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Case Report

A case of head and neck cutaneous squamous cell carcinoma highlighting aggressive perineural features [☆]

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ARTICLE INFO

Article history:

Received 27 April 2022

Revised 16 August 2022

Accepted 20 August 2022

Keywords:

Cutaneous squamous cell carcinoma (cSCC)

Facial paralysis

Skull base

Magnetic resonance imaging (MRI)

Perineural invasion

ABSTRACT

Cutaneous squamous cell carcinoma (cSCC) is the second most common nonmelanoma skin cancer in the United States following basal cell carcinoma. The majority are successfully cured by surgical excision or Mohs microsurgery. A subset of cSCCs are more aggressive and likely to recur locally, spread to regional lymph nodes or even distantly, and can even result in death. High-risk features of cSCC including perineural invasion of nerve >0.1 mm in diameter and invasion beyond the subcutaneous fat are not routinely reported by Mohs microsurgery. Facial cSCC commonly involves branches of the facial nerve (VII) or trigeminal nerve (V). Clinical symptoms associated with cranial nerve VII and V involvement include pain, paresthesia of the face and tongue, facial paralysis. Assessment of nerve involvement by magnetic resonance imaging (MRI) is the most optimal imaging modality. Here, we present a case where Mohs microsurgery was performed on a facial cSCC 1.5 years prior to the development of facial paresis. We aim to highlight the interesting perineural path resulting in facial paralysis and associated symptomatology, the importance of MRI, and to remind clinicians of important high-risk features of cSCC.

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Introduction

Cutaneous squamous cell carcinoma (cSCC) is the second most common nonmelanoma skin cancer in the United States following basal cell carcinoma. The majority are successfully

cured by surgical excision or Mohs microsurgery, but there are a subset of cSCCs that are at high risk for recurring locally, spreading to regional lymph nodes or even distantly [1]. cSCC is responsible for the majority of nonmelanoma skin cancer deaths.

[☆] Competing Interests: This case report did not result from any specific grant funding agencies in the public, commercial, or not-for-profit sectors. None of the authors have industry relationships to report.

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<https://doi.org/10.1016/j.radcr.2022.08.072>

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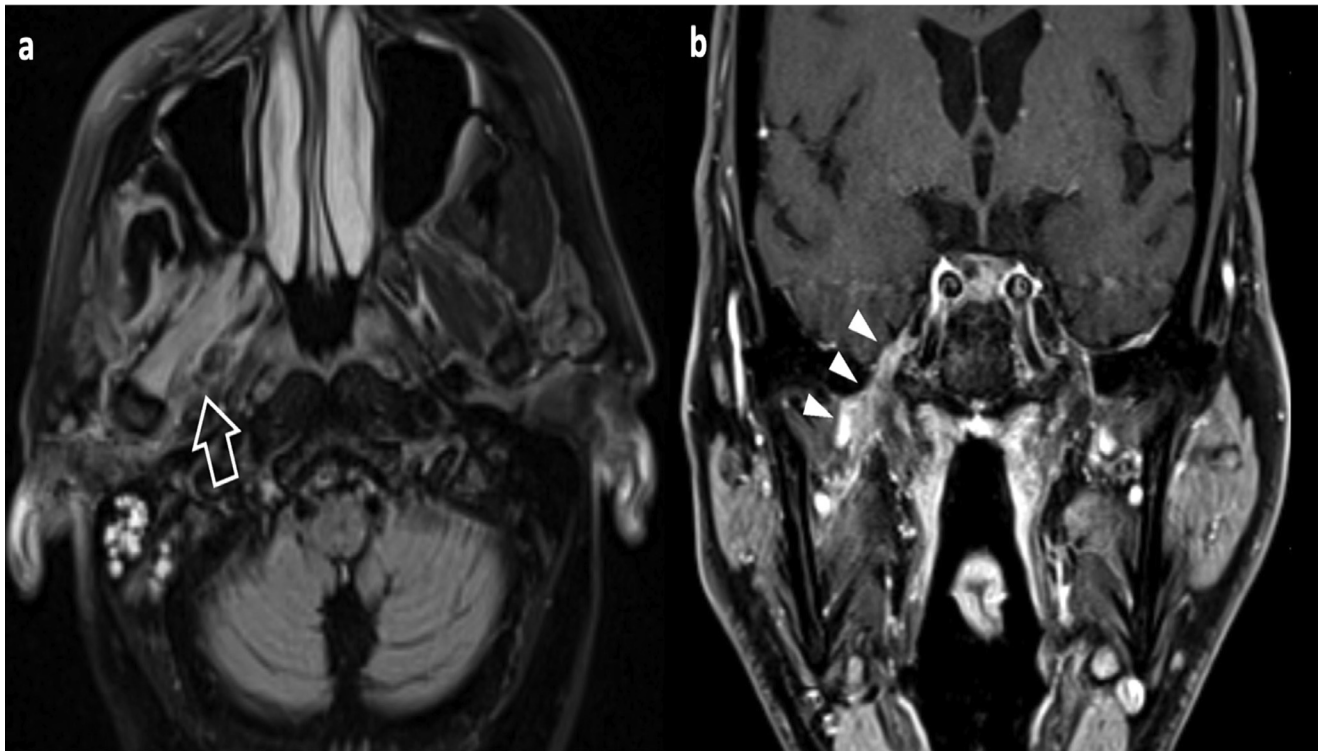


