Cancer of the external auditory canal-diagnostic and treatment

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Abstract

Background Ear squamous cell carcinoma (SCC) is a tumor with a poor prognosis, due to a late initial diagnosis because of a concealment by primarily benign symptoms and due to the unfavorable localization including the infiltration of important structures such as the middle ear, mandibular joint or dura.

Patients and methods We retrospectively examined 10 patients, medium age: 63.8 ± 9.3 years between 2002 and 2008 with a histological confirmed SCC of the external auditory canal. The median follow-up period was 20.5 months (range 7–60 months).

Results The treatment involving surgery, radiotherapy and/or chemotherapy yielded a survival rate of 38.3 ± 11.3 months for T1 and a survival rate of 17.0 ± 3.0 months for T2–T4 tumors. 3/10 patients at T1 stage are under follow-up, all 7/10 (70%) patients at T2 and T4 stage did not survive 5 years.

Conclusion The prognosis for ear SCC primarily depends on early clinical and histopathological diagnostics and requires a sufficient and standardized staging to determine the therapy involving surgery and radiochemotherapy.

Keywords Carcinoma of the external auditory canal · Squamous cell carcinoma · Surgery · Radiation treatment · Prognosis

Introduction

Literature states that the carcinoma of the external auditory canal has a frequency of 10–15% of all malignant ear tumors [1]. American studies assume an incidence of 1/1,000,000 per year [2]. However, diagnostic is not always easy- and therefore late as many of the symptoms can simulate otitis externa or fungal infections.

As long as no biopsy is available, there is no definite evidence for the existence of a squamous cell carcinoma (SCC). Symptoms such as otalgia, bloody otorrhea [3–5] and hearing loss can mislead the treating physician to conservatively treat the patient for e.g. otitis externa exsudativa over a long period. Therefore this type of tumor is frequently diagnosed rather late, which obviously co-affects the prognosis.

From the histopathological aspect, the majority of cancer in the external ear is SCC followed by adenocarcinoma and adenoid cystic carcinoma [6]. Imaging processes such as computed tomography (CT) and magnet resonance imaging (MRI) keep a central position with respect to diagnostic, treatment planning and potential prognosis. In particular, adequate staging examinations are indispensable for cases with planned complex tumor resection to detect certain foreseeable postsurgery defects such as facial paresis, ablatio auris or mandibular joint resection. Contrary to other carcinomas in the head and neck region there exist varying TNM classifications [7–9].

Examining our patients with a primary auditory canal SCC at the time the diagnosis was made, this work presents and analyzes the tumor's expansion and subsequent surgery and/or radiotherapeutic treatment.

Materials and methods

We retrospectively examined 10 patients (8 women, 2 men; medium age: 63.8 ± 9.3 years) with histopathological

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diagnosis “SCC of the external auditory canal”. The patients were diagnosed and treated between 2002 and 2008 at our ENT University Clinic. Patients with basal cell carcinoma of the external auditory canal or the auricle were not included. All data were scanned for symptoms and duration till definition of diagnose. Due to biopsy and/or surgery as

well as imaging (CT/MRI) a TNM classification according to the Pittsburg model [8,9] was undertaken (Table 3). Further, all data were examined regarding therapy and the depending survival time/prognosis. For statistics we used a Cox regression analysis and the Kaplan-Meier curve to determine the time of survival.

