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ORIGINAL ARTICLE

OWN EXPERIENCE OF SURGICAL TREATMENT FOR ADVANCED CANCER OF THE TONGUE AND THE MOUTH FLOOR

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ABSTRACT

Purpose of the study. Improvement of surgical treatment outcomes in patients with advanced cancer of the tongue and the mouth floor providing radical surgery with preservation of the organ functions.
Materials and methods. Two patients with advanced cancer of the tongue and the mouth floor with metastases to lymph nodes in the neck (St.4 (IVA, pT4a N2b M0), clinical group 2, were operated on according to our special technique.
The surgery was performed under endotracheal anesthesia. After cervical lymph node dissection, the tongue and the mouth floor tissues were resected intraorally. The incisions were made through their entire thickness along healthy tissues. Smears were taken from the dissected tissues for intraoperative pathology consultation control for the presence of cancer cells. The tissues of the mouth floor affected by the tumor were completely removed without going beyond the hyoglossus muscle, since the lingual and hypoglossal nerves go along its outer surface. This allowed radical tumor removal with preservation of the tongue functions.
Results. Patients operated on according to our special technique have been observed for more than 9 months without continued tumor growth and recurrences tumor with preservation of the tongue and the mouth floor functions.
Conclusion. In such patients, ablastics principles are combined with the preservation of the tongue functions. This can be achieved because after removal of the tongue tumor, resection of the mouth floor is performed without going beyond the hyoglossus muscle not affected by the tumor, since the lingual and hypoglossal nerves go along its outer surface. Complying with ablastics, it preserves the tongue functions: chewing, swallowing, articulate speech, taste perception.

Keywords:
advanced cancer, oral organs, mandibulotomy, orostoma, lingual and hypoglossal nerves, hyoglossus muscle

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ОРИГИНАЛЬНАЯ СТАТЬЯ

СОБСТВЕННЫЙ ОПЫТ ХИРУРГИЧЕСКОГО ЛЕЧЕНИЯ РАСПРОСТРАНЕННОГО РАКА ЯЗЫКА И ДНА ПОЛОСТИ РТА

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РЕЗЮМЕ

Цель исследования. Улучшить результаты хирургического лечения больных с распространенным раком языка и дна полости рта обеспечевающего радикальное проведение операции с сохранением функций оперируемых органов.
Материалы и методы. Двое больных с распространенным раком языка и дна полости рта и метастазами в лимфатические узлы шеи St.4 (IVA, pT4a N2b M0) клиническая группа 2, были прооперированы по разработанной нами методике. Операцию проводили под эндотрахеальным наркозом. Сначала осуществлялась шейная лимфодиссекция, далее интраоральным способом резецировался язык с тканями дна полости рта. Разрезы проводились через всю толщу по здоровым тканям. С рассеченной раневой поверхности языка изымались ткани для срочного гистологического исследования – контроля на наличие раковых клеток. Пораженные опухолью ткани дна полости рта полностью удалялись, не выходя за пределы подъязычно-язычной мышцы, по наружной поверхности которой проходят язычный и подъязычный нервы. Это позволяет радикально убрать опухоль с сохранением функций языка.
Результаты. Больные, прооперированные по разработанной методике, находятся под наблюдением без продолженного роста и рецидива опухоли более 9 месяцев, с сохранением функций языка и дна полости рта.
Заключение. У данной категории больных принципы абластики сочетались с сохранением функций языка. Это достигалось тем, что после удаления опухоли языка, резекция дна полости рта проводилась в пределах здоровых тканей сохраняя подъязычно-язычную мышцу, на внешней стороне которой проходят язычный и подъязычный нервы. Тем самым, при соблюдении абластики, сохраняются функции языка: жевание, глотание, членораздельная речь, вкусовое восприятие.

Ключевые слова:
распространенный рак, органы полости рта, мандибулотомия, оростома, язычный и подъязычный нервы, подъязычно-язычная мышца

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INTRODUCTION

Malignant tumors of the oral cavity in the Russian Federation (RF) occupy a leading place among tumors of the head and neck. The dynamics of the morbidity of the population is constantly growing. The absolute number of patients (men and women) in 2010 was 5251, and in 2020–6089. The dynamics of morbidity indicators in these terms amounted to 5.18 and 6.18 with an increase of 28.58 %. At the same time, the rough indicator of the incidence of oral cancer in the Russian Federation per 100,000 population in 2010 was 5.18, and in 2020–6.18. The average annual growth rate of this pathology was 2.47 with an increase of 28.58 %. The gross mortality rate in patients with cancer of the lip, oral cavity and pharynx in 2010 was 6.36, and in 2020–6.50, with an average annual growth rate for this period of 0.46 and an increase of 4.77 [1].

