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Efficacy of petrosectomy in malignant invasion of the temporal bone

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Abstract

We present the outcomes of lateral, subtotal, and total petrosectomies in patients with invasion of the temporal bone by specific primary cancers, with particular emphasis on survival in the advanced stages of disease. We made a retrospective study of 20 consecutive patients (squamous cell carcinoma of the temporal bone, n = 11, and primary cancer of the parotid gland with infiltration of the lateral skull base, n = 9) treated by total, subtotal, or lateral petrosectomy at the University Department of Otolaryngology, a tertiary referral centre, between June 2006 and December 2010. Fourteen of the 20 patients were alive at the time of analysis, and follow-up ranged from 36-60 months. Six of seven patients whose disease relapsed (4 local and 3 distant metastases) died. The three-year, disease-free survival was 65% and the overall survival 68%. Survival between those with temporal bone and parotid tumours did not differ significantly. The combined group survival was affected by involvement of invaded resection margins (n = 6, p = 0.03). Involved margins were significant in the development of recurrence (p = 0.03). Tumour stage, nodal involvement, type of operation, sex, age, skin involvement, facial palsy, and previous history of disease had no impact on prognosis. There was a significant difference in the survival curves of patients with carcinoma of the temporal bone with and without facial paresis (n = 6 compared with n = 5; p = 0.046). Two of 11 free flaps required revision of the anastomoses, but none was lost.

Keywords: Cancer of temporal bone; Parotid cancer; Petrosectomy

Introduction

Squamous cell carcinoma (SCC) of the temporal bone from the external auditory meatus or middle ear is rare, at about 1-6 cases/million annually.[1] Risk factors, including chronic suppurative otitis media, previous radiotherapy in neighbouring regions, and exposure to ultraviolet (UV) radiation, have been well-documented, but it is difficult to provide evidence-based recommendations for treatment because studies have reported such small samples.[2,3] Skin cancers and parotid cancers that have invaded the temporal bone are over 10 times more common, but there is even less evidence of best practice.[4] Regardless of the origin of the primary cancer, resection remains the treatment of choice.[5]

We present the outcomes of extensive resections (lateral, subtotal, and total petrosectomy) in patients with invasion of the temporal bone, with special emphasis on survival in patients with advanced disease.

Patients and Methods

We retrospectively analysed a series of 20 patients with tumours of the lateral skull base who had been referred to the University Department of Otolaryngology, a tertiary referral centre, for evaluation and management between January 2006 and December 2010. The patients' ages ranged from 29 -81 years, mean 54. Eleven patients had primary carcinomas in the temporal bone and nine patients deep lobe

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parotid neoplasms that had infiltrated the temporal bone. All patients were treated by lateral, subtotal, or total resection of the temporal bone.

The details of the patients are shown in Tables 1 and 2. The revised Pittsburg system for tumours that derive from the external auditory meatus was used to classify tumours of the temporal bone and lateral skull base.[6,7] The American Joint Committee on Cancer (AJCC) TNM staging system was used for parotid tumours.[8] The progression of the primary tumour was assessed using computed tomography (CT) and magnetic resonance imaging (MRI). A preoperative biopsy specimen was taken in all cases, and the two patients who had false negative results had frozen sections taken during the resection. The stage of lymph node involvement was assessed from CT, MRI, and ultrasound pictures of the neck, and all patients had a preoperative audiological assessment.

The main predictive variable was the tumour, and the site of the primary tumour, type of resection, presence of free margins, and nodal involvement were additional ones. Primary outcome variables were: recurrence, and three-year, disease-free and overall survival. Reported characteristics were age, sex, duration of history of the disease, facial nerve paresis at presentation assessed using the House-Brackmann scale, and pathological type. We used the chi square test with Yates' correction and Fisher's exact test, as appropriate, to assess the impact of recurrence, 3-year disease-free survival, and overall survival, for each predictive variable, and we also calculated odds ratios. Analysis was done with the aid of the Statistica 10.0 software (StatSoft, Dell Statistica, Tulsa, OK, USA) and univariate analysis was applied. Probabilities of less than 0.05 were accepted as significant.

Results

Mean (SD) duration of symptoms (including previous treatment) was 43 (10–104) months for the total sample, 36 (8–74) months for the temporal bone group, and 52 (18–104) months for the parotid group.

At operation we found that in three of the 11 temporal bone, and four of the nine parotid, primary lesions the extent of the tumour had been underestimated. Inaccuracies mainly related to the depth of the parotid parenchyma and infiltration of the temporomandibular joint (TMJ) in the first group (Table 1, case numbers1,5, and 6), and involvement of the infratemporal fossa and dura in the second (Table 2, case numbers 14, 15, 16, and 20). All diagnostic errors related to patients who had previously been operated on. Operations and outcomes are summarised in Tables 3 and 4. The internal carotid artery had not been infiltrated, and was not sacrificed, in any case.

Surgical technique

Our choice of surgical technique was not influenced by the site of the primary lesion, the patient's age, previous history of disease, paresis of the facial nerve, nodal status, or invasion of the dura, middle ear, TMJ, or skin. All nine patients with primary parotid cancer were treated by total parotidectomy, as were five of the 11 with primary temporal bone cancer. The choice of lateral or total parotidectomy was not influenced by the patient's age, previous history of disease, paresis of the facial nerve, nodal status, site of the primary lesion, or invasion of the dura, middle ear, or skin. In primary tumours of the temporal bone the presence of infiltration of the TMJ forced us to do a total parotidectomy significantly more often (chi square 9.53; $p = 0.002$).

Metastases to lymph nodes

There were lymph node metastases at presentation in two of the 11 patients in the temporal bone group (Table 1, case numbers 3 and 11) and in three of the nine in the parotid group (Table 2, case numbers 16, 17, and 20).

Facial nerve

The facial nerve was resected in six of the 11 patients with temporal bone tumours and all nine parotid tumours including 3 patients (14, 16, and 18) in whom nerve function was preserved. In four cases (1, 5, 12, and 13) a cable graft was inserted from the middle ear to the intraparotid branches using the greater auricular nerve. Four other patients had suspension of the oral commissure from the cheek with Goretex® (WL Gore Associates) three months after radiotherapy.

Reconstruction

Patients with skin defects required reconstruction. Large defects were covered with microvascularised anterolateral thigh flaps and radial forearm flaps. Smaller defects were closed by simple advancement of skin, or rotation or transposition flaps. When the dura was affected, small defects were repaired with collagen sponge and human fibrin in a "sandwich" technique, and larger defects by fascia (Table 3).

The two groups did not differ significantly with respect to tumour, nodes, history of disease (primary treatment or salvage), type of surgery (total or subtotal parotidectomy compared with lateral parotidectomy) presence of free margins, duration of symptoms, presence of facial palsy, involvement of skin at presentation or infiltration of the dura intraoperatively. All patients, except five who had had irradiation previously, were given external beam radiotherapy, total dose 64-72 Gy, six weeks postoperatively.

Statistical results

Fourteen of 20 patients were alive at the time the data were analysed, and duration of follow-up ranged from 36-60 months (Table 4). One patient died from a stroke free of disease after 12 months. Six of the seven patients who relapsed (four local metastases and three distant metastases) died. The median (range) time to relapse was 6 (2-24) months. The