

## CLINICAL CASE REPORTS

# THE SURGICAL TREATMENT EFFECTIVENESS OF PATIENTS WITH MIDDLE EAR CANCER

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### ABSTRACT

Among human malignant tumors, middle ear cancer is rare: up to 0.06%, and among ear tumors — up to 5%. Due to the late detection of the tumor, patients turn to a specialist with advanced, nearly or completely unresectable disease, and it limits the treatment to conservative one with poor results. Combination treatment is the most effective option, where surgery plays a leading role. During surgery, temporal bone tissues affected by a tumor are removed.

Over the decade from 2003 to 2018, we operated on 10 patients with advanced cancer of the middle ear who had previously received radiation therapy (cumulative dose 40 Gy). Lymphadenectomy was first performed in 3 patients with neck metastases. During surgery, the temporal bone was removed in all patients. The results of treatment demonstrated that relapse-free survival in 3 patients was 2 years, in 4 patients — 3, in 2 patients — 4 years; 1 patient — no data available. Two patients who survived 3 years received repeated surgery due to recurrence. Upon discharge, patients underwent chemotherapy at the place of residence. A clinical case of a 42-years old patient with advanced disease is presented. Cranial spiral x-ray computed tomography showed advanced middle ear cancer affecting cranial bones. The patients underwent radical surgery on the temporal bones with isolation of the facial nerve and exposure of the jugular bulb. Histological examination of tumor tissues of the external auditory canal and parotid salivary gland confirmed squamous cell carcinoma.

Temporal bone tissues affected by the tumor were removed during surgery. The elements of the organ of corti and cochlea were exposed and preserved: the horizontal semicircular canal, the oval and round windows. A wide external auditory canal was formed, and the wound was packed; skin grafting was performed. The patient has been in remission for 8 months.

### Keywords:

middle ear cancer, resection of temporal bone, dura mater, inner ear, auditory ossicles, tumor

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## ЭФФЕКТИВНОСТЬ ХИРУРГИЧЕСКОГО ЛЕЧЕНИЯ БОЛЬНЫХ РАКОМ СРЕДНЕГО УХА

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### РЕЗЮМЕ

Среди злокачественных опухолей человека рак среднего уха встречается редко: до 0,06%, а среди опухолей уха — до 5%. В связи с поздней выявляемостью опухоли больные обращаются к специалисту с распространенным на грани резектабельности или с нерезектабельным процессом, что вынуждает онколога ограничиться консервативным лечением, которое обычно не способствует выздоровлению и ухудшает результаты. Наиболее эффективным является комбинированное лечение, в котором операции отводится ведущая роль. В процессе операции удаляются пораженные опухолью костные ткани височной области.

За десятилетний период, с 2003 по 2018 гг., нами прооперировано 10 больных с распространенным раком среднего уха, предварительно получивших лучевую терапию (суммарная очаговая доза 40 Гр). Трем больным, имеющим шейные метастазы, вначале была осуществлена лимфаденэктомия. В процессе операции у всех больных резецировалась височная кость. Результаты лечения показали, что 3 больных без рецидива прожили 2, а 4 — 3 года. 2 больных прожили 4 года. Судьба одного больного неизвестна. Двум больным, пережившим 3 года, из-за рецидива была проведена реоперация. При выписке по месту жительства пациенты подвергались химиотерапии. Представлен клинический случай 42-летней больной с распространенным процессом. Проведенная спиральная рентгеновская компьютерная томография (СРКТ) черепа выявила распространенный рак среднего уха с поражением костей черепа. Больная была подвергнута радикальной операции на височной кости с выделением лицевого нерва и обнажением луковицы яремной вены. Результаты гистологического исследования опухоли наружного слухового прохода и околоушной слюнной железы подтвердили наличие плоскоклеточного рака.

В процессе операции удалены пораженные опухолью костные ткани височной области. При этом были обнажены и сохранены элементы кортиева органа и улитки: горизонтальный полукружный канал, «овальное и круглое окна». Сформирован широкий наружный слуховой проход. Рана тампонирована. Кожная пластика. Ремиссия 8 мес.

### Ключевые слова:

рак среднего уха, резекция височной кости, твердая мозговая оболочка, внутреннее ухо, слуховые косточки, опухоль

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Middle ear cancer is a rare oncopathology: accounts 1–2% of all human malignancies and up to 10% of ear cancer. The disease proceeds by covert penetration into the temporal bone [1, 2].

