CASE REPORT

Head and Neck Squamous Cell Carcinoma Metastatic to the Orbital Apex

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Abstract—Primary squamous cell carcinoma of the head and neck most commonly metastasizes to the lymph nodes, lung, bone, and liver. Many other rare sites of metastatic disease have been reported. To date, metastatic squamous cell carcinoma of the head and neck to the orbital apex has not been described. Presented are two cases, one tonsil and one parotid primary with metastatic disease to the orbital apex. Many tumors have been found to metastasize to the eye and orbit, but head and neck neoplasms are rarely reported. A review of the literature is presented in addition to the detailed case reports with their radiologic findings and clinical course. Surgical resection followed by postoperative radiotherapy appears the treatment of choice at this time. (*Skull Base Surgery*, 5(2):123–129, 1995)

Head and neck squamous cell carcinomas most commonly metastasize to the regional lymph nodes. When distant metastases occur, the most common sites are lung (80%), mediastinal lymph nodes (34%), bone (31%), and liver (31%)¹ (Table 1). Orbital involvement by tumor is usually caused by direct extension, as in nasopharyngeal and ethmoid sinus carcinoma or perineural invasion as seen with facial skin cancers.^{2–4} Rarely do head and neck neoplasms, particularly squamous cell carcinoma, metastasize to the eye or orbit.⁵

When metastatic tumors are located within the bony orbital walls, the eye is predominantly involved rather than the orbit. Ferry and Font⁶ reviewed 227 metastatic carcinomas to the eye and orbit but found only 28 confined to the orbit and none originating in the head and neck. Rare reports of head and neck squamous cell carcinomas metastatic to the eye or orbit have been documented, but the location and route of spread were not reported.^{3,4} We present the first two known cases of metastatic squamous cell carcinoma of the head and neck to the orbital apex.

CASE REPORTS

Case 1

A 56-year-old man presented with an 18-month history of a right neck mass and was diagnosed with T₂N₃M₀ squamous cell carcinoma of the right tonsil (Fig. 1). Bone scan revealed no distant evidence of metastatic disease. The patient underwent oropharyngeal resection and right radical neck dissection followed by postoperative radiation with a dose of 5000 cGy. Pathologic results revealed clear margins with 20 of 25 lymph nodes involved and extracapsular spread identified. The patient presented 1 week following completion of radiotherapy with right-sided diplopia and orbital pain. Visual acuity was normal but proptosis and mild ophthalmoplegia was present. Magnetic resonance imaging (MRI) revealed an enhancing mass in the orbital apex separate from the globe (Fig. 2). The patient then received 5000 cGy radiotherapy to the right orbit, but during treat-

Table 1. Sites of Distant Metastases in Head and Neck Cancers

<i>Site</i>	<i>No.</i>	<i>Incidence (%)</i>
Lung	310	80
Mediastinal nodes	130	34
Liver	119	31
Bone	118	30
Abdominal nodes	79	20
Kidney	61	16
Adrenal gland	59	15
Pleura	58	15
Heart	47	12
Diaphragm	40	10
Spleen	35	9
Pericardium	34	9
Soft tissue	30	8
Axillary nodes	24	6
Small bowel	16	4
Pancreas	14	4
Dura	14	4
Brain	11	3
Stomach	11	3
Peritoneum	11	3
Pituitary	10	3
Mesentery	7	2
Gallbladder	5	1
Genitourinary	4	1
Colon	3	0.8
Total	1250	—

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ment developed progressive deterioration in visual acuity and ophthalmoplegia. Computed tomography (CT) scan of the orbits revealed persistent tumor in the orbital apex. Nearing the completion of radiotherapy, the patient developed abdominal pain and hepatic metastases were diagnosed. He succumbed to his disease soon thereafter.

Case 2

A 55-year-old man initially presented with partial paralysis of the upper branches of the left facial nerve but an extensive workup revealed no etiology. He developed the onset of diplopia and periorbital swelling on the left side 10 months later. Examination at that time revealed 2 mm proptosis, normal visual acuity, and normal extraocular movements. CT scan revealed a mass in the orbital apex without involvement of the eye, optic nerve, or extraocular muscles (Fig. 3). An MRI confirmed these findings and bone scan was normal (Fig. 4). The patient underwent a frontotemporal craniotomy and superior apical orbitotomy with resection of the mass preserving the ocular structures. Pathologic evaluation revealed squamous cell carcinoma grade II and an extensive metastatic workup revealed no evidence of an occult primary (Fig. 5). Radiotherapy was instituted with a dose of 6000 cGy over 6 weeks to the left orbit. During radiotherapy, the patient developed progressive proptosis with slight worsening of visual acuity. CT scan and MRI revealed persistent tumor or scarring at the orbital apex with impingement on the optic nerve and extraocular muscles (Figs. 6, 7). Orbital exenteration and resection of this mass was performed but pathologic results revealed only fibrosis. The patient was asymptomatic until 1 year later, at which time he was found to have a left parotid mass. Total parotidectomy revealed squamous cell carcinoma grade II

Figure 1. Tonsil revealing a moderately differentiated squamous cell carcinoma. (Hematoxylin & eosin; original magnification $\times 320$.)

