Lateral temporal bone resection for malignancy of external auditory meatus: our approach

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Abstract

Objective: Surgical management of tumors of the external ear remains controversial with regard to the extent of resection and the efficacy of piecemeal resection compared to standard en bloc resection. The objective was to study the results of lateral temporal bone resection with soft tissue resection used at our centre in managing a series of such cases.

Setting: Tertiary referral centre

Patients: A retrospective study was carried out on seven cases of temporal bone malignancies treated at our center, with lateral temporal bone resection by the otologic microsurgical technique and superficial parotidectomy, with adjuvant radiotherapy where indicated. The mode of presentation, clinical and pathological staging, extent of surgical resection, reconstructive methods used and adjuvant therapy given were evaluated. The disease free survival on follow-up was noted.

Results: Disease free survival achieved was comparable with other published series, with acceptable morbidity patterns.

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Conclusion: Lateral temporal bone resection using otologic microsurgical technique with soft tissue resection is an effective way of achieving control of temporal bone malignancies.

Keywords Lateral temporal bone resection · External auditory meatus carcinoma

Introduction

Malignant neoplasms of the external auditory canal, middle ear and temporal bone are relatively rare, and constitute a broad range of pathological subtypes including squamous cell carcinoma, basal cell carcinomas and others. Such tumours present in a subtle manner, which may delay diagnosis. The complex anatomy of the region presents a great challenge to the surgeon in achieving oncosurgical clearance while at the same time keeping morbidity to the minimum. A combination of surgery and radiation is now used to treat these conditions. The aim of treatment is to achieve optimal disease control along with maximum preservation of function.

The efficacy of piecemeal resection when compared with standard en bloc resection is one of the controversies that exist in the treatment of these tumors. Controversy also exists regarding the extent of resection necessary in lesions confined to the external auditory meatus. Analysis of series dealing with squamous cell carcinoma of the temporal bone has revealed no statistically significant difference in survival between mastoidectomy (50% 5-year survival), lateral resection of the temporal bone (48.6% 5-year survival) and subtotal resection (50% 5-year survival) when disease was confined to the external auditory canal [1].

These data seem to allow for a less than en bloc resection with no compromise in survival. However, the small number of patients in this and other published series necessitate caution in arriving at definite conclusions.

We have treated these patients in our centre with lateral temporal bone resection. The technique used was a combination of microsurgical resection and soft tissue resection which resulted finally in piecemeal removal of tumor. The results in our series of such cases are analysed and presented in this descriptive paper.

Patients and methods

A retrospective chart review of patients with malignancies of the ear managed at our centre from Jan 2001 to Dec 2005 was carried out. Seven cases of external auditory meatus malignancy had been operated and were included in the study. Pre-operative tissue diagnosis was obtained in all cases. Imaging studies were performed using high resolution CT scan (HRCT) of the temporal bone and adjacent soft tissues and the neck. A comprehensive metastatic workup was done in all cases.

The tumors were staged using Pittsburgh TNM staging proposed for EAM [2]. A thorough assessment of the general condition of all these patients was carried out to ascertain fitness for a major surgical procedure under prolonged general anaesthesia. All these cases were discussed at this centre's Head and Neck Tumour Board for determining final treatment plan.

All these cases underwent lateral temporal bone resection (LTBR) with superficial parotidectomy. A superficial parotidectomy was first performed with a standard incision extending downwards from just anterior to the helix curving posteriorly below the lobule and then down into the neck for superficial parotidectomy. The facial nerve was identified using standard landmarks at its exit from the stylomastoid foramen.

After this a postaural incision was given which was joined to the first incision inferior to lobule of pinna. Cortical mastoidectomy was performed using an operating microscope. Further steps were modified according to the specificities of the individual cases. A lateral temporal bone resection with removal of all the parts of the temporal bone lateral to the Fallopiian canal, preserving the stapes was performed.

Reconstruction was tailored to the specific needs of each case with a view to achieving best possible functional and cosmetic results. The final pathological staging of the cases were determined as per the histopathology reports. Post op radiotherapy was given in those cases where it was felt that margins of tumour clearance were doubtful. The patients were kept under regular follow-up.

