Case report

Hemifacial reimplantation in surgical treatment of maxillary sinus cancer: a case report

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Abstract

Introduction
Tendency of cancer of the mucous membrane of the maxillary sinus to persistent recurrence, relatively high resistance of the most of them to radio- and drug therapy define complexity of treatment of this oncological pathology. At the present time expanded surgery in combination with chemo- and radiotherapy allows achieving high oncological und functional outcomes. This paper reports a case of surgical treatment of maxillary sinus cancer.

Case Report
Here we describe the case of a 28-year-old patient T. with locally advanced low differentiated squamous cell carcinoma of the mucous membrane of the maxillary sinus. During the first stage of complex treatment four courses of chemotherapy were held. Further preparative radiotherapy ROD-10 was conducted. Then bloc-resection of the left upper jaw with left orbital exen- teration, plastic with displaced muscle graft, reimplantation of facial tissue with microsurgical grafting of the facial nerve on the left was performed. No complications were observed. Follow-up was 6 months long. Cosmetic and functional results are satisfactory.

Discussion
Using this approach during surgery on maxilla for locally advanced tumours provides more detailed visualisation of facial skull structures which facilitates radical operation. Excellent visualisation and skin preserving technique promotes good cosmetic and functional results. The functional rehabilitation in such patients significantly increases their life quality.

Conclusion
Current surgical methods can be used not only for treatment of patients with tumours of paranasal sinuses but also for wide access to skull bones for reconstruction after radical tumour treatment or trauma.

Introduction
Malignant tumours of the paranasal sinuses account for 0.2–3% of all neoplasms and its number increases annually by 1.5–2%. Due to the clinical course, histological structure and topographic anatomy of these tumours are treated by different specialists (dentists, otolaryngologists, ophthalmologists, neurologists, radiologists, oncologists). Malignant tumours of the nasal cavity and paranasal sinuses usually originate from maxillary sinus (75–80%), ethmoidal labyrinth and nasal cavities (10–15%). Frontal and sphenoid sinuses are affected less commonly (1–2%). The main morphological forms of malignant tumours for this localisation are keratinising squamous (57%) and non-keratinising squamous (19.3%) cell carcinoma. The maxillary sinus cylindromas are characterised by extremely aggressive course and inclination to remote metastasis. Regional metastases of malignant tumours of the maxilla are relatively rare (14.9%) They are mainly localised in the upper neck or in the deep jugular lymph nodes chain. In case of poorly differentiated tumours, metastases may be bilateral. Distant metastases are rare and commonly localised in lungs, liver and bones. The treatment of malignant tumours of the nasal cavity and the paranasal sinuses is combined. Surgery and radiotherapy can be used for limited exophytic tumours of the nasal cavity with clear borders. At the first stage of combined treatment distant gamma-ray therapy with total boost dose of 40–45 Gy is given. Irradiation is carried out mainly from two fields, i.e. from anterior and lateral ones, whose dimensions are defined depending on the volume and growth direction of the tumour. The retropharyngeal lymph nodes are included in the irradiation field. Submandibular and cervical lymph nodes are irradiated only in case of confirmed metastatic disease. The surgery is performed 3–4 weeks after radiotherapy. Intraoral approach with dissection of mucous membrane of the anterior part of the upper vestibule of the oral cavity is used to remove tumours, which are located on the floor area of the nasal cavity and nasal septum. The tumour is widely removed. If the tumour is located on the lower part of the lateral nasal wall then Denker’s approach is to be used. Then the front and medial walls of the maxillary sinus are removed with excision of the lower and middle (if indicated) turbinate. Lower part of the frontal process and the nasal bone are removed to provide better access. Locally advanced cancer of the mucous membrane of the maxillary sinus is an indication for full maxilla removal (preferentially by electroscopy) or for extended operations with Moore’s approach. Electroscopy consists in step-by-step processing of tissues

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which are removed using bipolar electrodes. The processed fragments of the affected maxilla are removed together with medial wall of the maxilla sinus, turbinal bones and then anterior; medial and posterior ethmoidal labyrinth cells are extracted. Exenteration of the orbit should be performed in case of destruction of its walls. Limited invasion of the tumour into the cranial cavity is an indication for craniofacial resection. The disfiguring impact of surgery causes inclusion of prosthetic or plastic substitution of postoperative defects in the treatment plan. Lymphadenectomy on the neck is performed in case of clinically determined lymph node metastases (Radical neck dissection, Crile procedure). Preventive lymphadenectomy usually is not used. Patients who have contradictions to radical combined treatment because of the prevalence of the process or because of general contraindications, undergo chemoradiation therapy or radical external beam gamma-therapy in a dose of 70 Gy with a mandatory reduction of radiation dose delivery after 40–50 Gy. Chemoradiotherapy is also a method of choice for the treatment of poorly differentiated tumours of nasal cavity and paranasal sinuses. Drug treatment is used as neoadjuvant chemotherapy or with palliative purposes as a part of chemoradiotherapy. The following medicaments and their combinations can be used (also as regional artery chemotherapy): 5-Fluorouracil, Adriamycinum, Methotrexatum, Cisplatin, Bleomycinum. Arterial regional chemotherapy can also be performed.