Figure 2. T₁-weighted, gadolinium-enhanced, fat suppression resonance image, with axial slice of orbits revealing enhancing mass in right orbital apex from case 1.

Figure 3. Axial computerized tomography scan of case 2 revealing solitary mass in orbital apex.

Figure 4. T₁-weighted magnetic resonance image on axial cut revealing soft tissue density in orbital apex.

without perineural involvement. Postoperative radiotherapy with 5600 cGy was given to the left parotid and neck regions. The patient is now free of disease at 6 years and CT scan reveals no evidence of recurrent tumor.

RESULTS

These two cases represent the first known cases of squamous cell carcinoma of the head and neck metastatic

to the orbital apex. The first case is a stage IV primary tumor with a poor prognosis progressing to widespread metastatic disease. With such advanced tumor, the orbital apex cannot be cited as the origin of hematogenous tumor dissemination and therefore radiation therapy may be effective in earlier stage tumors with isolated metastases to the orbital apex.

The second case represents a diagnosis of the orbital metastases prior to identification of the primary, which is common in earlier studies.⁷ The anatomy of the orbital

Figure 5. Biopsy of left orbital apex. Note nests of grade II squamous cell carcinoma. (Hematoxylin & eosin; original magnification $\times 125$.)

apex with its proximity to many important structures of which deficits are easily noticed predisposes it to early diagnosis. The diagnosis of the primary and metastases prior to extensive local and regional spread may have contributed to the excellent response to combined surgery and radiotherapy in this case. The frontotemporal crani-

The use of both CT scan and MRI was helpful in our cases. The CT scan provided information regarding bony involvement by the tumors, thus affecting the approach

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Table 2. Sites of Primary Tumors with Orbital Metastases*

Reference	Orbital Metastases	Breast	Lung	GU	GI	Other
Henderson ⁴	56	21	10	4	2	19
Tijl et al. ¹⁹	34	20	1	7	1	0
Ferry and Font ¹⁸	28	8	4	4	1	10
Shields et al. ¹⁶	16	12	1	2	1	0
Reese ³	14	7	0	0	2	5
Hart ²⁵	10	5	5	0	0	0
Jensen ¹⁷	8	3	0	1	1	3
	166	76	21	18	8	37

*GU = genitourinary; GI = gastrointestinal

and bony resection during the operation. MRI added details about the proximity and involvement of vital soft tissue structures around the tumor, further delineating surgical margins (that is, orbital exenteration or intracranial resection).

DISCUSSION

A review of the literature reveals several large series of metastatic tumors to the eye and orbit. It should be emphasized that eye involvement by metastatic disease is much more common than orbital involvement.^{5,16-18} Ferry and Font¹⁸ presented 227 cases of eye and orbital metastases of which only 28 were confined to the orbit. Of the orbital metastases, the most common primaries are the breast, lung, and genitourinary tract, whereas the thyroid is the most common site in the head and neck^{3,4,18,19} (Table 2). A summary of these previously reported series reveals only six cases of 166 orbital metastases originating in the head and neck. Of these, four originated in the thyroid, and one each in the parotid and tonsil (Table 3). The pathologic diagnosis, location, treatment, or follow-up were not reported on any of these tumors.^{3,4,19}

There have been three reports of primary squamous

cell carcinoma originating in the orbit but none in the orbital apex²⁰⁻²² (Table 4). These cases may represent metastatic foci from an occult primary, although two were found to arise in an orbital cyst. Treatment of these consisted of radiotherapy alone in two and combined surgery and radiotherapy in one. The patient undergoing combined treatment was without disease at 6 years, and the other two died of disease within 2 years of diagnosis.

The frontotemporal craniotomy and superior apical orbitotomy is recommended for tumors confined to the orbital apex. The supraorbital modification of the frontotemporal craniotomy may improve exposure to this region but has not been used by the authors.^{9,10} The lateral approach or modified Kronlein procedure described by Berke²³ and Maroon and Kennerdell²⁴ does not provide adequate exposure to tumors extending posterior to the superior orbital fissure or deep into the cone.¹³

Mention should be made as to the etiology of these two cases. Is there microscopic perineural spread, hematogenous implantation, or did they arise from malignant transformation? Close attention to microscopic detail in the pathologic sections may better address these issues in future cases but both hematogenous and perineural spread may be implicated until this is answered.