Treatment of advanced cancer of the tongue and the floor of the oral cavity remains an urgent problem, in which an integrated approach is used: surgery, chemotherapy and radiation.

Having more than 50 years of experience in performing operations in this category of patients, we have to listen to the complaints of patients who have undergone extended operations, who have been cured of cancer and are now living. Complaints are mainly about an unsatisfactory quality of life: difficult or probe feeding, illegibility or lack of speech, etc.

The loss of the functions of the oral organs makes patients socially inferior and therefore the issues of their rehabilitation are of paramount importance [2]. There are a lot of publications in the literature on this problem using various methods. This is speech rehabilitation based on increasing the mobility of the stump of the tongue and correcting sound reproduction [3], as well as developed methods of prosthetics of resected organs using various auto-tissues: fascia, musculoskeletal, bone-cartilage, etc. [4].

A detailed acquaintance with the literature on this problem, to a certain extent, served as a basis for us to study the methods already used, as well as to develop new, in our opinion, more effective surgical interventions.

With limited cancer of the tongue and the floor of the oral cavity (T1 and T2 art.), both surgical and radiation methods are used, whereas with common (T3, T4), complex, where operations dominate, is used [5]. Surgical interventions in this category of patients are constantly being improved [6]. At the same time, in some cases it is recommended to remove the contents of the submandibular and, if indicated, the chin triangles in a single block with the primary tumor [7]. At the same time, radical operations, with all their radicalism, as a rule, damaging the afferent and efferent nervous system, disrupt the motor and sensory functions of the tongue and the bottom of the oral cavity.

The innervation of the tongue and the bottom of the oral cavity is complex. It is caused by the presence of a variety of its functions and is carried out by both afferent and efferent pathways through VII,

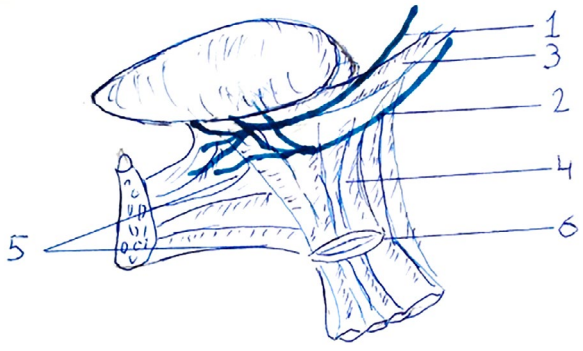

Fig. 1. Topography of sensitive and motor innervation of the tongue.
Note: 1 – *n.lingualis* (lingual nerve), 2 – *n.hypoglossus* (hyoid nerve), 3 – *m.styloglossus* (shield-lingual muscle), 4 – *m.hyoglossus* (hyoid-lingual muscle), 5 – *m.genioglossus* (chin-lingual muscle), 6 – *os.hyoideum* (hyoid bone).

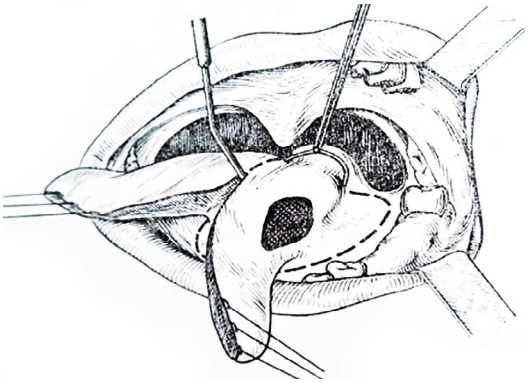

Fig. 2. The generally accepted method of resection of the tongue, the middle third of the half of which is affected by the cancer.

IX, X and XII pairs of cranial nerves. The greatest load falls on the lingual (*n.lingualis*), sublingual (*n.hypoglossus*), lingual (*n.glossopharyngeus*) and upper–laryngeal (*n.laryngeus superior* – branch of the vagus nerve) nerves [8]. *N.lingualis* is one of two branches of the sensitive part of the III branch (*ramus mandibularis*) of the trigeminal nerve (*n.trigeminus* – V pair). It mainly provides afferent communication, whereas efferent communication is carried out by the sublingual (XII pair) nerve (*n.hypoglossus*).

Radical removal of a common (III–IV st.) tumor of the tongue and /or the floor of the oral cavity may be complicated by damage to the nerves of the tongue, the most important of which are the lingual and sublingual (Fig. 1). Their main function is to ensure the sensitivity and motility of the language. For clarity, we present our own sketches on the issue under consideration.