Table 1 Clinical symptoms and cancer staging

Patient	Sex	Age (years)	Histology	Symptoms	Duration (months)	Staging	Surgery	Radio/chemotherapy	Progress/recrudescence	Palliative chemotherapy	Survival (months)
1	F	81	SCC	None	0	T1N0M0R0	L	None	None	None	under follow-up, 60
2	M	65	SCC	Otorrhea	3	T1N0M0R0	L	+ 66 Gy	None	None	under follow-up, 33
3	F	49	Keratoa-kanthoma transition to SCC	Otorrhea	5	T1N0M0R0	L	None	None	None	under follow-up, 22
4	F	57	SCC	Hearing loss Otorrhea	2	T2N0M0R1	L, M, PA	+60 Gy	Infiltration of rear and middle cranial fossa	Erbitux	DOD, 19
5	F	57	SCC	Hearing loss Otalgia	12	T2N1M0R0	P, PA, ND	+64 Gy	Locoregional tumor break through, cutaneous metastases	Cisplatin (2 cycles) 5-FU	DOD, 14
6	F	67	SCC	Otalgia Otorrhea	6	T4N1M0R1	L, M, PA, ND	+66 Gy, +Carboplatin (2 cycles)	Recrudescence preauricular, submandibular, cheek and dura infiltration	Cetuximab	DOD, 31
7	M	73	SCC	Otorrhea	24	T4N1M0R1	P, PA, ND, K	+64 Gy	base of the skull, nasopharynx lower jaw	Cisplatin, 5-FU	DOD, 23
8	F	63	SCC	Hearing loss Otalgia Otorrhea	12	T4N0M0	None	+stereotactical radiation, hyperfraction up to 78 Gy +5-FU +Mitomycin	Intracranial expansion incl. facial nerve paresis	Cisplatin	DOD, 14
9	F	69	SCC	Otalgia Otorrhea	6	T4N1M0	None	+60 Gy +Carboplatin	external tumor break through incl. facial nerve paresis	Cisplatin (3 cycles) Taxol	DOD, 11
10	F	57	SCC	Hearing loss Otalgia	3	T4N1M1	None	+ 2 Gy +Mitomycin	Residuum, metastasis, base of the skull	None	DOD, 7

P: Petrosectomy, L: Local auditory canal resection, M: Mastoidectomy, PA: Parotidectomy, ND: Neck dissection, K: Mandibular joint resection, DOD: Dead of disease; TNM (classification of malignant tumors; T, tumor size; N, regional lymph nodes; M, presence of metastasis)

Result

Diagnose finding and staging

All patients were histopathologically diagnosed SCC by biopsy. In addition, to assure the tumor's expansion, all patients underwent staging examinations such as CT and/or MRI, according to the case. The clinical symptoms, duration till diagnose, histology and TNM classification according to the Pittsburgh model [8,9] are summarized in Table 1. The majority of the patients suffered symptoms such as otorrhea (70%), otalgia (40%) or hearing loss (40%). Only one patient did not report any clinical symptoms. Exculcerated craters in the auditory canal presented in 6 of 10 patients. By an image morphology aspect, distinct destructions of the auditory canal, the mastoid, the base of the skull and the mandibular joint were found in 6 patients. 3/10 patients were staged T1. In none of the patients local lymph node or systemic metastasis showed at the time of diagnose finding, i.e. all were T1N0M0. In two patients a T2 tumor was detected, one with additional lymph node metastases (T2N1M0). No T3 tumor showed in our patients, but five patients were diagnosed a T4 stage (50%). 4/5 (80%) already had local (T4N1M0), 1/5 (20%) local and systemic metastases (T4N1M1).

Therapy and survival

Radical surgery including a resection of the auditory canal and cavernous system was indicated in 70% (7/10 patients) after staging was completed. A parotidectomy was done in 4/7 patients, an ipsilateral neck dissection in 3/7 cases. Adjuvant radiation was performed in 5/7 patients. In three T4 patients, a primary surgery procedure was not possible, these patients had to undergo primary radio- chemotherapy or palliative chemotherapy. Three patients with primarily T1 stage survived so far. The median survival rate was for

Table 2 Division according to UICC, 6th edition 2002 tumor type “skin in the head-neck region”

Tis:	Carcinoma <i>in situ</i>
T1:	Tumor smaller than or equal to 2 cm
T2:	Tumor larger than 2 cm, but smaller than 5 cm
T3:	Tumor larger than 5 cm
T4:	Tumor infiltrates deep extradermal layers (cartilage, muscle, bones)
N0:	No regional lymph node metastases
N1:	Regional lymph node metastases (preauricular, submandibular, cervical and supraclavicular)

Table 3 University of Pittsburgh staging system for dividing auditory canal carcinoma, 1990, modified 2000

