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MALIGNANT TUMORS OF THE MAXILLARY SINUS. A TEN-YEAR EXPERIENCE

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Summary. *Optimal treatment policies of maxillary sinus carcinoma remain to be defined. In this study 20 cases of maxillary sinus malignant tumors in the past 10 years were retrospectively reviwed. The most common histopathological diagnosis were squamous cell carcinoma. All patients were staged clinically according to the 1997 AJCC staging systems. The T classification of the tumors of the patients was as follows: 8 with T2, 7 with T3, and 5 with T4 according to the 1997 AJCC staging system. Eleven patients had lymph node involvement at diagnosis. All patients received a combination of surgical and radiation treatments. Complete surgical removal of the tumor with postoperative radiation therapy remains the standard of care for resectable lesions.*

Key words: *Squamous cell carcinoma, maxillary sinus, treatment*

Introduction

Cancers of the nasal cavity and paranasal sinuses are rare, comprising less than 1 percent of all human malignancies and only 3 percent of those arising in the head and neck (1). Sinonasal malignancies occur twice as often in males as in females, and are most often diagnosed in patients 50 to 70 years of age (2). The majority of these tumors are squamous cell carcinoma, although a wide variety of other malignancies including sarcoma, adenoid cystic carcinoma, lymphoma, melanoma, and olfactory neuroblastoma may occur at this site (3,4).

Sinonasal malignancies are very difficult tumors to treat and traditionally have been associated with a poor prognosis. One reason for these poor outcomes is the close anatomic proximity of the nasal cavity and paranasal sinuses to vital structures such as the skull base, brain, orbit, and carotid artery. This complex location makes complete surgical resection of sinonasal tumors a challenging and sometimes impossible task. In addition, tumors of the paranasal sinuses and nasal cavity tend to be asymptomatic at early stages, appearing more frequently at late stages once extensive local invasion has occurred. The unfortunate combination of complex surrounding anatomy with late, advanced stage presentation therefore leads to the frequent local recurrence and subsequent poor outcome associated with sinonasal maligancies.

The aim of this investigation was to study malignant tumors of the maxillary sinus treated at the University Otorhinolaringology (ORL) Clinic in Niš, in the 10-year period (1993-2002).

Patients and methods

This retrospective study was carried out on a group of 20 patients with different malignant tumors of the maxillary sinus treated in the University ORL Clinic Nis, in the period from 1993 to 2002. A complete head and neck physical exam was performed, beginning with an assessment of overall facial symmetry and any areas of swelling or fullness. An eye examination have been performed with attention to the range of extraocular motion, visual acuity, pupillary response, and signs of globe displacement. An ear examination was included to inspect the tympanic membrane to assess middle ear aeration and to evaluate possible eustachian tube dysfunction or obstruction. Intraoral inspection of the hard palate, gingiva, and anterior maxillary wall were also assessed for fullness, signifying an expanding mass within the maxillary sinus or nasal cavity. Mandibular excursion was assessed for trismus, a possible sign of pterygoid musculature invasion. Cranial nerves were tested with partic-ular attention to nerves I through VI along with a general neurologic eyaluation. A thorough intranasal exam is essential, using a flexible or rigid endoscope for optimal visualization of the nasal cavity and nasopharynx. Although gross tumor may be obvious, subtle irregularities in the nasal mucosal lining or fullness in the lateral or superior nasal cavity wall were also carefully assessed. A thorough neck examination was performed to evaluate for palpable lymph node metastases. Imaging studies are an essential component in the diagnosis, staging, and follow-up of sinonasal malignancies. Computed tomography (CT) scans gave a good initial overview of the tumor's location with excellent bone detail. Because the paranasal sinuses and nasal cavity are mucosal-lined bony chambers, CT is

helpful in determining whether a tumor remains confined within these natural boundaries or has eroded through the surrounding bone. CT provided details of the extent of local bone invasion, and was particularly useful in assessing the lamina papyracea, orbital floor, fovea ethmoidalis, cribriform plate, pterygoid plates, hard palate, and skull base.