Relapses of tumours of the nasal cavity and paranasal sinuses usually occur within the first year after surgery. Their treatment is limited to irradiation (considering previous dose) or to different variants of combined therapy.

According to various authors, 5 years survival of patients after combined treatment with preoperative radiation therapy and electrosurgical resection of the tumours of the maxillary sinus mucosa are 73.6% for stages I–II, 54.9% for stage III and 24.2% for stage IV. Presence of regional metastases decreases 5 year survival to 37.5%. Chemoradiotherapy in advanced poorly differentiated tumours of maxillary sinus and nasal cavity provides a direct positive result in 74% of patients. The worst 5 year survival rates take place when radiotherapy or surgery is used as an independent method of treatment (18–35%)\(^1\). The article deals with the clinical example of treatment of a patient with locally advanced cancer of the maxillary sinus mucosa.

**Case report**

A 28-year-old patient T. (Figure 1) attended the outpatient department of P.A. Hertzzen Moscow Oncological Research Institute and complained about the tumour and pain in the left upper jaw. Anamnesis: he considered himself sick since June 2012, when he first noted the appearance of discharge from the left half of the nasal cavity and nasal breathing difficulty. He appealed for medical care in the place of residence (Stavropol, Russia), received treatment as for sinusitis with no effect. Several teeth in the left upper jaw were removed in July 2012, afterwards the patient noted ulceration and the growth of tumour in this area. Poorly differentiated squamous cell carcinoma of the left maxillary sinus T4N0M0 stage IV was diagnosed in Stavropol Cancer Dispensary in September 2012. In October 2012, the patient was referred to P.A. Hertzzen Moscow Cancer Research Institute for further examination and treatment planning.

Infiltrative tumour growth with ulceration in the left half of alveolar bone spreading in the left half of nasal cavity was revealed on the examination. Regional lymph nodes were not enlarged by palpation. A facial skull computed tomography (CT) scan showed a tumour mass expanding the left maxillary sinus (body of maxilla on the left, palatine bone, palatine process of maxilla on the left, left group of ethmoidal labyrinth cells, medial wall of the left orbit). A facial skull MRI scan (Figure 2) showed a mass with linear dimensions of 63 × 66 mm and length of 87 mm in the left maxillary sinus. The tumour tended to damage the walls and to expand to the left side of the nasal cavity with signs of nasal septum involvement (prolapse into the right side, crushing of turbinal bones), prolapse into the pharyngonasal cavity, ethmoidal labyrinth cells on the left, lower wall of the left orbit (in all probability it tended to grow to the lower oculomotor muscle, to reach the medial muscle and eyeball; the optic nerve was not involved; infiltration was spreading into the lower eyelash), adjoining the cribiform plate (without destruction; obstructing anastomosis with the frontal sinus on the left (the mucous membrane was reactively thickened and filled with liquid), prolapse into the sphenoidal sinus (the cavity was filled with haemorrhagic liquid); the front border of the tumour was characterised by prolapse into suborbital soft tissues, infiltration of wing-shaped and mastication muscles; retromolar space, zygomatic process of maxilla; damage of alveolar process of the maxilla 5–8 teeth, spreading to the soft tissues of the left cheek, 

**Figure 1:** Appearance of the patient, September 2012.
prolapse into the oral cavity, buccogingival recess. The brain structures at the scanning level were characterised by normal functioning.

On additional examination (X-ray of chest, ultrasound examination of neck, abdominal cavity, cytological examination of neck lymph nodes biopsy material) no signs of distant metastases were found. No comorbidities were revealed.

The therapeutic approach was discussed by the oncological council of physicians with the participation of surgeons, radiologists, chemotherapists. Having taken into account a histological structure of the tumour and also expending of the neoplastic process, the systemic polychemotherapy at the first stage of anticancer treatment was recommended.