The tumor occurs in patients who associate it with chronic purulent inflammation of the middle ear. They are treated by an otolaryngologist, and the disease is considered as a prolonged chronic otitis media. The tumor process spreads from the middle ear to the external auditory canal, which is mistakenly regarded as a polyp [3]. The performed biopsy establishes the malignant process, and the patient is sent to the oncologist. Histologically, squamous cell carcinoma with a tendency to keratinization is mainly detected. Other types of cancer (adenocarcinoma, adenocystic carcinoma, etc.) develop extremely rarely. At the same time, metastases to regional lymph nodes are usually observed in the late stage of the disease [4].

Patients are treated by an oncologist, usually with an already common, on the verge of resectability, or with an unresectable process, which forces the oncologist to limit himself to conservative treatment, which usually does not contribute to recovery [5]. Best results are achieved with the complex treatment, which is dominated by the operation [5, 6].

**The purpose of the study:** to improve the effectiveness of treatment of patients with a common malignant tumor of the middle ear.

## PATIENTS AND METHODS

For the period from 2003 to 2018, we've operated on 10 patients aged 35–65 years: 6 male and 4 female. In 5 patients, the process was complicated by facial nerve paralysis. The external auditory canal was obstructed by a tumor in all patients. The diagnosis in all cases was verified-squamous cell cancer with keratinization. 9 patients had enlarged cervical lymph nodes of II AB levels, and one had metastases to both cervical and parotid lymph nodes. In all cases, a puncture biopsy revealed the presence of metastases.

All patients had previously received preoperative irradiation on the primary lesion – the region of the middle ear and temporal bone, and cervical metastases. Irradiation was carried out in static mode with 2 fields, the single dose was 2.0 Gr, the cumulative dose was 40–45 Gr.

Surgical interventions were performed the type of classical operations on the middle ear according to the method of Zaufi-Levin, but with a more expanded volume due to radical removal of the tumor-affected bony parts of the temporal bone and cervical metastases. The Dura mater of the temporal lobe of the brain was exposed in 8 patients, while removing the affected and destroyed bone tissue, and in 6 patients the mastoid process was removed, the sigmoid sinus was opened, followed by tamponade of its lumen with a hemostatic sponge. In 5 patients with facial nerve paralysis, the horizontal part of the nerve was exposed and removed, and if necessary, the modified bone tissue of the temporal bone was removed. After removal of the affected bone tissue, a common cavity was formed in the temporal bone including the middle ear cavity (*cavum tympani*), its communication (*aditus ad antrum*) with the mastoid cave (*antrum mastoideum*). Removal of the tumor from the middle ear cavity was performed using an operating microscope. At the same time, elements of the cortical organ and the cochlea were exposed and preserved. As a rule, the auditory bones were destroyed: "hammer" and "anvil". "Stapes" in all patients was intact – it was preserved.

The external auditory canal was expanded for good visualization of the postoperative wound after radical removal of the tumor. It was performed by a T-shaped incision of the cartilaginous part of the external auditory canal with the expansion and fixation of the formed triangular cartilage flaps. The operating wound was loosely tamponed with an ointment swab with antiseptic. The wound was sutured tightly with the end of the tampon removed out through the newly formed external auditory canal.

After 10–15 days, patients were discharged for outpatient observation and postoperative

chemotherapy with cisplatin and 5 fluorouracil.

The results of treatment showed that 3 patients without relapse lived 2 years, and 4–3 years. 2 patients lived for 4 years. The fate of one patient is unknown. Two patients who survived 3 years, due to a relapse that occurred in the bone tissue bordering the Dura mater, were re-operated, after which they died 6 months later. Lethality occurred from brain metastasis (4) and 2 – from lung metastases. At this time, 3 patients are alive (more than 4 years).