Fig. 1 – (A) T1 axial FLAIR MRI. Edema in the right muscles of mastication consistent with denervation of the trigeminal nerve. (B). T1 coronal fat-saturated gadolinium-enhanced MRI. Thickening and enhancement of the right mandibular nerve (V3) extending through the right foramen ovale consistent with perineural spread of disease via the auriculotemporal nerve.

The eighth edition of the American Joint Committee on Cancer made changes to address clinical and pathologic risk factors demonstrated to have increased risk for recurrence, lymph node metastasis, and disease-specific death. These factors are tumor diameter >2 cm, depth of tumor >6 mm, perineural invasion of nerves ≥ 0.1 mm or nerves situated deep to the dermis, poorly differentiated histology, and location on the ear or lip [2].

Perineural invasion reportedly increases the risk for lymph node metastasis by 35% and the risk for distant metastatic disease spread by 15%. The involvement of large caliber nerves also increases disease-specific mortality [3]. This case illustrates cSCC recurrence involving cervical lymphadenopathy and major nerves. The patient provided consent to share his case.

Case presentation

A 75-year-old male with a history of right facial pre-auricular cSCC removed by Mohs micro-surgery of reportedly 3 excisions 1.5 years prior to presentation now with 2-month complaint of right facial paresis. He also reported decreased facial sensation, sensation of right ear fullness and tingling of the right tongue. Physical examination demonstrated a right facial transversely oriented 2 cm length scar with no nodules visible or palpable, lagophthalmos, epiphora, and slight asymmetry of smile. There was a palpable 1.9 cm right neck mass

at level VA. The patient did provide a pre-Mohs micro-surgery photo that showed an approximately 2 cm lesion about 2.5 cm superior to the tragus. Magnetic resonance imaging (MRI) was obtained (Figs. 1 and 2). PET CT imaging was significant for increased metabolic activity in the right posterior neck. It did not identify any additional lymphadenopathy, distant metastatic disease, or other site of hypermetabolic activity. Fine needle aspiration of the right neck mass confirmed SCC.

Discussion

cSCC is one of the most common cancers worldwide, the majority occurring in the head and neck region [1]. Mohs micro-graphic surgery is preferred over wide local excision for maximal preservation of normal tissue and lower risk of recurrence due to comprehensive circumferential evaluation of all tumor resection margins [1]. A subset of patients with cSCCs exhibiting high-risk features however experience local recurrence, nodal metastasis and disease-specific death [1]. High-risk features of cSCC including perineural invasion of nerve >0.1 mm in diameter and invasion beyond the subcutaneous fat were present in our patient. Facial cSCC often results in direct invasion perineural spread in branches of the trigeminal and facial nerves [2]. Clinical symptoms associated with cranial nerve VII and V involvement include pain, paresthesia of the face and tongue, facial paralysis with lagophthalmos, and asymmetry of mouth at rest, which our patient demonstrated.

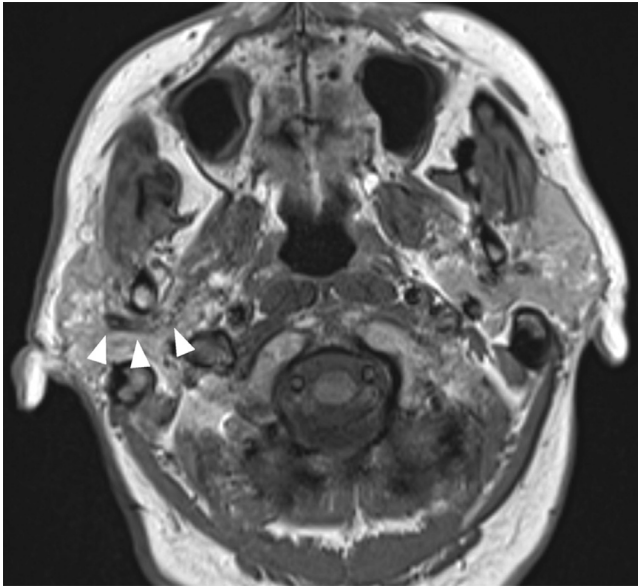


Fig. 2 – T1 axial MRI. Abnormal thickening of the right auriculotemporal nerve as it courses posterior to the mandible, best seen on this T1-weighted sequence without fat saturation as T1 isointense signal in contrast to the background of normal bright fat signal in the parotid gland.

