TREATMENT OF CANCER OF THE NOSE AND THE PARANASAL SINUSES – MODERN CONCEPTS

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Head and Neck Surgery

- Head and neck surgery, especially surgery of the nose and paranasal sinuses, is a very specific kind of surgery because of specific anatomical conditions

- sense organs:
  - sight
  - taste
  - smell

- Very good vascularization and innervation
Head and Neck Surgery

- Restricted surgical field
- Difficult to view some anatomical structures, requires application of additional visual equipment (endoscope, microscope)
- Common part of upper respiratory and alimentary tract determines operational and post-operative procedure

Head and neck cancers – tumor of the paranasal sinuses and anterior skull base

- Crossing the borders of different specializations
Within the cooperation in the Department there is a therapeutic team proposing treatment for every single patient individually.

- Head and neck surgeon
- Radiotherapist
- Anesthesiologist
- Pathologist
- Neurosurgeon
- Clinical oncologist
- Radiologist
- Psychologist
- Physiotherapeutist

MAXILLARY-ETHMOIDAL COMPLEX TUMORS
Maxillary-ethmoidal complex tumors constitute 3% of all neoplasms of the upper gastro-pulmonary tract.

7 : 100 000 cases

M : F
2:1 → 3:1

Exposure to industrial fumes and wood dust has been associated with an increased incidence of certain types of sinonasal malignant tumors.

Nickel workers show an incidence 250 times greater than the general population with a latent period of 3 to 18 months.

Furniture workers, who are exposed to hardwood dust, suffer an increased incidence of adenocarcinoma of the ethmoid sinus.
Sinuses & skull base

- The most common clinical presentation of tumors of the sinonasal tract includes nasal airway obstruction, pain, epistaxis, nasal discharge, or swelling of the cheek.
- 9% to 12% of patients with sinonasal tumors are asymptomatic.
- Weisberger and Dedo reported that paranasal tumors are associated with a high incidence of cranial neuropathies (34%) as compared to inflammatory disease (4% to 8%).

Diagnosis – Paranasal Tumors

**Technique**

- History and physical
- Risk factors/cranial nerve deficits
- Imaging
- Radiograms
- CT scanning
- MRI

**Biopsy**

- Sinus lavage/cytology
- Fine needle aspiration
- Transnasal biopsy Direct or endoscopic
Treatment

- Surgery
- Radiotherapy
- Chemotherapy

What should be taken into consideration when planning individual treatment?

- tumor’s histological type
- stage of neoplastic process
- surgical radicalness
- patient’s general condition
- possibility of combined therapy
- possibility of reconstruction
- socio-economic factors
- patient’s expectations
### Maxillary-ethmoidal complex tumors

<table>
<thead>
<tr>
<th>Epithelial</th>
<th>Nonepithelial</th>
<th>Nonepithelial</th>
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</thead>
<tbody>
<tr>
<td><strong>Benign</strong></td>
<td><strong>Benign</strong></td>
<td><strong>Malignant</strong></td>
</tr>
<tr>
<td>Keratotic papilloma</td>
<td>Fibroma</td>
<td>Soft tissue sarcoma</td>
</tr>
<tr>
<td>Fungiform papilloma</td>
<td>Chondroma</td>
<td>Rhabdomyosarcoma</td>
</tr>
<tr>
<td>Inverted papilloma</td>
<td>Osteoma</td>
<td>Leiomyosarcoma</td>
</tr>
<tr>
<td>Cylindrical papilloma</td>
<td>Neurilemmoma</td>
<td>Fibrosarcoma</td>
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<tr>
<td>Adenoma</td>
<td>Neurofibroma</td>
<td>Liposarcoma</td>
</tr>
<tr>
<td><strong>Malignant</strong></td>
<td><strong>Malignant</strong></td>
<td></td>
</tr>
<tr>
<td>Squamous cell carcinoma</td>
<td>Hemangioma</td>
<td>Angiosarcoma</td>
</tr>
<tr>
<td>Transitional cell carcinoma</td>
<td></td>
<td>Myxosarcoma</td>
</tr>
<tr>
<td>Adenocarcinoma</td>
<td></td>
<td>Hemangiopericytoma</td>
</tr>
<tr>
<td>Adenoid cystic carcinoma</td>
<td></td>
<td>Connective tissue sarcoma</td>
</tr>
<tr>
<td>Melanoma</td>
<td>Neurofibroma</td>
<td>Chondrosarcoma</td>
</tr>
<tr>
<td>Olfactory neuroblastoma</td>
<td></td>
<td>Osteosarcoma</td>
</tr>
<tr>
<td>Undifferentiated carcinoma</td>
<td></td>
<td>Lymphoreticular tumors</td>
</tr>
</tbody>
</table>

