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Main Articles

Mode of parotid involvement in external auditory canal carcinoma

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Abstract

Until now, little was known about the mode of parotid involvement in external auditory canal (EAC) carcinoma. The incidence of parotid node metastasis and direct parotid invasion was examined in patients with EAC carcinoma. The study comprised 11 patients with squamous cell carcinomas (SCC) and 10 patients with adenoid cystic carcinomas (ACC). A retrospective review of the surgical specimens was undertaken with specific reference to parotid node metastasis and parotid invasion. Parotid node metastasis was noted only in two cases of advanced staged SCC, whereas none of the ACC patients showed parotid node metastasis. Direct parotid invasion occurred only in advanced staged SCC, however, it did occur in early stage ACC. Our data indicated that elective parotidectomy for control of occult parotid node metastasis is necessary only in advanced SCC carcinoma, whereas parotid management to secure adequate safety margins is mandatory for advanced SCC and all cases of ACC.

Key words: Ear, External; Carcinoma, Squamous Cell; Carcinoma, Adenoid Cystic; Parotid Gland; Tumour Invasiveness

Introduction

Carcinoma of the external auditory canal (EAC) is a rare tumour and a challenge to treat. Despite the technical innovation of *en bloc* resection described in the early 1950s,[1] the prognosis for these patients remains poor. The current conclusion from the literature to date is that the best results are obtained with *en bloc* resection of the tumour together with radiotherapy.[2,3]

Because the lymphatics of the EAC empty into the parotid area and tumours of the EAC can directly invade the parotid gland through the cartilage defect of the EAC anterior wall, parotidectomy is recommended in dealing with malignancy of the EAC.[4] Parotidectomy also provides a more adequate margin of tissue anteriorly and affords better control over the peripheral portion of the facial nerve during the resection. However, little information is available regarding the incidence of parotid lymph node metastasis and direct parotid invasion in EAC carcinomas. In addition, there was a report[5] that the survival rate did not correlate with the performance of parotidectomy in EAC carcinoma. Therefore, the decision to perform elective parotidectomy and its appropriate surgical extent remain matters of controversy. Furthermore, taking into account the inevitable sequelae of parotidectomy such as disfiguring, parotidectomy for early staged EAC carcinoma might represent over-treatment.

This study was undertaken to evaluate the role of parotidectomy, and to provide guidelines for the performance of parotidectomy when dealing with EAC carcinoma. The incidence of parotid node metastasis and direct parotid invasion in patients with squamous cell carcinoma (SCC) or adenoid cystic carcinoma (ACC) of the EAC was examined according to the pre-operative tumour stage.

Patients and methods

Patients

The study comprised 21 patients (nine males, 12 females, mean age 55 years, range 35–71 years) of EAC carcinoma undergoing parotidectomy with various types of temporal bone resection between August 1989 and March 1996 at the Departments of Otolaryngology, Yonsei University. Histopathological examinations confirmed 11 cases of SCC and 10 cases of ACC. Tumours were staged pre-operatively by using clinical examination reports, pre-therapeu-

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TABLE I
CHARACTERISTICS OF PATIENTS WITH SQUAMOUS CELL CARCINOMA OF THE EXTERNAL AUDITORY CANAL

Patient	Sex/Age	preoperative stage	Surgery	RT	Status(Mo)
1	M/61	I	LCR	None	NED(136)
2	M/37	I	PTBR	None	NED (29)
3	M/67	II	PTBR	None	NED (25)
4	F/67	II	PTBR	None	NED (21)
5	F/60	II	PTBR	None	NED (19)
6	F/64	III	STTR	post	NED (98)
7	F/49	III	STTR	post	DWD(32)
8	M/56	IV	STTR	post	DWD(34)
9	M/62	IV	STTR	post	LWD (19)
10	M/48	IV	STTR	post	DWD(29)
11	M/35	IV	TTBR	None	DWD (6)

