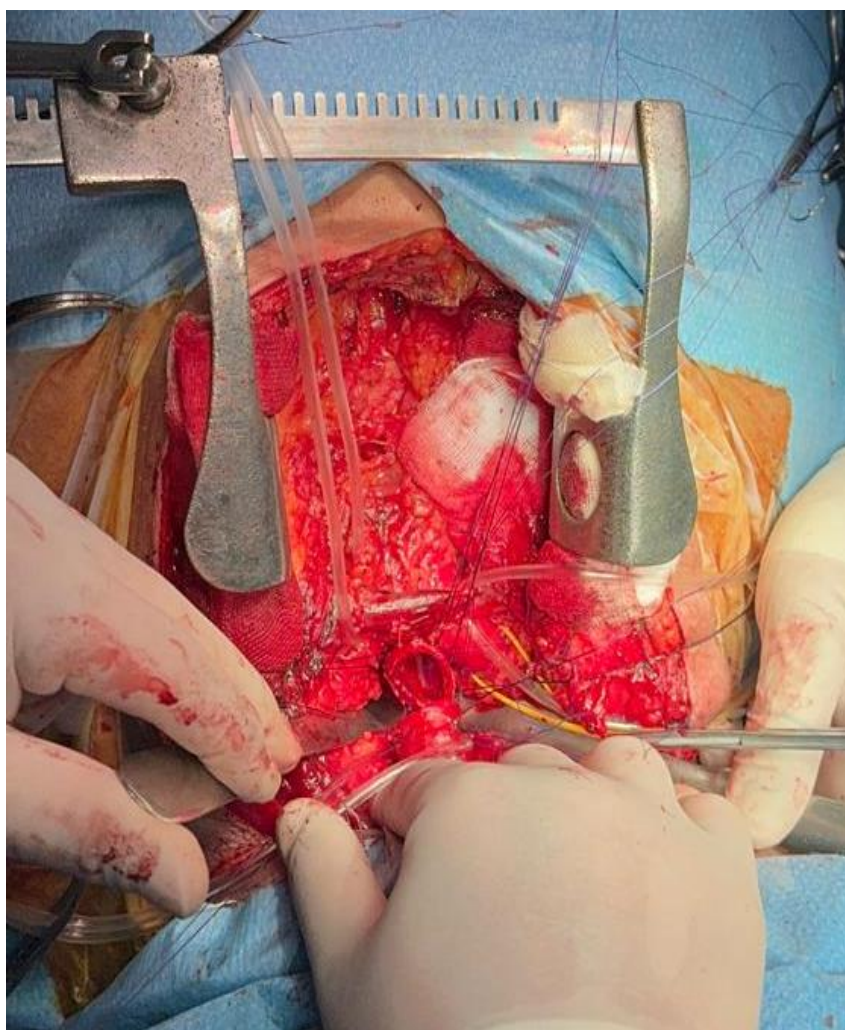
cervical part, in 29 patients in the thoracic part, of which the stenosis was located above the tracheal bifurcation in 4 patients. Long (2-8 cm) stenoses affecting both the cervical and thoracic parts of the trachea were found in 5 patients [6,10]. The Tashkent Medical Academy also studied the subsequent fate of 186 patients who underwent surgical treatment for laryngeal stenosis, and found that 165 (88.5%) of them had an iatrogenic cause, developing after resuscitation measures. They noted that 180 patients had a good and satisfactory outcome after the surgical treatment, and 6 patients died as a result of various complications [9]. The problem of preventing anastomosis separation after circular resection due to tracheal stenosis is also a matter of much debate among scientists, and various suggestions have been made. One of them is to fix the distal end of the trachea to the inner surface of

the sternum after the anastomosis is performed to prevent (reduce) tension in the suture area, or to lung tumor reinforce the main suture by placing an additional suture

between the tracheal rings using Vicryl or Polysorb threads, one end of which is fixed to the lower horn of the thyroid cartilage or the hyoid bone [11]. Kovalev M.G. and colleagues wrote that in the surgical treatment of bronchial stenosis, it is necessary not only to improve surgical techniques, but also to improve anesthetic measures, and to introduce new technologies. They considered alternative methods due to the difficulty of intubation in the cervical part of the trachea. Depending on the severity of the stenosis, it is recommended to image of a introduce a special I-Gel tube through the supraglottic airway and perform high-frequency ventilation of the lungs, or stenting the narrowed area under sedation [11].