Results

The age group of the patients ranged from 36 to 77 years. There were five males and two females.

All of the cases presented with hearing loss, and a growth in EAC. In one patient the growth also involved the pinna, and was being managed by a dermatologist as a case of Cutaneous Leishmaniasis. Two of them presented with otorrhoea, and were being managed in an otology centre as a case of chronic suppurative otitis media. One patient presented with history of ear bleed. The duration of the symptoms varied from 6 months to one year.

None of the cases had any palpable pre or post auricular nodes, cervical nodes or facial palsy. Puretone audiometry revealed only conductive hearing loss in all these cases indicating preservation of cochlear function.

The pre-operative tissue diagnosis revealed various histopathological subtypes as shown in Table 1.

HRCT temporal bone in these cases revealed involving EAM. In one case tissue was seen extending up to tympanic membrane with air filled middle ear. In another case a soft tissue density opacity was seen in middle ear with a distinct plane of differentiation from the soft tissue density opacity in EAM (at the level of tympanic membrane) suggestive of secretions in middle ear (Figs. 1, 2). In all others middle ear and mastoid were reported free of tumor. Two of them showed limited EAM bony erosion. One patient showed full thickness erosion of the anterior osseous canal and limited (< 0.5 cm) soft tissue involvement (Fig. 2). None of the CT Scans showed any intracranial involvement or any infra-temporal fossa infiltration. Thus 06 tumors were staged as T2N0M0 and one was staged as T3N0M0, as per Pittsburgh TNM staging proposed for EAM.

Table 1 Pre-operative histology of the tumours

No of cases	Mode of tissue diagnosis	Histopathology (HPE)	Remarks
3	Punch biopsy of growth in EAM	Well differentiated Squamous Cell Carcinoma	
1	Punch biopsy of growth in EAM	Basal Cell Carcinoma	
1	Repeat punch biopsy of growth in EAM	Basosquamous Carcinoma	Previous biopsy suggestive of cutaneous leishmaniasis.
1	Specimen obtained from EAM after intact canal wall mastoidectomy	Moderately differentiated Squamous Cell Carcinoma	Was being managed as a case of CSOM
1	Excision biopsy of growth in EAM	Adenoid Cystic Carcinoma of Eccrine gland

Fig. 1 Showing tissue extending upto tympanic membrane

Fig. 2 HRCT confirming temporal bone in these cases revealed EAM

Fig. 3 CT scan showing the medial tympanic ring or infratemporal fossa (ITF) inferiorly

All the patients underwent LTBR. Superficial parotidectomy was performed initially in all the cases. An otologic microsurgical technique was then used to complete the LTBR. In 04 cases, this involved a cortical mastoidectomy initially, followed by an extended posterior tympanotomy and dislocation of incudostapedial joint. Then dissection was extended by drilling upto the anterior annulus inferiorly and superiorly in the root of zygoma upto anterior canal wall so as to join with the inferior part. Thus the resection included EAC, tympanic membrane, malleus and incus. The boundaries on completion were the medial wall of the middle ear cavity and stapes medially, the mastoid cavity posteriorly, the epitympanum and zygomatic root superiorly, the temporomandibular joint (TMJ) capsule anteriorly, and the medial tympanic ring or infratemporal fossa (ITF) inferiorly (Fig. 3). The lateral margin depended on the extent of spread to the pinna and superficial soft tissue. The bony labyrinth and facial nerve were preserved in all cases.

However, in three of the cases a canal wall down mastoidectomy was performed initially, followed by extension of the resection to achieve the boundaries as specified earlier. In effect, LTBR was completed piecemeal in all the cases. In one case where anterior canal wall was involved, we had to resect the condyle and part of the ascending ramus of the mandible in order to achieve tumour clearance.

In 6 cases EAM was closed as a blind sac except in the case where half of the pinna was destroyed by disease. In this case the cartilage of the pinna remnant was removed and skin of the preserved upper part of pinna was used for primary closure as a random flap.

The histopathological reports, adjuvant therapy given, follow up and outcomes are summarized in Table 2.