### Sinuses & skull base

- maxillary sinuses 60%
- lateral nasal wall 30%
- ethmoidal sinuses 10-15%
- sphenoidal and frontal sinus other
**Sinuses & skull base**

American Joint Committee on Cancer

- Ohngren line
- Infrastructure tumors – better prognosis
- Suprastructure tumors – worse prognosis

**Surgery**

- From simple endoscopic lesion resection to a total maxillectomy with exenteration of an orbit and craniofacial resection
When to use the conventional surgical technique?

When to use the endoscopic technique?

Is the fundamental rule of oncological surgery, *removal of the whole tumor with a margin of neoplasm-free tissues*, possible to fulfill when using the endoscopic techniques?
Endonasal endoscopic tumor removal:

Small intraethmoidal tumors can be removed *en block*.

*Endonasal micro-endoscopic treatment of malignant tumors of the paranasal sinuses and anterior skull base. Paolo Castelnuovo et al.*
*Operative Technique in Otolaryngology (2006) 17, 152-167.*

Endonasal endoscopic tumor removal:

„*Multilayer centripetal technique*”

*Endonasal micro-endoscopic treatment of malignant tumors of the paranasal sinuses and anterior skull base. Paolo Castelnuovo et al.*
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Endonasal endoscopic tumor removal:

"Multilayer centripetal technique"

Consists of 5 stages:
1. Decreasing tumor’ mass
2. Subperiosteal removing of ethmoid
3. Removal of bony structures surrounding the tumor (septum, bones of the skull base, lamina papiracea)
4. Removal of the dura, olfactory bulb, periorbit
5. Plastic of the dura of the skull base

Endonasal micro-endoscopic treatment of malignat tumors of the paranasal sinuses and anterior skull base. Paolo Castelnuovo et al.
Area of the removal of ethmoid

for intraoper.
histological
examination

Endonasal micro-endoscopic treatment of malignant tumors of the paranasal sinuses and anterior skull base. Paolo Castelnuovo et al.

Area of the nasal septum removal

Endonasal micro-endoscopic treatment of malignant tumors of the paranasal sinuses and anterior skull base. Paolo Castelnuovo et al.
Area of the medial maxillectomy

Endonasal micro-endoscopic treatment of malignat tumors of the paranasal sinuses and anterior skull base. Paolo Castelnuovo et al.

Plastics of the dura

Endonasal micro-endoscopic treatment of malignat tumors of the paranasal sinuses and anterior skull base. Paolo Castelnuovo et al.
Exclusion criteria in endoscopic approach

- Frontal sinus involvement
- Orbital content involvement
- Massive dura involvement (not merely contact or focal involvement)
- Maxillary sinus bony involvement (except the medial wall)
- Extension to nasopharynx but not limited to pharyngobasilar fascia
- Lacrimal tract involvement
- Hard palate involvement
- Nasal pyramid involvement

“Craniofacial resection” for tumors located within cribrum and skull base

- Smith 1954 – malignant tumors developing from upper part of nasal cavities, ethmoidal sinuses (posterior ethmoidal complex) and structures of orbital cavity
- Non-malignant but clinically aggressive tumors: meningioma, chordoma, juvenile adenofibroma penetrating to the inside of the skull
“Craniofacial resection” for tumors located within cribrum and skull base

- Ketchum 1963 – reported the first series of patients treated with an anterior craniofacial resection for tumors arising in the ethmoid sinuses;