The patient was hospitalised into the cancer chemotherapy unit. In October 2012, the first course of polychemotherapy was carried out: Cisplatin 130 mg and 5-Fluorouracil 3.4 g as 96 h infusion, without complications. Second course was performed in November 2012, (Cisplatin 130mg, Docetaxel 120mg, 5-Fluorouracil 6.8g) with no complications. Third course was held in December 2012, (Cisplatin 130mg, Docetaxel 120mg, 5-Fluorouracil 6.8g) with no complications. Control MRI study (Figure 3) showed positive effect of chemotherapy. The tumour mass in the left maxillary sinus, which had been visualised before, decreased in dimensions to 53 × 44 mm (tumour resorption 20%). In December 2012, on control MRI examination before 4th course of chemotherapy negative dynamics was revealed. Previously visualised tumour extended in dimensions to 60 × 53 mm (Figure 4). Considering this the 4th course of chemotherapy was changed to cisplatin 130 mg and gemzar 2.2 g—(completed 28.12.2012).

The therapeutic approach was discussed by the oncological council of physicians for the second time. Having taken into consideration the progression of neoplastic process on the

Figure 2: MRI scan of facial skull before treatment (October 2012). Signs of tumour of the left maxillary sinus with extensive local growth.

Figure 3: MRI scans of facial skull after three courses of chemotherapy (11.12.2012). Signs of the positive dynamics. Massive tumour of left maxillary sinus decreased in dimensions.

Figure 4: MRI scans of facial skull after three courses of chemotherapy during fourth course of chemotherapy (26.12.2012). Signs of negative dynamics. Extensive growth of the tumour of left maxillary sinus.
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microsurgery equipment the anastomosis pieces of the trunk of facial nerve, which had been previously transected, were formed. Anastomosis between crossed segments of the facial nerve was formed under optical magnification using microsurgical techniques. Then facial tissues were returned to the original position and sutured in layers forming conjunctival sac where a temporary prosthetic device of the eyeball had been placed. (Figure 13).

Postoperative course was uneventful, wounds healed by first intention. Feeding in postoperative period was carried out through a nasogastric tube. Obstructive prosthesis of left half of maxilla was installed (Figure 14), to restore per oral nutrition.

**Histological examination results**

The results showed poorly differentiated squamous cell carcinoma without evidence of therapeutic pathomorphism with invasion of blood vessels. The tumour infiltrates the soft palate with ulceration of the mucous membranes and destroys the walls of the maxillary sinus. In the margins of soft tissues, optic nerve, in the retrobulbar tissue no evidence of tumour growth was found. The eyeball was intact. No tumour growth was found in studied bone fragments.

**Discussion**

Using this approach during surgery on maxilla for locally advanced tumours provides more detailed visualisation of facial skull structures which facilitates radical operation\(^5\)-\(^7\). Apparent contradiction is tumour invasion in facial soft tissues. After completion of anticancer treatment and obtaining the results of the planned morphological investigation the therapeutic approach was again discussed by the oncological council of physicians. Additional anticancer treatment was not ordered. A strict dynamic follow-up was recommended.

On control examination 3 months after no signs of tumour progression were found. CT study of the facial part of the skull showed (Figure 15): CT-pattern corresponds to postoperative changes in the left half of the skull. No convincing signs of tumour growth in resection margins at the level of the maxillary sinus and palate were found.

At the present point the patient (Figure 16) feels well, marks the emergence of movement and sensation in the left side of the face. In order to further rehabilitation endoprosthesis replacement of the left eyeball is scheduled to perform.
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who underwent facial reimplantation during surgery for malignant tumours of paranasal sinuses. All patients are currently under the dynamic observation with no signs of recurrence.

Conclusion

Excellent visualisation and skin preserving technique promotes good cosmetic and functional results. In case of no recurrent disease secondary soft tissue reconstruction using prosthesis and autografts is possible. Another advantage of this approach is quick restoring of per oral nutrition due to absence of orostoma and possibility of using obstructive prosthesis. Microsurgical technique allows re-establishing the integrity of facial nerve leading to restoring mobility of soft tissues of the face. The functional

Figure 12: A) Marking of the temporal muscle before creating a muscular flap. B) Muscular flap is rotated. C) Muscular flap is fixed to the orbital bones, in place of previously removed frontal wall of maxillary sinus.

Figure 13: Appearance of the patient after the surgery.

microsurgery department of PA Hertzen Moscow Cancer Research Centre, we accumulated five patients

Figure 14: A) Obstructive prosthesis. B) Obstructive prosthesis in place. C) Cosmetic effect is reached.
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rehabilitation in such patients significantly increases their life quality. Current surgical methods can be used not only for treatment of patients with tumours of paranasal sinuses but also for wide access to skull bones for reconstruction after radical tumour treatment or trauma.

Consent
Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

References

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