### Clinical observation

A patient of 62 years old turned to an oncologist at the Federal state institution National Medical Research Centre for Oncology of the Ministry of Health of Russia of the Russian Ministry of health for a tumor of the right middle ear. Was under the supervision of an ENT doctor for 1 year without achieving a therapeutic effect. When viewed in the clinic RCRI the tumor was growing into the ear canal. The cervical and parotid lymph nodes were enlarged. A biopsy of the tumor in the auditory canal and cervical lymph nodes was performed. In the projection of the zygomatic process with the transition to the parotid salivary gland, a dense painless subcutaneous tumor-like formation of 4.0×3.0 cm with disintegration was determined. Enlarged upper cervical, manually dense, weakly mobile, painless lymph nodes of II a-B levels (Fig. 1). A SCT study was conducted.



Fig. 1. Patient S. The appearance when entering RCRI. D-z: skin Cancer of the external auditory canal with spread to the middle ear and parotid salivary gland. Level IIA-B cervical metastases

It was revealed that air conduction on the right ear is missing during the acumetry. At the same time, bone conduction was preserved, and it's lateralization (Weber's symptom) was in the sick side, which indicated a violation of sound conduction while maintaining sound perception. Conclusion: the inner ear is not affected.

The results of histological tumors examination of the external auditory canal and parotid salivary gland confirmed the presence of squamous cell cancer.

CT scans of the skull revealed a common right-sided cancer of the middle ear with damage to the skull bones (Fig. 2).

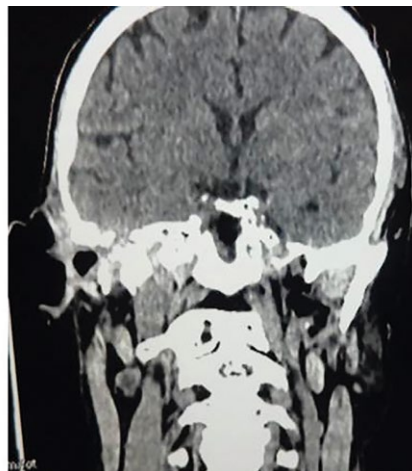
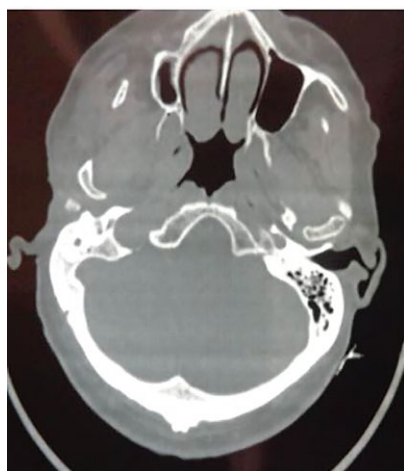


Fig. 2. Patient S. a Computer tomogram of the skull in 2 projections: an infiltrative tumor affecting the subcutaneous tissue anteriorly from the auditory canal on the right with a spread to the parotid salivary gland, affecting the skin of the external auditory canal with a transition to the middle ear. Destruction of the anterior walls of the external auditory passage and the roof of the tympanic cavity with partial destruction of the pyramid of the temporal bone

An operation was suggested, to which the patient consented. Preoperative radiation therapy was performed in a cumulative dose of 45 Gr.

The operation was performed under General anesthesia with intubation through the mouth. Initially, on the side of the lesion, lymphodissec-

tion was performed in the volume of IIA-B, III levels with the removal of the affected skin and soft tissues of the parotid region. The facial nerve was isolated and preserved. Surgery on the temporal bone was performed according to the method Zaufli- Levin using an operating microscope.

