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Carcinoma of temporal bone: Outcome of surgical therapy depending on stage and type of tumor

KEYWORDS: Skull Neoplasms; Temporal Bone; Carcinoma; Surgery; Neoplasm Staging; Neoplasms by Histologic Type; Ear, External; Ear, Middle

ABSTRACT

Carcinoma of temporal bone is rare, but it has considerable malignant potential. Critical evaluation of therapeutical results of these tumors is difficult because of unequal classification. To analyze the results of surgical and radiation therapy of these carcinomas we divided them into primary (9 patients) and secondary tumors (12 patients) according to Arriaga et al. (1990). Partial temporal bone resection was done in 7 patients, subtotal resection (petrosectomy) in 11 and total temporal bone resection in 2 patients. Postoperative irradiation during 6 weeks with 6 000 cGy in 30 fractions was also applied. Five-year survival rate for primary carcinoma decreased from 100% for grade A, to 33% for group B, and to 0% for group C. For secondary carcinoma this rate decreased from 75%, to 66%, and finally to 0% for the same clinical groups. Prognosis of temporal bone carcinoma directly depends on the propagation of tumour. Patients with free margins had significantly better survival rate (totally 82%), than patients with involved margins (0%). Patients with affected lymph nodes had very poor survival rate (19%). Local recurrence of tumor was the cause of death in all such cases, with the average interval from recurrence to death amounting 4,1 month. Computerized tomography is a reliable method for determination of the propagation and for planning the treatment. Temporal bone resection with postoperative irradiation is the method of choice of temporal bone carcinoma.

INTRODUCTION

Temporal bone carcinoma is a rare disease, but it has very aggressive course and bad prognosis. Clinical presentation of temporal bone tumor is usually insufficiently specific, and when it is obvious the disease is advanced with rapid progression and limited therapeutic success (1-3). Malignant temporal bone tumors can be divided on primary (planocellular carcinoma, adenocarcinoma), metastatic (from breast, lungs, kidney, stomach, larynx) and secondary affection (basocellular and planocellular carcinoma, other carcinoma and sarcoma). The aim of this study was to analyze the surgical results of a series of patients who underwent surgical therapy for primary and secondary temporal bone tumor.

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PATIENTS AND METHODS

Between 1991 and 2000, 21 patients with malignant tumors of the external auditory canal and middle ear were treated at the Department of Otolaryngology, University Medical faculty Nis. Their hospital charts were retrospectively reviewed. They were divided in the groups with primary (9 patients) and secondary (12 patients) temporal bone tumors. Secondary tumors stared on auricle, its surroundings and parotid gland. The CT scans were used to analyze the extent of tumor. The stage of disease was determined according to Arriaga et al. (1990) (4).

Partial temporal bone resection, subtotal resection (petrosectomy) or total temporal bone resections were surgical methods of treatment. Postoperative irradiation with 6 000 cGy during 6 weeks in 30 fractions was applied in all the patients.

Clinical characteristics, types of operation and survival rate were analyzed and compared in primary and secondary group of temporal bone tumors.

RESULTS

There were 17 males and 4 females, and their ages ranged from 37 to 79 years (median: 66). Sex distribution was nearly equal in the group of primary tumors (male: female ratio 5:4), contrary to secondary temporal bone involvement where males significantly predominated (male: female ratio 11:1). Otalgia, otorrhea or bloody otorrhea were the chief complaints of most patients with external auditory canal of middle ear tumors. The diagnosis of malignant tumor was established before surgery in five patients, but four patients were operated upon for suspected chronic otitis.

External auditory canal tumors were surgically excised, while radical mastoidectomy, subtotal, or total petrosectomy and subsequent irradiation were performed for the middle ear tumors. Histopathological examination revealed squamous cell carcinoma in all the cases.

Secondary affection of bony external meatus and middle ear was the result of local invasiveness of planocellular (58%) or basocellular carcinoma (42%), or inadequate previous surgical therapy. Local recidivism was mainly situated on one of the borders of tumor, and in one case operated by plastic surgeon residual tumor was present deeply in meatus, together with tympanic membrane, both covered by local skin flap.