With a widespread cancer of the tongue affecting one of its halves with damage to the hyoid nerve, there is a unilateral violation of its functions – immobilization of the affected tumor of this half of the tongue.

As can be seen from figure 1, the main nerves of the tongue, sensory and motor, pass on the lateral side of the duplicate of the shield-lingual and sublingual muscles, focusing on which, it is possible to avoid injury to these nerves.

If, before the operation, a patient with a widespread cancer process had a mobile tongue and retained sensitivity, then this indicates that the tumor has not spread to the nerves listed above. Therefore, when performing operations in this category of patients, in order to preserve the functions of the tongue, observing ablasty, it is necessary to exclude, as far as possible, their damage.

Operations performed on the tongue and organs of the oral cavity belong to the category of complex, when the radicalism of their performance should be combined with the possibility of preserving the functions of the resected organs: chewing, swallowing and speech.

There is a generally accepted method of surgery for cancer of the tongue affecting part of its back. It provides for the removal of 2 or more anatomical areas within 2–3 cm of healthy tissues (Fig. 2) [7].

As can be seen from the picture presented for these operations, during their resection of healthy tissues, it is quite possible to injure the most important part of it – the non-tumor-affected posterior third of the back of the tongue, the lower part of which is anatomically connected with the bottom of the oral cavity and the nerves passing there. In addition, during hemostasis, carried out by stitching the remaining healthy tissues, the probability of nerve damage also increases.

In cases where the tumor is large and passes to the opposite half of the tongue, when it is removed, using the above methods, providing radicalism, nerve injury on both sides is not excluded.

It is quite clear that the surgeon, first of all, requires radical ablastic surgery. However, it is always necessary to think about its consequences – the usefulness of the patient's subsequent life. Before the operation, the functions of the tongue and the bottom of the oral cavity are checked: chewing, swallowing, speech. Preserved functions after radical surgery speak about the integrity of the nerves.

The aim of the study is to improve the results of surgical treatment of patients with advanced cancer of the tongue and the floor of the oral cavity through radical surgery with possible preservation of the sensory and motor nerves that provide their functions.

PATIENTS AND METHODS

The proposed method of surgery in patients with advanced cancer of the tongue and the bottom of the oral cavity, providing radicalism, allows in the process of its implementation to preserve the motor and sensory nerves not affected by the tumor.

Taking into account the anatomical features of the oral cavity organs, which limit the view of the surgical field and complicate the operation, especially with advanced (IV st.) cancer, it is recommended to perform a mandibulotomy beforehand [6]. If the patient refuses to carry it out or at the third stage of the disease, the operation is performed intraoral.

The operation is performed under endotracheal anesthesia through a pre-imposed tracheostomy. The tongue affected by the tumor is brought out as much as possible. In case of unilateral location of the tumor or when it spreads to the other half of the tongue, dissection of healthy tissues is performed by retreating 2.0 cm from the edge of the tumor in accordance with its shape and size, preserving the unaffected tissues as much as possible (Fig. 3).

From the middle and edges of the healthy tongue tissue left after resection, 3 tissue fragments are taken for urgent histological examination for the presence of cancer cells. In their absence, the operation continues, and when malignant cells are detected, the resection zone expands by another 1.0 cm with repeated histological examination. Let us repeat that it is easier to fulfill these requirements with a pre-performed mandibulotomy.

When the tumor spreads to the tissues of the bottom of the oral cavity with preserved functions of the tongue, which indicates the integrity of the tumor with sensitive and motor nerves, the operation is carried out radically with the preservation of these nerves. To do this, focusing on the duplicate of the shield-lingual and sublingual muscles, on the lateral surface of which these nerves pass, under visual and manual control carried out both in the oral cavity and externally on the neck, the tumor tissue is removed medially above the above-named muscle duplicate.

With a tumor process spreading to one half of the tongue and the bottom of the oral cavity with damage to the sublingual and lingual nerves, which makes it immobile, the operation is carried out radically to healthy tissues, including the above-mentioned muscle duplicate. With a tumor affecting both halves of the tongue, the immobile half is radically removed, while the other, mobile, is operated according to the presented method. Its radical implementation later, depending on the nature of the operation, returns to the patient certain functions of the language sufficient for natural nutrition and speech.

Our relatively small experience (two patients with advanced cancer of the tongue and the bottom of the oral cavity with unilateral immobility of the tongue, who were informed about the scope of the operation and agreed to it) revealed the expediency of using these operations, since, observing radicalism, the functions of the language were preserved. In the postoperative period, these patients underwent radiation and chemotherapy. The collection of clinical material continues.