Figure 2. View from the stage of tracheal resection

**2 Clinical case report.** I would like to present to your attention information about the circular resection of the larynx, which was successfully performed in the "City Multidisciplinary Hospital with an Oncology Center" in Shymkent. Patient T., 42 years old, has been undergoing treatment for cervical and subglottic cancer for several months. During chemotherapy and radiation therapy, the patient gradually developed a narrowing of the larynx (stricture). He was forced to breathe with humidified oxygen for several weeks. Due to the growth of the tumor, it became completely difficult for air to pass through the larynx, and shortness of breath began to develop.



Tracheoscopy revealed an exophytic tumor measuring 2x3 cm, extending from the mucosa of the lower larynx to the level of the second tracheal ring and occupying more than 80% of the tracheal lumen.

As a result, he was examined by a doctor and sent to an oncology clinic. The operation was performed through the neck. Under intubation anesthesia, after the surgical site was cleaned and sterilized, an incision was made in the skin.

Hemostasis was achieved with an electrocoagulator, depending on the stage of the operation. The stenosed segment of the trachea was carefully isolated, and after the distal trachea was transected, the breathing tube was temporarily repositioned there. The portion of the trachea containing the tumor was gradually isolated by cutting, then circularly excised and removed. Using the ligature as a guide,



the tracheal rings in its distal segment and proximal margin were tied together. At this stage, the intubation tube was returned to its original position. The staged, interrupted sutures were placed around the tracheal tube using it as a guide. The tracheal edges were brought into full, airtight contact. Hemostasis was meticulously maintained during the procedure. Layered sutures were placed sequentially, the skin was closed, and hemostasis was achieved with a dry field. After applying aseptic dressings, to prevent tracheal elongation, the patient's chin was pulled down toward the chest and secured with sutures.

The direct surgical procedure began under intravenous anesthesia, after the trachea was cut below the

Figure 3 shows a macroscopic specimen of a tumor

level of the tumor, a No. 6.0 intubation tube (taking into account the endophytic growth of the tumor) was inserted into the space of its distal part, and inhalation anesthesia was continued.

Artificial respiration was performed in VCV mode. During tracheal reconstruction, 3 2-minute artificial apneas were performed as needed during the surgical phase (manipulations, suturing, cutting,

etc.). Before temporary respiratory arrest, 100% hyperoxygenation with O<sub>2</sub> was performed, and the blood was pre-saturated with oxygen.

Towards the end of the operation, a bronchoscope was inserted through the tube, endotracheal intubation was performed, and endoscopic monitoring of the anastomosis was performed. In the postoperative period, after the patient was fully awake, extubation was performed in the usual manner. The postoperative period was uneventful and without complications. The patient was discharged home on the 8th day with recommendations.

**Discussion.** Given the importance of the surgical field and the complexity of its location, the operation must be performed very carefully and quickly. Even small bleeds are dangerous due to aspiration.

Since the tracheal incision and tumor excision phase requires temporary apnea, preoperative hyperoxygenation is necessary, which demands a high level of anesthesiological support. After the trachea was incised, the endotracheal tube was repositioned distally from the incision site, and anesthesia was continued. After the tumorous portion of the trachea was completely excised, the endotracheal tube was repositioned, and anesthesia and surgery were continued. Upon completion of the surgery, the patient showed no signs of hypoxia or other complications.

**Conclusion.** At the Shymkent City Oncology Center, the surgical treatment of tracheal stenosis caused by cancer was successfully completed. In the next phase, it is necessary to further refine the stages of surgical intervention and the level of anesthesiological support.

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