Metastatic temporal bone tumor was verified in one patient. She was 69 years old with intense local pain, pressure, left hearing loss, vertigo, and no previous ear disease. Twelve years age she had gastrectomy with histologically proven adenocarcinoma. On otoscopy tympanic membrane was intact, she had mixed hearing loss at 50-60 dB. Classical Sch¸ller radiography indicated on osteolytic area 4x3 cm in squamous and mastoid part of temporal bone. Subtotal temporal bone resection was performed and metastatic temporal bone tumor, adenocarcinoma was verified. After that postoperative irradiation was performed, but lethal exitus occurred seven months later because of intracranial propagation. For primary temporal bone malignances survival amounted 100% for the group A, 33% for the group B, and 0% for the group C. For secondary tumor involvement this rate amounted 75%, 66%, and 0%, respectively. In both groups patients with free margins had significantly better survival rate (totally 82%), than patients with involved margins (0%). Also, patients with affected lymph nodes had very poor survival rate (19%). Local recurrence of tumor was the cause of death in all such cases, with the average interval from recurrence to death amounting 4,1 month.

The extent of surgery did not affect the survival rate when comparing partial resection and subtotal petrosectomy. Total temporal bone resection was not sufficient because of tumor propagation in cases where this operation was performed.

DISCUSSION

Early detection of primary temporal bone tumor relies on histopathologic analyze of each removed external canal and middle ear tissue. This should be followed by detailed high-resolution computerized tomography (CT) for documentation of bone erosion. Soft tissue changes can not be accurately verified only on the basis of CT scan, so MRI must be used as an adjunct diagnostic procedure in some cases (5).

Extension of tumor is associated with higher mortality rate. Local invasion of tumor is the most important prognostic factor. This emphasizes the need for adequate preoperative diagnosis, and surgical technique that enables resection of tumor that leaves margins unaffected.

Patterns of temporal bone tumor invasion are: superior erosion through the tegmen tympani into the middle cranial fossa, anteriorly into the glenoid fossa and infratemporal space, inferiorly through jugular foramen, posteriorly in the mastoid air cells, medially into carotid canal, and very rarely through otic capsule erosion (6). We found endocranial and skull base propagation to be the most frequent and the most important.

Metastatic carcinoma of the temporal bone is rare and usually not recognized because it can be oligosymptomatic or overshadowed by other metastases. Also, metastatic evaluation does not include temporal bone imaging (7).

The surgical treatment of temporal bone malignancies is strictly dependent upon the radiographic delineation of disease extent and the tumor relationship to adjacent neurovascular structures. No randomized or nonrandomized control studies are present in medical literature concerning primary or secondary temporal bone malignances. Usually, all studies are case series without control subjects.

Review of articles dealing with surgical therapy of such tumors indicates on the following data. Patients with carcinoma that is confined to the external auditory canal have similar survival, regardless of whether mastoidectomy, lateral temporal bone resection, or subtotal temporal bone resection is performed. The addition of radiation therapy to lateral temporal bone resection does not appear to improve survival. When tumor extends into the middle ear, survival of patients treated with subtotal temporal bone resection appeared to be improved over those treated with lateral resection or mastoidectomy. Additional radiation therapy to mastoidectomy improves survival, but the exact value is uncertain. The results of surgical resection when carcinoma extends from middle and inner ear and involves the petrous apex are bad. Resection of involved dura mater, involved brain parenchyma or internal carotid artery is of limited or no clinical improvement. The best survival rate is obtained with total temporal bone resection and postoperative radiotherapy. However, this technique can not be used for all the patients (8-10).

According to the results of this study there are some clinically important differences between primary and secondary temporal bone tumors. Secondary malignancy is mainly caused by locally invasive or inadequately radically operated tumor starting around external meatus. Thus, their diagnosis is obvious, previous operation is frequent, and reoperation can be performed if necessary. Basocellular carcinoma usually infiltrates at few sites, so reoperations are needed, but their survival rate (60%) is much better than for planocellular carcinoma (43%). Primary tumors are frequently unexpectedly found, adequate preoperative diagnosis can be wrong, and reoperations can be hardly performed. Affection of middle ear is followed by further propagation inside temporal bone and adjacent vital structures, so there are very little differences in survival in such stage no matter type of tumor, or type of surgical procedure.

CONCLUSION

Prognosis of temporal bone carcinoma is directly related to the extension of tumor. Early diagnosis is needed for adequate, successful therapy. Computerized tomography delineates precisely the extension of tumor and improves planning of therapy. Therapy of temporal bone carcinoma is combined: surgical and irradiation, however the five year survival is poor. Significant differences in clinical characteristics between primary and secondary invasive temporal bone tumors were found. Adequate selection of patients, choice of surgical resection, reconstruction and postoperative radiotherapy can achieve better survival rate, and can improve patient's quality of life.

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