Clinical observation

Patient K. born in 1999 was admitted to the Department of Head and neck Tumors of the National Medical Research Centre for Oncology, Rostov-on-Don, with the diagnosis: cancer of the tongue with spread to the bottom of the oral cavity and metastases to the lymph nodes of the neck (squamous cell carcinoma St.4 (IVA, pT4a N2b M0)). Concomitant disease: leukemia, condition after treatment, stabilization of the process. He considers himself ill for about 6 months, when a tumor appeared on the left half of the tongue. I did not go to the doctor, I was treated independently with mouthwash. Pathology in the mouth was regarded as stomatitis on the background of leukemia. When examined by a dentist, a tumor of the tongue was revealed. Sent to an oncologist.

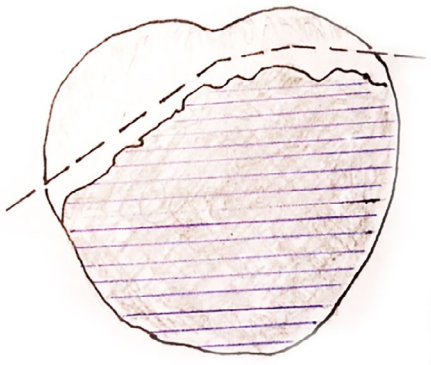

Fig. 3. Resection of the tongue with advanced cancer affecting both its halves. Dissection lines are carried out within healthy tissues, in accordance with the shape of the tumor, which allows you to preserve healthy tissues of the tongue as much as possible.

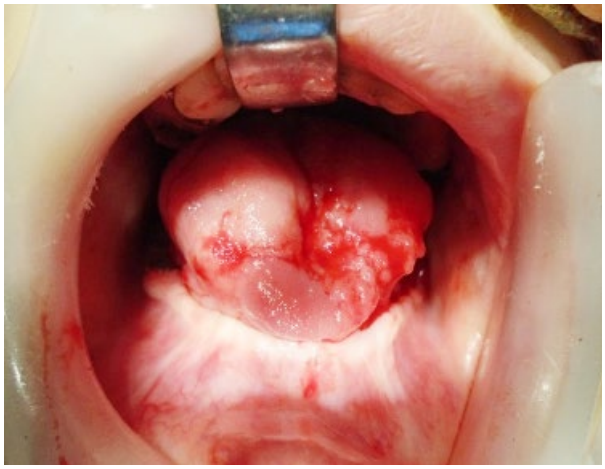

Fig. 4. Patient K. 1999. Cancer of the tongue with lesions of the anterior, middle and partially posterior third of the left half, as well as the anterior third of the right half.

Local status: symmetrical face. In the submandibular region on the left, enlarged, slightly mobile lymph nodes 2.5 × 3.0 cm and on the neck, along the internal jugular vein 2.0 × 3.0 cm. Opening the mouth is painful, but in full. Teeth on the upper and lower jaws are missing after leukemia. The left half of the tongue is motionless. Its anterior, middle and partially posterior third are affected by a tumor spreading to the anterior third of its right half (Fig. 4).

After the examination, the patient was operated on. A tracheotomy with intubation and subsequent radical surgery under general endotracheal-intubation anesthesia was performed under local anesthesia. Cervical lymphadenectomy (I–V levels) with ligation of the external carotid artery was performed. Taking into account the patient's refusal of mandibulotomy, the operation was continued by intraoral method. The middle third of the right, unaffected by the tumor, half of the tongue is stitched and brought out. Under visual and manual control, resection of the left half of the tongue and partially the right half was performed with the preservation of its middle and posterior third of the dorsum and lateral edge, retreating from the tumor by 2.0 cm. The parts of the tongue affected by the tumor were removed in a single block. No malignant cells were found in the tissues taken for urgent histological examination from the left part of the tongue. Squamous cell carcinoma was detected in the removed tissues of the tongue and the bottom of the oral cavity.

Under visual-manual control of the bottom of the oral cavity and external-manual control of the neck, tumor-affected tissues were identified, which were removed without going beyond the hyoid-lingual muscle not affected by the tumor. In a similar way, focusing on the right duplicate of the shield-lingual and sublingual muscles, the tumor of the bottom of the oral cavity was removed without going beyond the sublingual muscle. A smear was also taken from the abandoned tissues for urgent cytological examination for the presence of cancer cells, which did not reveal their presence. The defect of the tissues of the tongue and the bottom of the oral cavity is sutured in layers with the formation of the stump of the tongue, which is up to half of its former volume. Healing took place by primary tension. The postoperative period proceeded without complications. On the 5th day, the movement of the tongue stump was partially restored (Fig. 5). Nutrition was carried out with the help of a naso-esophageal probe, which was removed on the 10th day, after which, with partial restoration of the function of the tongue, the tracheostomy was decanulated (Fig. 6). By the end of the second week, after removal of stitches, she was discharged home.