LCR = local canal resection; PTBR = partial temporal bone resection; STTR = subtotal temporal bone resection; TTBR = total temporal bone resection; RT = radiation therapy; post = post-operative; NED = no evidence of disease; DWD = dead with disease; LWD = live with disease

tic radiographic studies such as computed tomography (CT) and magnetic resonance image (MRI) scan according to the modified Pittsburgh tumour staging system.[6] There were two stage I patients, three stage II patients, two stage III patients and four stage IV patients in the SCC group. In the ACC group, there were two stage I patients, three stage II patients, one stage III patient and four stage IV patients. All the patients presented without clinical evidence of parotid nodal metastasis or distant metastasis. Other information was also collected recording treatment modality and patient outcome (Tables I and II). A retrospective review of the surgical specimens was undertaken with specific reference to parotid node metastasis and parotid invasion according to tumour staging and pathology. The patterns of treatment failure in 10 patients with recurrent or remained carcinoma were also reviewed. Patients were followed for a minimum of two years (range; two–12 years, mean; four years).

Treatment

As an initial treatment, surgery was carried out in all patients. The surgical procedures performed were as follows: local canal resection in one patient, partial temporal bone resection in seven patients, subtotal temporal bone resection in 12 patients, and total temporal bone resection in one patient. Local canal resection was defined as removal of the skin and all or part of the cartilaginous EAC and may have included removal of a portion of the bony canal. Partial, subtotal and total temporal bone resections have been described in detail by Gacek and Goodman.[4] Total parotidectomy was performed when the tumour definitively involved the parotid gland in pre-operative evaluation. Otherwise, superficial parotidectomy was performed.

TABLE II
CHARACTERISTICS OF PATIENTS WITH ADENOID CYSTIC CARCINOMA OF THE EXTERNAL AUDITORY CANAL

Patient	Sex/Age	preoperative stage	Surgery	Radiation	Status(Mo)
1	F/47	I	PTBR	None	NED (26)
2	F/49	I	PTBR	post	NED (36)
3	F/71	II	PTBR	None	NED (110)
4	M/52	II	STTR	post	NED (49)
5	F/50	II	STTR	None	LWD (61)
6	F/60	III	STTR	None	DWD (98)
7	M/50	III	STTR	post	DWD (65)
8	F/60	IV	STTR	post	LWD (25)
9	F/67	IV	STTR	post	NED (28)
10	F/53	IV	STTR	post	LWD (19)

PTBR = partial temporal bone resection; STTR = subtotal temporal bone resection; RT = radiation therapy; post = post-operative; NED = no evidence of disease; DWD = dead with disease; LWD = live with disease

TABLE III
PATTERN OF PAROTID INVOLVEMENT IN SQUAMOUS CELL CARCINOMA ACCORDING TO STAGE AND PATHOLOGY

preoperative stage	Squamous cell carcinoma		Adenoid cystic carcinoma	
	Patients (n)	Node metastasis (n)	Patients (n)	Node metastasis (n)
I	2	0	2	0
II	3	0	3	0
III	2	1	1	0
IV	4	1	4	0

Results

Parotid involvement pattern in squamous cell carcinoma

Histological examination revealed that two cases of SCC at an advanced stage (one at stage III, one at stage IV) had subclinical parotid nodal metastasis. Direct invasion was noted only in an advanced stage of SCC (stage I, none of two, stage II, none of three, stage III, one of two, stage IV, two of four) (Table III).

Parotid involvement pattern in adenoid cystic carcinoma

None of the patients had positive parotid nodal metastasis in ACC. The incidence of direct parotid invasion was high and parotid invasion could be present despite the early stage (stage I, one of two; stage II, one of three, stage III, one of one, stage IV, three of four) (Table IV). Figure 1 shows MRI (A) and histological (B) findings of a 49-year-old female with stage I ACC. The tumour was confined to the EAC without parotid extension in MRI. However, the carcinoma extended through the cartilage defect and a direct spread lesion was noted in the parotid gland on histological study.