Biopsy

Once the site of the tumor was identified, tissue diagnosis was required. A fundamental principle was to obtain representative tissue by the least invasive method possible. An optimal procedure for biopsy of sinonasal malignancies was an endoscopic approach through the nares. This approach offers several advantages, including excellent visualization, low morbidity, and minimal alteration of the tumor and its surrounding structures. Even small, lateral tumors within the maxillary sinus may be accessible with the creation of a middle meatal antrostomy, visualization with a 30° or 70° endoscope, and biopsy using a long, curved giraffe instrument. However, an endoscopic approach was not used for either debulking or an attempted resection of the tumor. When the tumor presented itself at the nasal vestibule, punch biopsy in the office was considered. However, it was important to ensure by clinical examination that the mass is neither contiguous with the cerebrospinal fluid space nor highly vascular. If the mass compresses easily or appears vascular, further imaging should be obtained prior to biopsy. In cases where a maxillary sinus tumor was not accessible transnasally with the endoscope, a canine fossa puncture was combined with endoscopic visualization and biopsy. Open biopsy was rarely necessary for poorly accessible tumors, through either the Caldwell-Luc approach or an external ethmoidectomy (Lynch) incision.

Results

All our patients suffered from squamous cell carcinomas of the maxillary sinus. The T classification of the tumors of the patients was as follows: 8 with T2, 7 with T3, and 5 with T4 according to the 1997 AJCC staging systems. Eleven patients had lymph node involvement at diagnosis. Symptoms initially included nasal obstruction, epistaxis, pain, and episodes of sinusitis. In one patient, tumor expansion inferiorly towards the oral cavity was associated with swelling of the gingiva or palate with loose teeth, while by 3 patients orbital invasion leaded to ocular symptoms such as proptosis, diplopia, decreased acuity, and restriction of ocular motion. We noticed in 2 cases extension into the pterygoid musculature which caused trismus and laterally deeper invasion into the infratemporal fossa. Anterior extension through the anterior maxillary wall was notice in 2 cases causing visible cheek swelling and numbness from involvement of the infraorbital nerve. In one case posterior and superior extension into the skull base and brain leaded to headache and cerebrospinal fluid leak, and central nervous system deficits.

All patients received a combination of surgical and radiation treatments. The type of surgical resection required for tumors of the maxillary sinuses was dictated by each lesion's anatomic location and sites of exten-sion. Tumors originating in the maxillary sinus are removed by some form of maxillectomy. We performed the limited maxillectomy in three cases removing one wall of the maxilla. The limited maxillectomy was most frequently performed with either resection of the medial wall or the floor of the maxillary sinus, while in 4 cases we used the subtotal maxillectomy during which we removed two walls, including the palate. Total maxillectomy we performed in one case. Medial maxillectomy was appropriate for limited, low-grade tumors of the medial wall of the maxillary sinus. The entire medial maxillary wall, lamina papyracea and ethmoid sinus were removed in this procedure. The infraorbital nerve was preserved, along with the majority of the anterior maxillary wall, orbital floor, and entire lateral maxillary wall and floor. The fragile nature of the ethmoid air cells, lamina papyracea, and lateral nasal wall made the en bloc removal of an entire medial maxillectomy specimen challenging. In 2 cases malignancies of the floor and lower half of the maxillary sinus were extended inferiorly into the hard palate and alveolar ridge. These 2 tumors were limited in extent and anteriorly located, so they were resected by a limited maxillectomy of the maxillary floor by an approach through the open mouth. Intraoral mucosal incisions were made on the hard palate and extended into the gingival-buccal sulcus, allowing elevation of the cheek soft tissues off the anterior maxillary wall. Osteotomies along the inferior maxilla were then made with a high-speed power saw and osteotome. Larger tumors of the maxiliary sinus were resected by subtotal maxillectomy, a procedure removing at least two walls of the sinus including a portion of the hard palate. The tumor location determines the particular subtotal variant that is appropriate. Orbital exenteration was included in one case in which we did total maxillectomy.

Discussion

The prognosis for maxillary sinus malignancies has remained poor for the past several decades despite improvements in both surgical technique and radiation therapy. Stern reviewed Anderson's experience for maxillary squamous cell carcinoma and found no significant improvement in survival when compared to a similar study there 20 years earlier (5).