In the early course of perineural invasion, spread is limited to smaller nerves in the reticular dermis, during which time, there is a lack of symptomatology. Therefore, patients may not present to clinic until perineural spread progresses to include larger nerve trunks causing symptomatic complications and a poorer prognosis [3–5].

In the present case, delayed nerve dysfunction over one year after Mohs excision of the primary cSCC led to imaging demonstrative of regional metastatic disease to the neck. Regional lymph node recurrence was ascribed after fine needle aspiration interpretation of nodal SCC, coupled with history of ipsilateral head and neck cSCC, and PET CT imaging showing no other potential primary site of cancer to spread to the lymph nodes. There was no evidence of intraparotid lymph node disease or disease at the stylomastoid foramen.

MRI images specifically displayed evidence of perineural spread to the auriculotemporal nerve tracking cranially to involve the facial nerve. Although contrast-enhanced computed tomography imaging is instrumental in evaluation of the primary site, lymph node involvement and bone structures, it often fails to portray perineural tumor spread. Prior studies have demonstrated, high resolution, contrast enhanced, multiplanar T1-weighted MRI imaging with fat suppression techniques yield the best information [4]. Thus, if a patient presents with possible perineural spread of cSCC MRI is recommended. MRI ultimately led to recognition of our patient's facial nerve paralysis in retrograde perineural spread of cSCC from the auriculotemporal nerve direct invasion by the original primary tumor to the facial nerve within the skull base. After parotidectomy and neck dissection demonstrating extracapsular extension of nodal disease, our patient subsequently

underwent adjuvant intensity-modulated radiotherapy (IMRT) to the primary site and regional nodal basin including the parotid and neck, stereotactic beam radiotherapy (SBRT) to the skull base following the auriculotemporal nerve course, with platinum-based chemotherapy. He required tarsorrhaphy to protect the eye during treatment and has undergone static reanimation surgery following post-treatment imaging demonstrative of no clinically evident disease now 1 year later.

Conclusion

While Mohs microsurgery is the most effective treatment of addressing cSCC, it is important to identify high-risk lesions. Mohs microsurgery often does not result in a detailed pathology report that describes aggressive features such as perineural invasion, for example. This interesting case highlights the utility of MRI imaging to demonstrate perineural invasion of the auriculotemporal nerve branch of Cranial Nerve V in retrograde fashion to the facial nerve resulting in facial paresis. Ultimately identification of nerve involvement at the skull base by MRI led to disease control after surgery with the ability to provide SBRT at this location.

Patient consent

The patient presented in this case report provided his written informed consent to share his clinical history, physical examination, diagnosis, treatment and interesting case discussion. Our patient is a retired orthodontist who hopes his case report will aid others in the medical community who manage cutaneous squamous cell carcinoma.

REFERENCES

- [1] Van Lee CB, Roorda BM, Wakkee M, Voorham Q, Mooyaart AL, de Vijlder HC, et al. Recurrence rates of cutaneous squamous cell carcinoma of the head and neck after Mohs micrographic surgery vs. standard excision: a retrospective cohort study. *Br J Dermatol* 2019;181:338–43.
- [2] Motaparathi K, Kapil JP, Velazquez EF. Cutaneous squamous cell carcinoma: review of the eighth edition of the American Joint Committee on Cancer staging guidelines, prognostic factors, and histopathologic variants. *Adv Anat Pathol* 2017;24(4):171–94.
- [3] Carter JB, Johnson MM, Chua TL, Karia PS, Schmults CD. Outcomes of primary cutaneous squamous cell carcinoma with perineural invasion. *JAMA Dermatol* 2013;149(1):35–41.
- [4] Bhat V, Devere J, Ramakrishanan A, Kuriakose MA. Perineural spread in squamous cell carcinoma of the face: an overlooked facet of information on imaging. *J Oral Maxillofac Surg* 2015;15(3):390–3.
- [5] Ruiz ES, Karia PS, Morgan FC, Schmults CD. The positive impact of radiologic imaging on high-stage cutaneous squamous cell carcinoma management. *J Am Acad Dermatol* 2017;76:217–25.