TABLE IV
PATTERN OF PAROTID INVOLVEMENT IN ADENOID CYSTIC CARCINOMA ACCORDING TO STAGE AND PATHOLOGY

preoperative stage	Squamous cell carcinoma		Adenoid cystic carcinoma	
	Patients (n)	Direct extension (n)	Patients (n)	Direct extension (n)
I	2	0	2	1
II	3	0	3	1
III	2	1	1	1
IV	4	2	4	3

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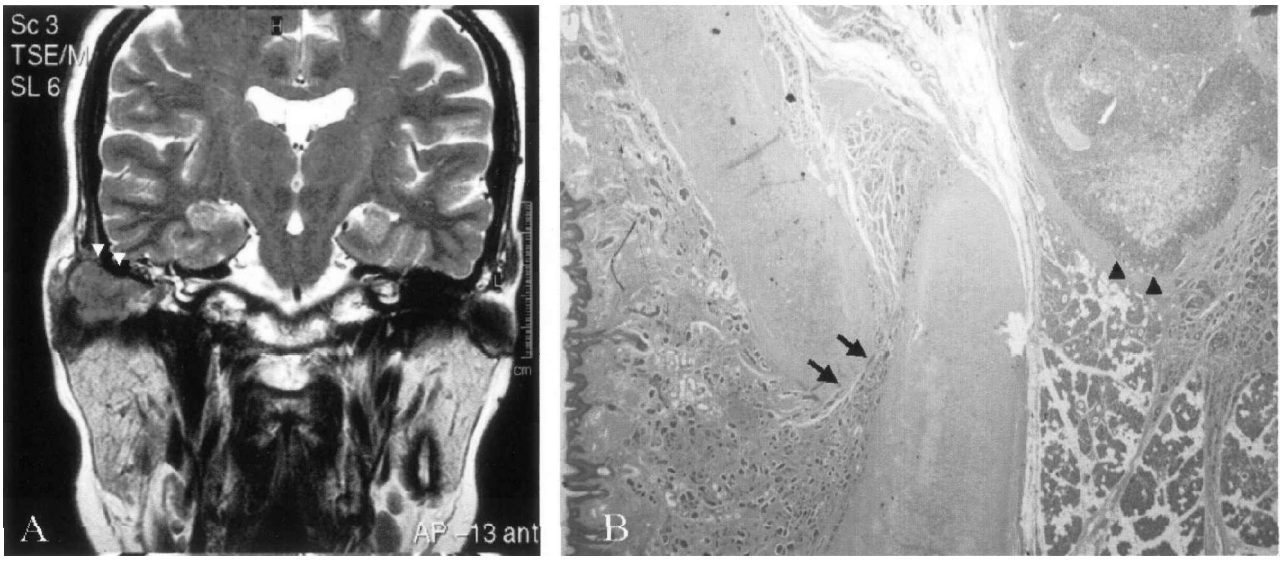

FIG. 1

(A) MRI illustrating the findings of external auditory canal (EAC) carcinoma. The tumour (white arrow heads) is confined in the EAC without parotid involvement. (B) Histopathological specimen from the same patient. Note the tumour extending through the cartilage defect (arrows) and a direct spread lesion in the parotid gland (dark arrow heads).

Pattern of treatment failure

The tumour recurred in seven patients (four cases of SCC, three cases of ACC). The most common site of recurrence was the middle or posterior fossa dura (n = 3), followed by one case each in the mastoid air cells, infratemporal fossa and glenoid fossa. The seventh tumour recurred at the remaining deep lobe of the parotid in one ACC patient who had negative surgical margin. None of the patients showed parotid nodal recurrence. In three patients (one case of SCC, two cases of ACC), the tumour remained despite surgical removal (two cases in carotid, one case in posterior fossa dura) (Table V).