None of our cases had post-operative facial nerve paresis. Partial wound breakdown occurred in one case which required a local rotation flap.

Discussion

The optimal management of temporal bone malignancies remains unclear because of continued debate regarding the staging, difficulties in accurate preoperative radiographic evaluation, extent and nomenclature of surgical procedures, surgical techniques used and use of adjuvant radiation therapy. The limited number of cases of temporal bone malignancies at each individual institution precludes definitive conclusions regarding the optimal protocol for management [3].

The cases which we have treated in our centre covered a wide spectrum of modes of presentation, clinical staging and histopathological subtypes. Delay in definitive diagnosis seen in two cases can be attributed to the rarity of the disease and the overlap with symptoms of commoner ear diseases.

All our cases underwent detailed imaging studies and were then staged as per the staging system proposed by the Uni-

Table 2 Histopathology, adjuvant therapy, follow-up and outcome

No of cases	HPE of specimen	Adjuvant therapy	Post op follow up – duration	Outcome
3	Focus of well differentiated Squamous Cell Carcinoma, superficial parotidectomy specimen free of disease	Nil in 02 cases Post-op RT given in one case (56 Gy in 28 fractions)	02 yrs, 04 m 03 yrs, 08 m 01yr	NED NED Lost to follow-up thereafter
1	Basal cell carcinoma, superficial parotidectomy specimen free of disease	Nil	02 yrs	NED
1	Baso-squamous Carcinoma, parotidectomy specimen free of disease, margins and depth free, destruction of cartilage and infiltration of tumor cells into minor salivary glands	Nil	04 yrs, 10 m	NED
1	Focus of moderately differentiated squamous cell Ca in soft tissue, no tumor in superficial parotidectomy specimen, reactive lymph nodes	Post op RT advised – 64 Gy in 32 fractions	03 yrs	Died of unresectable recurrent disease
1	Adenoid cystic Ca, superficial parotidectomy specimen free of disease	Post op RT -completed 56 Gy in 28 fractions	1 yr, 03m	NED

versity of Pittsburgh. It has been seen that this staging system closely correlates with treatment outcomes. This is because prognosis in these malignancies is largely determined by the extent of local disease at the time of presentation [4].

The actual technique used for achieving oncosurgically acceptable tumour clearance in the temporal bone has been a matter of considerable debate. En bloc resection of the tumour with a cuff of soft tissue is an attractive option, but has the disadvantage of being practically very difficult to achieve in the complex and intricate anatomy of the temporal bone. Proponents of the otologic microsurgical technique have argued that similar survival rate can be achieved by this technique [5, 6]. We have also consistently used this technique in our centre.

A superficial parotidectomy was performed with preservation of the facial nerve in all these cases as the lesions were not so far advanced as to require a total parotidectomy nor was there any pre-operative facial palsy in any of these cases. None of the cases in our series showed histopathological evidence of disease in the parotidectomy specimens. The requirement for parotidectomy in these cases has been a matter of debate. It has been favoured by most workers based on the rationale that the intraparotid lymph nodes are the first echelon drainage site for cancers of the EAM and middle ear [7, 8]. Resection of these soft tissues also addresses minimal soft tissue extension beyond the temporal bone.

Various reconstruction methods have been described for achieving functional and cosmetic rehabilitation following temporal bone resections [9]. We have used a novel technique using the skin of the pinna remnant in one case.

Adjuvant post-operative radiotherapy was given in two of our cases for covering possible residual tumour after sur-

gical resection. Post-operative radiotherapy has been shown to definitely improve survival in these cases [6].

In our limited series, we have achieved disease free survival in 5 out of 7 cases with a mean follow-up period of 2.6 years. The published results by other workers also show similar outcomes [10]. However, all these studies are based on a small numbers of patients. Therefore, the future of improved treatment strategies lies in a multi-institutional effort to adopt a universally acceptable staging system and develop prospective trials.

Conclusion

The results at our center validate the contemporary surgical approach to tumors of the external ear, consisting of lateral temporal bone resection by otologic microsurgical dissection technique and superficial parotidectomy followed by adjuvant therapy where indicated.

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