T classification	
T1	Tumor limited to the external auditory canal without bone erosion or evidence of soft tissue involvement
T2	Tumor with limited external auditory canal bone erosion (not full thickness) or limited
T3	Tumor eroding the osseous external auditory canal (full thickness) with limited (<0.5 cm) soft tissue involvement or tumor involving the middle ear and/or mastoid
T4	Tumor eroding the cochlea, petrous apex, medial wall of the middle ear, carotid canal, jugular foramen or dura; or with extensive soft tissue involvement (>0.5 cm) such as involvement of the temporomandibular joint of styloid process, or evidence of facial paresis
Phase division	
I	T1
II	T2
III	T1, N1
IV	T2, T3, T4, N1, M1

T1 (n = 3) auditory canal SCC 38.3 ± 11.3 months [95% CI: (16.2, 60.5)], for T2 (n = 2) and for T4 tumors (n = 5) 17.0 ± 3.0 months [95% CI (11.0, 23.0)]; p = 0.048. The treatment and subsequent progress is summarized in Table 1. A tumor of the external auditory canal with destruction of the middle and posterior skull base in a CT and MRI is depicted in Figures 1 and 2.

Discussion

Preliminary studies showed that it is not easy to distinguish between the middle ear and auditory canal carcinoma in extended tumor stages [4]. In this respect, recommendations were developed to summarize this tumor type as “carcinoma of the petrosal bone” [10]. Internationally, the stages are divided differently. An exact determination or formulation of a standardized stage division has not yet been made. A division according to UICC, 6th edition 2002, into the tumor type “skin in the head and neck area” is shown in Table 2. In European clinical routine this is a widespread and accepted classification. To our opinion, with this classification, a SCC of the auditory canal is not described adequately. Due to the division according to size only the involvement of surrounding anatomic structures is not mentioned at all.

The much more practicable Pittsburg division provided by Arriga in 1990 [8] summarizes pretreatment imaging (CT, MRI) and the clinical findings and has been slightly modified in 2000 [9] (Table 3). Here an exact determination of the tumor's expansion using CT and/or MRI is assessed [11], particularly to provide the best available treatment.

Fig. 1 Computed tomography of a T4 tumor of the external auditory canal

Fig. 2 Magnet resonance imaging of the same patients after primary radiochemotherapy without any signs of tumor regression

According to some authors, the SCC of the auditory canal is divided into three stages [12]: Tumors that are limited to the auditory canal, spread to the middle ear and the mastoid, and finally infiltrate the base of the skull or dura. Shih and Crabtree [13] are identifying a similar division.

The prognosis for patients suffering from an auditory canal carcinoma is rather poor as described in the literature [14,15]. The total survival time (T1, T2 and T4) of our patients was 28.2 ± 6.4 (CI: 15.6–40.9) months.

In case of a T1 tumor, after surgery, the tumor distance must certainly be taken into account and further decisions have to be made on a case-by-case basis. In our patients, no radiation was administered for two T1 tumors after R0-resection, both patients are tumor-free so far. Another T1 tumor was subsequently adjuvant radiated and is also tumor-free and in follow-up. Using our small patient clientele, a sole analysis with respect to radiation and successful treatment cannot be justified and a general recommendation cannot be deduced. It appears that the only critical prognosis remains early detection and timely surgery as well as a close follow-up.

It is known that gaps in the auditory canal can support a fast expansion of a SCC tumor, e.g. into the pre-auricular soft parts [11,16,17]. In case of a T2, T3 or T4 tumor [18], an additional parotidectomy and a neck dissection should be performed [19]. A curative approach involving surgery is no longer possible after the dura is infiltrated [11]. An adjuvant radiation for an expanded tumor involving chemotherapy is recommended. Regarding our small number of cases, it

seems of advantage, to radically treat the patient by surgery followed by radiochemotherapy. Three patients diagnosed at a T4 stage were treated by radiochemotherapy only and obviously had a shorter survival duration (7, 11, 14 months) compared to the other four patients that underwent surgery before (14, 19, 23, 31 months). One T2 tumor of the auditory canal was resected R1 and subsequently radiated, but an expanded tumor growth could not be prevented.

Additional studies should follow in this field.

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