Discussion

The parotid gland area is abundantly supplied by lymph nodes and lymphatics that receive most of the lymphatic drainage from the facial skin and scalp. An average of 20 intraparotid lymph nodes may be identified after serial sectioning of the normal parotid gland. The parotid area lymph nodes are also one of the lymphatic drainage sites from the EAC skin.[8] Metastatic spread into the parotid lymph node has been known to be more common from primary tumours of the external ear.[9,10] Lee *et al.*[10] reported that all of 14 patients with external ear carcinoma had metastases to the parotid lymph node. Consequently, they recommended elective parotidectomy in dealing with external ear carcinoma. However, this study found that only two of 11 cases of SCC of EAC had metastasis to the parotid lymph node, both had an extensive primary tumour. None of the 10 ACC patients showed parotid lymph node metastases. It is unclear why EAC carcinoma showed a much lower tendency of parotid lymphatic spread than external ear carcinoma, however, there are several possibilities for this difference. First, the lymphatic network might be less developed in the EAC than that in the external ear. Second, the difference may be due to the fact that the EAC skin is completely confined by bony tube. Our results correspond with those of a previous report[6] showing that lymphatic metastases in EAC carcinoma occurred always in patients with extensive tumour involving the middle ear and bony EAC. Our study indicated that elective parotidectomy for node metastasis control is justified only in stage III or stage IV stage SCC of the EAC patients.

Gacek and Goodman confirmed the preauricular spread of EAC carcinoma via the fissures of Santorini.[4] Their finding of tumour invasion forms the rationale for performing parotidectomy along with temporal bone resection. In the present study, the incidence of direct parotid invasion varied significantly according to the tumour pathology. Parotid invasion in SCC occurred only in advanced cases, and could be detected by pre-operative evaluation. However, parotid extension in ACC

TABLE V

PATTERN OF INITIAL TREATMENT FAILURES

Patient	Sex/Age	Pathology	T- stage	Initial treatment	Time to rucurrence (Mo)	Recurred or remained site
1	F/49	SCC	3	STTR,postop RT	19	mastoid air cell
2	M/56	SCC	4	STTR postop RT	11	infratemporal fossa
3	M/62	SCC	4	STTR postop RT	15	posterior fossa dura
4	M/48	SCC	4	STTR postop RT	12	middle fossa dura
5	M/35	SCC	4	TTBR	remained tumour	carotid artery
6	F/50	ACC	2	STTR	24	parotid deep lobe
7	F/60	ACC	3	STTR	16	glenoid fossa
8	M/50	ACC	3	STTR, postop RT	32	posterior fossa dura
9	F/60	ACC	4	STTR, postop RT	remained tumour	carotid artery
10	F/53	ACC	4	STTR, postop RT	remained tumour	posterior fossa dura

SCC = squamous cell carcinoma; ACC = adenoid cystic carcinoma; postop RT = post-operative radiotherapy; STTR = subtotal temporal bone resection; TTBR = total temporal bone resection)

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occurred even in early staged tumour without radiographic evidences of disease extension. Furthermore, the tumour recurred at the remaining deep lobe of the parotid gland after superficial parotidectomy in one patient with staged II ACC. Therefore parotid management to secure adequate safety margin is mandatory in early staged ACC.

- **Tumours of the external auditory meatus are rare and the current recommended treatment protocol is *en bloc* resection and radiotherapy**
- **This paper retrospectively examined surgical specimens to determine local invasion of squamous cell and adenoid cystic carcinoma from the external auditory meatus into the parotid gland and parotid lymph nodes**
- **Direct parotid invasion was found in early stages of patients with adenoid cystic tumours but was delayed in squamous cell carcinoma until the disease was advanced**
- **On the basis of this study the authors suggest parotid surgery is necessary in all cases of adenoid cystic carcinoma of the external meatus but that it is only necessary in squamous cell carcinoma when the disease is advanced**

Many surgeons performed parotidectomy in dealing with EAC carcinoma.[4,11] However, controversy remains regarding the role of parotidectomy in improving the survival rate. Moody *et al.*[5] reported that the survival rate did not vary according to the performance of parotidectomy. Until now, the guidelines for elective parotidectomy for EAC carcinoma have been indistinct. On the basis of this present pathological study, it is recommended that elective parotidectomy should be performed for control of subclinical metastatic node only in advanced SCC patients. Parotid excision, however, should be performed to secure adequate surgical margin in all ACC patients and advance staged SCC patients.

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