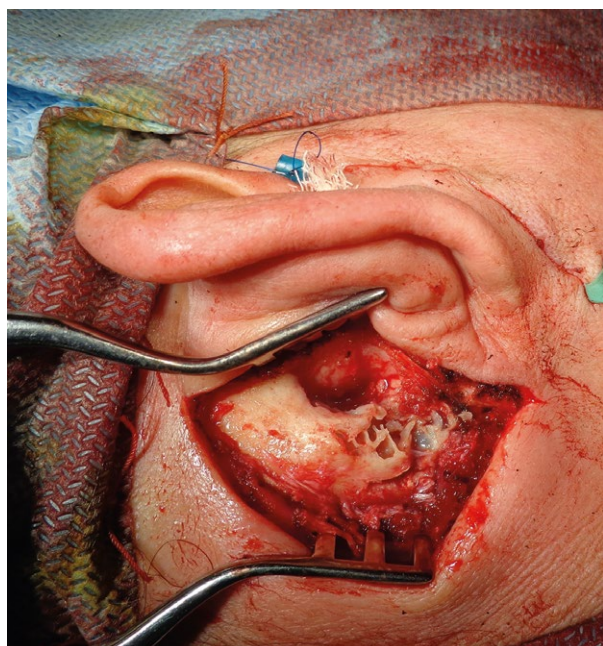


Fig. 3. Exposed mastoid process with areas of bone destruction

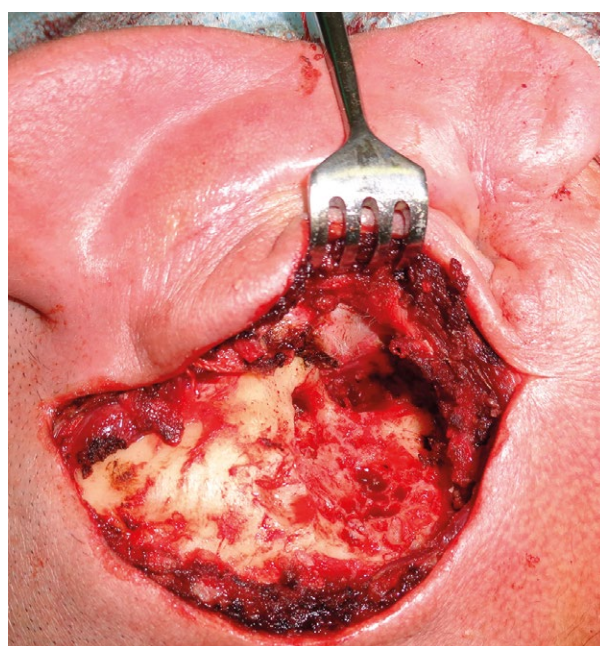


Fig. 4. after removal of the surface bone tissue, tumor masses were detected in the mastoid process

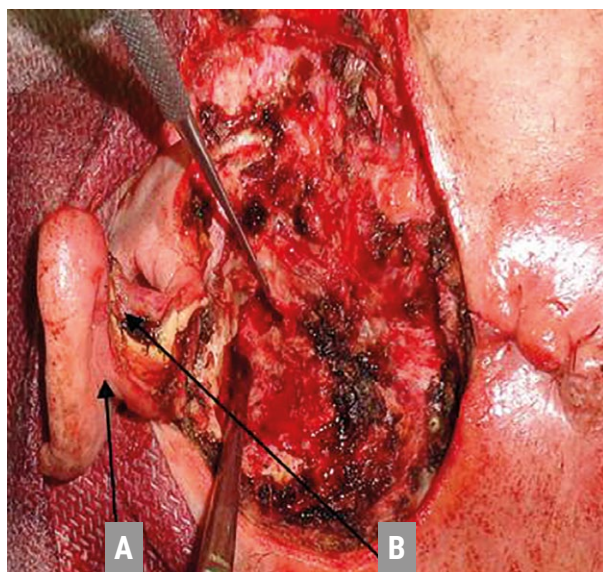


Fig. 5. the lumen of *antrum mastoideum* (A) and *aditus ad antrum* (B) is isolated. the Surrounding bone tissue is affected by a tumor

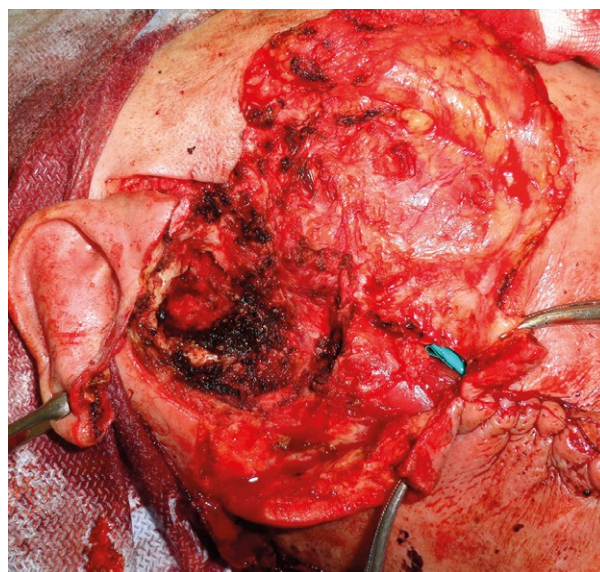


Fig. 6. The temporal bone after removal of the tumor – a common bone cavity is formed, including the *antrum*, *aditus ad antrum* and *cavum tympani*. The skin of the parotid region affected by the tumor was removed