- an en bloc resection of tumor, including the ethmoid sinuses, superior nasal septum, and floor of the anterior cranial fossa, corresponding to the interorbital area (i.e. anterior craniofacial resection) or extended laterally to include part of the bony orbit or its soft tissue contents (anterolateral craniofacial resection)

“Craniofacial resection” for tumors located within cribrum

- [Images of brain scans showing craniofacial resection areas]
“Craniofacial resection” for tumors located within cribrum
“Craniofacial resection” for tumors located within cribrum
“Craniofacial resection” for tumors located within cribrum
52 years old woman

- diplopia for two weeks before hospitalisation

MRI

Pathological mass in sphenoid bone filling up sphenoid sinus, penetrating nasopharynx, nasal cavity and posterior part of ethmoid sinus

MRI
Chondrosarcoma

Tumor fills sella turica and presses cavernous sinuses

CT

Chondrosarcoma

Surgery
Endoscopic approach
Chondrosarcoma

Week after surgery

Chondrosarcoma

6 months after surgery and radiotherapy
Chondrosarcoma

CT week after surgery

Chondrosarcoma

MRI 6 months after surgery and radiotherapy
**Cranio-endoscopic technique**

- combined endoscopic transnasal and transcranial approach
- cooperation with neurosurgeon
- tumors penetrating in the nasal cavity and anterior cranial fossa

**Area of the resection**

Endonasal micro-endoscopic treatment of malignant tumors of the paranasal sinuses and anterior skull base, Paolo Castelnuovo et al.

Endonasal endoscopic tumor removal: for every patient/tumor? NO

Carcinoma planoepitheliale

MRI

54 years old male
Tumor of the hard palate for 3 weeks
CT after surgery
Leiomyosarcoma

32 years old male
4 weeks history of rapidly growing tumor in oral cavity
16 years old male
2 years history
– tumor of the right orbit
History of alternative treatment
T3 Kadish staging system
Esthensioneurblastoma

MRI

Esthensioneurblastoma

Surgery
Esthensioneurblastoma

MRI
4 months after surgery
Esthensioneurblastoma
Patient qualified for:
endoscopic-transcranial approach.
Craniofacial resection. Craniotomia fronto basalis, orbitotomia supramedialis, excisio tumoris cavi nasi, septi nasi, sinus ethmoidalis anterior et posterior, sinus frontalis et sphenoidalis.
Lymphadenectomia selectiva colli sin.
Endoscopic evaluation – 7 days after surgery

Patient qualified for:
radiochemiotherapy.
– radiotherapy: 60 Gy, df = 2Gy
– chemotherapy: PPD (Cisplatinum 80 mg, Ondansetronum 8 mg)
Plasmocytoma

70 years old male
Headaches for 3 months

MRI

Plasmocytoma

Surgery
# Treatment – Tumors of the Sinonasal Tract

<table>
<thead>
<tr>
<th>Modality</th>
<th>Indications</th>
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<tbody>
<tr>
<td>Surgery</td>
<td>Mainstay treatment</td>
</tr>
<tr>
<td>Radiation</td>
<td>Unresectable or lymphoreticular tumors, poor surgical candidates. Usually requires surgical drainage/debridement</td>
</tr>
<tr>
<td>Combination therapy</td>
<td>(+) margins, perineural, perivascular invasion</td>
</tr>
<tr>
<td></td>
<td>(+) lymph nodes, recurrent tumor</td>
</tr>
<tr>
<td>Chemotherapy</td>
<td>Palliative role</td>
</tr>
<tr>
<td>Clinical research</td>
<td></td>
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</table>
Benign tumors

Endoscopic removal is recommended.

The limitation – involvement of the frontal sinus or the orbita.

The point of origin has a greater importance than the size of the pathology.

SUMMARY

- Treatment results (total survival time) using endoscopic technique are similar to the results using external approaches.

- The appropriate qualification for the endoscopic surgery is very important.


SUMMARY

- Treatment of maxillary-ethmoidal complex tumors should be an interdisciplinary therapy.