Fig. 5. The same patient. 5 days after the operation. The movements of the tongue stump are limited. Nutrition through the nasoesophageal probe. Breathing through the tracheostomy and natural pathways (mouth and nose).

Fig. 6. The same patient. 10 days after the operation. Breathing through the tracheostomy and natural pathways (mouth and nose). The lability of the tongue stump is sufficient for feeding liquid food. She was discharged in a satisfactory condition for postoperative chemoradiotherapy at her place of residence. After 1 month after discharge, natural nutrition and respiration were restored. He is under observation after surgery without continued growth and relapse for 9 months.

RESEARCH RESULTS AND DISCUSSION

The problem of treating patients with advanced cancer of the tongue and the floor of the oral cavity remains difficult to this day. This is due to the structural features of these organs and, first of all, their innervation. The most important for the life of a patient with this disease are the lingual (*n.lingualis*) and sublingual (*n.hypoglossus*) nerves responsible for sensory and motor functions. Radical removal of a common (III–IV st.) tumor of the tongue and/or the floor of the oral cavity may be complicated by damage to these nerves. At the same time, the functions of the language are violated. Speaking about the topography of the tongue and the bottom of the oral cavity with muscles and nerves, it should be noted that the maxillohyoid muscle (*m.mylohyoideus*) forms the diaphragm of the mouth, which divides the bottom of the oral cavity into two floors – upper and lower. If the patient's sensitivity and mobility of the tongue were preserved before the operation, then this indicates the integrity of the nerves. This means that in this category of patients, the tumor process has not spread to the bottom of the oral cavity or partially captured the tissues of only its upper floor, without spreading to the nerves. In these cases, the surgeon removes only the tumor, without delving into the projection of the location of the nerves. Practice has shown that the early detection of cancer depends much on the patient himself, which is especially pronounced in an oncological situation. Usually, patients turn to doctors at the first signs of the disease, while another category of patients suffers troubles associated with it, and only with its progression they turn to a doctor with an already widespread or even neglected disease. This is especially pronounced in patients with oral cancer, when patients see their pathology and, realizing the danger, suffer. And only when there is pronounced discomfort with eating and speech and the process has already spread, go to the doctor. It should be noted that during the initial examination of patients with III–IV st., cases with bilateral damage to the nerves of the tongue are practically not detected. At the same time, as a rule, in patients with an already widespread process, with one half of the tongue immobile, the other remains intact. When examining such a patient from the IV st., regional metastases and a tumor affecting one of the halves of the tongue with partial spread to the other are usually detected. Clinical examination almost always confirms this situation and does not exclude the possibility of the need for radical surgery with bilateral nerve resection in this category of patients. In these cases, the patient must be warned about possible consequences before the operation. Difficulties arise when the cancer process spreads to both halves of the tongue with the immobility of one of its halves. The proposed method of surgery is intended primarily for this category of patients, but it can also be used in cases with a less common process. For the orientation of the surgeon during the operation, after dissection of the tumor-affected tongue, it is necessary to orient yourself with the topography of the location of the nerves. To do this, during the operation, after dissecting the tissues of the tongue and obtaining a pathologic and histological conclusion about the absence of cancer cells in its preserved tissues, all attention should be paid to orientation in the topography of the muscles and nerves of the floor of the oral cavity. Manually and visually, both intraoral approach and external, on the neck, above the hyoid bone, determine the location of the combination of the schiloglossus (*m.stiloglossus*) and hyoglossus (*m.hyoglossus*) muscles. At the same time, manually, in the projection of these muscles, the topography of the sublingual-lingual muscle is determined, along the lateral surface of which nerves pass. Subsequently, the removal of the affected tissues of the bottom of the oral cavity is carried out to the medial edge of the hyoid-lingual muscle not affected by the tumor process. This allows for a radical operation without injuring the nerves, which preserves the function of the tongue.

CONCLUSION

In patients with advanced cancer of the tongue and the floor of the oral cavity, with the defeat of one of its halves, the principles of ablasty should, if possible, be combined with the preservation of their functions. This is achieved by the fact that after radical removal of the tumor of the tongue, resection of the bottom of the oral cavity is carried out ablastically, without going beyond the hyoid-lingual muscle not affected by the tumor, on the outside of which the lingual and hyoid nerves pass. This, while performing an ablastic operation, preserves the functions of the tongue: chewing, swallowing, articulate speech, taste perception and salivation.

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