During the operation, the tumor-affected bone tissues of the temporal region were removed (Fig. 3, 4, 5). One common cavity was created, including the *antrum mastoideum*, *aditus ad antrum*, and *cavum tympani* (Fig. 6). The tumor-affected part of the temporal bone was removed to its healthy part without exposing the Dura mater. The auditory bones: the Malleus and stepladder, as well as the horizontal semicircular canal were not destroyed by the tumor, while the remains of the anvil were in the General tumor mass – they were removed. The hammer was removed because it was not needed, while the stepladder was saved and left in the oval window (Fig. 7).

A wide external auditory canal is formed. The wound is swabbed. Skin plastic (Fig. 8). Bandage.

The postoperative period passed without complications. After 2 weeks, the tampon was removed. The relapse-free period is more than 3 years. Improved hearing to the perception of spoken speech in the ear.

## CONCLUSION

Unfortunately, relatively few publications are devoted to middle ear cancer. This can be explained by the fact that this disease is mostly

asymptomatic, simulating banal otitis media. Patients are treated by an otorhinolaryngologist. In the absence of a positive effect, the progression of the process and the appearance of a tumor clinic, patients are referred to an oncologist. By this period, the process becomes widespread, and the results of its treatment are not always satisfactory. Patients die from the progression guidance or metastasis in the brain. The best results are achieved with complex treatment, where the operation dominates. However, due to topographical and anatomical features, it is not always possible to conduct it radically. Reasons: difficulty of surgical access, with an extremely limited volume of the middle ear cavity. It should be noted that the effectiveness of the operation depends much on the experience of the surgeon, accumulated during the development of the operation technique, first with cadaverous material, with visual knowledge of the limit of surgical activity, and subsequent accumulated clinical experience. Taking into account the peculiarities of the pathology under consideration, it is always necessary to objectively assess the volume of the planned operation and the possibility of complications.

You need a precise knowledge of topographic and anatomical features of the middle ear

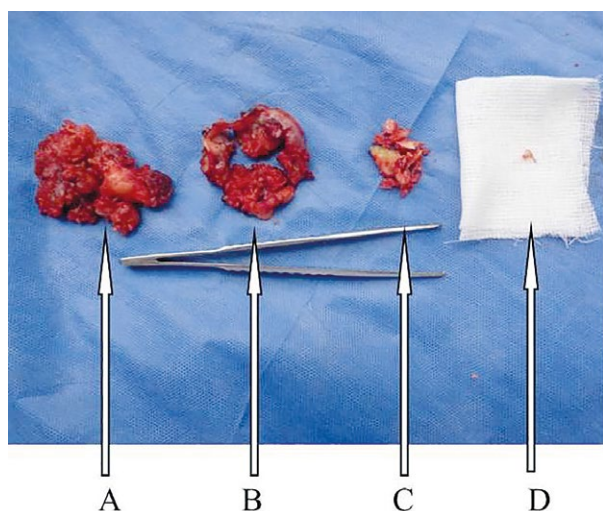


Fig. 7. Removed tissue: A – cervical and parotid metastases; B – tumor-affected tissue of the temporal bone; C – affected bone covering the Dura mater; D – unchanged auditory bone-Malleus



Fig. 8. The appearance of the patient after surgery

and it's borders with the vital organs: upper middle ear bordering the cavity of the skull, at the front, the internal carotid, from below – the horizontal branch of the facial nerve and a fragment of the internal carotid artery, behind – the sigmoid sinus, the lower edge of which enters the bulb of the internal jugular vein. The inner (medi-

al) wall of the middle ear cavity is represented by the outer wall of the inner ear-a snail with a cortical organ and semicircular channels. The outer part of the cavity is the most calm and is represented by the eardrum. Damage to vital parts of the middle ear cavity is fraught with serious complications.

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#### Authors contribution:

Svetitskiy P.V. – research concept and design

Engibaryan M.A. – surgical assistance

Meshcheryakov P.N. – performing and interpreting x-ray studies

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