CONCLUSION

The orbit and orbital apex are rare sites of metastases from head and neck primaries. Squamous cell carcinoma of the head and neck should be included in the differential diagnosis of orbital metastases from an occult primary site and appropriate directed biopsies should be performed. CT scan and MRI are helpful in diagnosing the site and extension of tumors in the orbital apex. There has

Table 3. Head and Neck Metastases to the Orbit

Reference	Thyroid	Parotid	Tonsil
Tijl et al. ¹⁹	1	0	0
Henderson ⁴	2	1	0
Reese ³	1	0	1
Day et al.	0	1	1
	4	2	2

Table 4. Primary Squamous Cell Carcinoma of the Orbit

Reference	Site	Origin	Treatment	Follow-up
Jones ²²	Superolateral	"Oil Cyst"	Radium	Died
Wright and Morgan ²⁰	Superolateral	"Orbital Cyst"	6000 cGY	Died at 2 years
Ruff et al. ²¹	Inferolateral	Primary	Surgery/5600 cGY	Alive at 6 years

been documented success with combined surgery and radiotherapy in the treatment of squamous cell carcinoma of the orbital apex, although radiotherapy may result in scarring and ocular symptoms, thus obscuring the diagnosis of recurrent tumor.

REFERENCES

1. Kotwall C, Sako K, Razack MS, et al: Metastatic patterns in squamous cell cancer of the head and neck. *Am J Surg* 154:439–442, 1987
2. Conley J: The risk to the orbit in head and neck cancer. *Laryngoscope* 95:515–522, 1985
3. Reese AB: *Tumors of the Eye*, 2nd ed. New York: Paul B. Hoeber, 1963, pp 509–560
4. Henderson JW: Metastatic cancer. In *Orbital tumors*. 2nd ed. New York: B.C. Decker, 1980, pp 451–471
5. Batsakis JG: *Metastatic Neoplasms to and from the Head and Neck*, 2nd ed. Baltimore: Williams & Wilkins, 1979, pp 240–251
6. Ferry AP, Font RL: Carcinoma metastatic to the eye and orbit I: a clinicopathologic study of 227 cases. *Arch Ophthalmol* 92:276–286, 1974
7. Font RL, Ferry AP: Carcinoma metastatic to the eye & orbit III: a clinicopathologic study of 28 cases metastatic to the orbit. *Cancer* 38:1326–1335, 1976
8. Osguthorpe JD, Saunders RA, Adkins WY: Evaluation and access to posterior orbital tumors. *Laryngoscope* 93:766–771, 1983
9. Maroon JC, Kennerdell JS: Surgical approaches to the orbit: indications and techniques. *J Neurosurg* 60:1226–1235, 1984
10. Johns ME, Kaplan MJ, Part TS, et al: Supraorbital rim approach to the anterior skull base. *Laryngoscope* 94:1137–1139, 1984
11. Long DM: *Clinical Neurosurgery*, pp 514–522
12. Leone CR, Wissinger JP: Surgical approaches to disease of the orbital apex. *Ophthalmology* 95:391–397, 1988
13. Osguthorpe JD: Surgical access to primary orbital tumors. *Otolaryngol Clin North Am* 21:135–153, 1988
14. Naffziger HC: Exophthalmus: some principles of surgical management from the neurosurgical aspect. *Am J Surg* 75:25–41, 1948
15. Housepian EM: Intraorbital tumors. In *Operative Neurosurgical Techniques: Indications, Methods & Results*. pp 227–244
16. Shields JA, Blakewell B, Augsburger JJ, et al: Classification and incidence of space-occupying lesions of the orbit: a survey of 645 biopsies. *Arch Ophthalmol* 102, 1606–1611, 1984
17. Jensen OA: Metastatic tumors of the eye and orbit. *Acta Pathol Microbiol Scand* 212:201–214, 1970
18. Ferry AP, Font RL: Carcinoma metastatic to the orbit. *Mod Probl Ophthalmol* 14:377–381, 1975
19. Tjil J, Koorneef L, Eijpe A, et al: Metastatic tumors to the orbit—management and prognosis. *Graefes Arch Clin Exp Ophthalmol* 230:527–530, 1992
20. Wright J, Morgan G: Squamous cell carcinoma developing in an orbital cyst. *Arch Ophthalmol* 95:635–637, 1977
21. Ruff T, Lewis A, Diaz JA: Atypical facial pain and orbital cancer. *Arch Otolaryngol* 111:1985
22. Jones AC: Oil cyst of the orbit with carcinomatosis. *Am J Ophthalmol* 18:532–535, 1935
23. Berke RN: A modified Kronlein operation. *Trans Am Ophthalmol* 51:193–231, 1953
24. Maroon JC, Kennerdell JS: Lateral neurosurgical approach to intraorbital tumors. *J Neurosurg* 4:556–561, 1976