Surgery with postoperative radiation therapy remains the standard treatment for resectable sinonasal carcinoma. Spiro et al. reviewed 105 patients at Memorial Sloan-Kettering Cancer Center with nasal cavity, maxillary, and ethmoid squamous cell carcinoma treated with combination surgery and radiation therapy, radiation therapy alone, or surgery alone (4). The

majority of these patients presented with extensive disease with 82 percent of newly treated patients having stage III or stage IV disease. Survival correlated to the stage at presentation, and the overall 5-year survival was 37 percent. The survival rates for nasal, maxillary, and ethmoid tumors were 45, 38, and 13 percent, respectively. The local control for maxillary sinus tumors was 49 percent, and local recurrence was the most common site of failure. Zaharia et al. reported the outcome of 149 patients treated with surgery and postoperative radiation therapy for a variety of malignant histologies. The 5-year actuarial survival was 36.2 percent overall, while for squamous cell carcinoma alone it was 35 percent (6). In the same year a 49 percent 5-year survival after treatment of 60 patients with sinonasal malignancies, with a variety of regimens, was described (7). An analysis of 73 patients with maxillary sinus malignancies of varying histologies, treated with surgery and postoperative radiation therapy, gave the overall 5-year relapse free survival 51 percent, with a local control rate of 78 percent (8). The 10-year Cleveland Clinic experience comprises 54 patients with squamous cell carcinoma of the sinuses: all received surgery and/or radiation therapy with an overall survival of 38.2 percent for the maxillary sinus group (9).

The overall treatment of maxillary malignancies in our group has resulted in 5-year survival rates in the 34 percent range.

Similar or better results were obtained in some recent studies. At the department of Otolaryngology VU Amsterdam 43 patients with squamous cell carcinoma were treated from 1975 to 1994 (10). Eighty-three percent of the tumors were in stage III or stage IV at the time of first presentation. Five-year survival after surgery and postoperative radiotherapy for all patients was 64%. For stages II, III, and IV it was 83, 49, and 37 percent, respectively (10). Carcinoma of the maxillary antrum is a rare disease, but in a retrospective analysis 110 cases were collected during the period from 1973 to 1993, at the Princess Margaret Hospital in Toronto (11). The 5-year local control rate was 42 percent, and theactuarial 5-year cause-specific survival was 43 percent.

Factors affecting survival in maxillary sinus cancer were analyzed in a large study (650 patients with maxillary sinus cancer) from Brigham and Women's Hospital in Boston (12). The overall mean (median) survival was 52 months (25 months). A high percentage of patients, 77.5 and 7.4 percent of patients presented with advanced (T3/T4) disease or cervical metastasis, respectively. Survival for patients with maxillary sinus cancer was determined not only by TNM staging but also by tumor histology and grade. TNM staging effectively stratifies patients according to survival. Radiation therapy significantly improves survival for those with T4 lesions.

Treating maxillary sinus cancer is challenging because of the proximity of critical structures, such as the eye and the brain, which preclude wide surgial excision and high-dose radiotherapy. The clinical course is indolent at most and a substantial number of patients have advanced disease at the time of diagnosis. Combined-modality therapy consisting of surgery and radiotherapy with or without intraarterial chemotherapy is generally used for the treatment. The reported 5-year local control and survival rates are 50-78 and 39-64 percent, respectively (13-15). However, an appropriate treatment strategy in terms of surgical procedure, radiotherapy methods and their sequence is still a matter of controversy.

Local control is a particularly difficult problem, with the majority of failures occurring at the primary site. These difficulties with maxillary cancer treatment are linked to the complex anatomy of the paranasal sinus region, and a propensity for late presentation due to the absence of symptoms in an early stage of disease. Complete surgical removal of the tumor with postoperative radiation therapy remains the standard of care for resectable lesions. Improved reconstructive techniques including microvascular free flaps and prosthetic obturators have significantly decreased the functional and cosmetic morbidity from aggressive surgical resection.

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MALIGNI TUMORI MAKSILARNIH SINUSA. DESETOGODIŠNJE ISKUSTVO

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Kratak sadržaj: *Uprkos ogromnom napretku u dijagnostičkim i hiruskim metodama prognoza malignih tumora maksilarnih sinusa je i dalje loša U našoj retrospektivnoj studiji prikazujemo desetogodišnjoj iskustvo u lecenju malignih tumora maksilarnih sinusa. Svi tumori su gradirani po 1997 AJCC stejdžing sistemu i to 8 tumora je klasifikovano kao T2, 7 kao T3 i 5 kao T4. Kod jedanest pacijenata je registrovano zahvatanje limfnih nodusa u momentu postavljanja dijagnoze. Svih 20 pacijenata je podvrgnuto hiruškoj i postoperativnoj zračnoj terapiji. Naše iskustvo ide u prilog shvatanju da kompletno hiruško odklanjanje tumora sa postoperativnom zračnom terapijom ostaje standard u lečnju resektibilnih malignih tumora maksilarnih sinusa.*

Ključne reči: *Planocelularni karcinoma, maksilarni sinusi, terapija*