



## Case Report

# Management of a recurrence of a squamous cell carcinoma of the scalp with extension to the brain: A case report and literature review

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## ABSTRACT

**Background:** Squamous cell carcinoma (SCC) is the most common form of nonmelanoma skin cancer after basal cell carcinoma. Simple excision can be the treatment at early stages of diagnosis. However, at late stages, treatment is more complex due to extension to the skull and the dura. In extremely rare cases, it can invade the brain making it a challenging situation for treatment.

**Case Description:** We present the case of a 54-year-old man with a history of cutaneous SCC who presented an invasive left frontal recurrence with brain invasion 19 years after initial surgery. The patient underwent surgery which consisted in tumor removal and bone and skin reconstruction. Immediate and late outcomes were favorable.

**Conclusion:** Multidisciplinary treatment for SCC diagnosed in advanced stages is the best way to obtain encouraging results. Although significant advancements have been made, further study is needed for cases with advanced disease.

**Keywords:** Neural invasion, Prognosis, Skin carcinoma, Surgery

## INTRODUCTION

Squamous cell carcinoma (SCC) is the second most common subtype of nonmelanoma skin cancer representing 20% of these tumors.<sup>[10]</sup> The head-and-neck region is the most affected site for skin malignancies due to significant ultraviolet radiation exposure.<sup>[2,9]</sup> Many other risk factors for SCC have been identified including age, fair skin, history of skin cancer, actinic damage, and immunosuppression.<sup>[5,11]</sup> SCC prognosis is dependent on tumor size, location, differentiation, and the histological subtype. Skull and cranial invasion are rare among cutaneous malignancies.<sup>[22]</sup> Brain extension is uncommon.

## CASE PRESENTATION

A 54-year-old man presented with a history of a left frontal cutaneous cell carcinoma. The patient had surgical removal of the tumor followed by radiation therapy in 2000. He had no metastasis

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at that time. He was then lost to follow-up for more than a decade. He presented with a painful and ulcerated extensive left frontal cutaneous lesion which occasionally bled. The progressive growth of the lesion was neglected by the patient for years. Because of a rapid progression in the past 3 months, he consulted. No other symptoms were reported. Physical examination showed a 12 × 15 × 14 cm left frontal cauliflower-like mass with a necrotic center and peripheral subcutaneous induration with erythema [Figure 1]. There was no neurological impairment. CT scan showed destruction of the left frontal skull [Figure 2a]. MRI revealed extensive frontal dural induration with a cystic invasion of the left frontal lobe [Figure 2b and c]. The patient underwent surgical removal of the tumor. The invaded skin, bone, and dura were excised with a safety margin of 1 cm [Figure 3a]. The tumor that invaded the cortex was then removed. Fascia lata muscle was used for dural reconstruction and cement for frontal bone reconstruction. Cutaneous reconstruction was performed using a scalp graft and free thigh flap transfer [Figure 3b and c]. Pathological examination revealed invasive SCC with negative margins. Three months after surgery, the grafts had completely healed [Figure 3d]. Local radiation therapy was then performed. Clinical follow-up showed no evidence of recurrence 2 years after surgery.

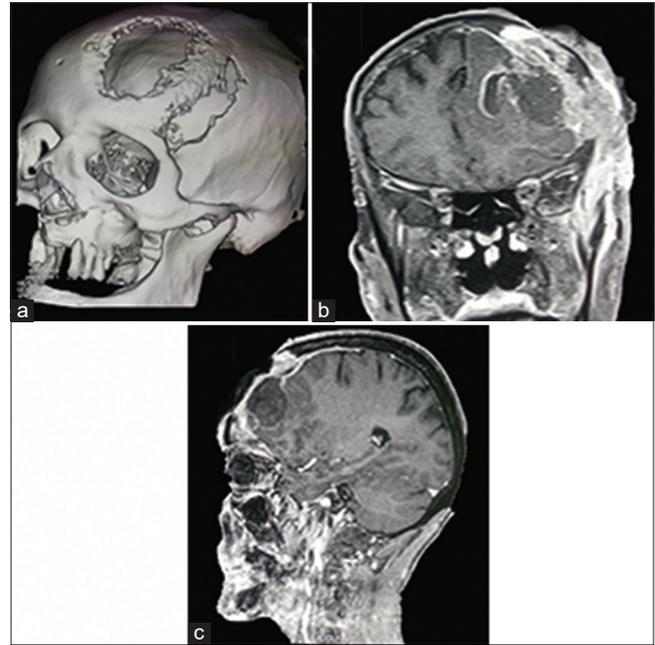
## DISCUSSION

SCC is the second most common subtype of nonmelanoma skin cancer after basal cell carcinoma. Due to their progressive and slow extension, these tumors are usually diagnosed before extension to the skull. However, in late stages of development, the skull and the dura can be invaded. In very few cases, SCC can extend to the brain. PubMed/MEDLINE search using the keywords squamous cell, carcinoma, scalp, and brain, found 16 similar cases with brain invasion [Table 1].<sup>[1,6,7,9,15-18,22,23]</sup> In such situations, patients can develop neurological symptoms.



**Figure 1:** A massive left frontal cauliflower-like squamous cell carcinoma with central necrosis and peripheral erythema.

<sup>[7]</sup> The standard treatment of SCC is clear margin excision. However, this is not always possible, especially in the scalp due to anatomical restrictions. Despite the challenge, invasive



**Figure 2:** (a) Preoperative 3D reconstruction CT scan showing the destruction of the left frontal bone. Coronal (b) and sagittal (c) T1-weighted MRI sequence with contrast agent showing invasion of the dura and the left frontal lobe.



**Figure 3:** (a) Total excision of the tumor and its extension to the bone, dura, and brain. (b and c) Use of local skin graft with free skin transfer to cover the large skin defect. (d) Postoperative result 3 months after surgery.

**Table 1:** Literature on SCC with extension to the brain.

Study	Patients	Age (years)	Gender	Localization	Neurological deficit	Treatment	Follow-up
Moffat <i>et al.</i> , <sup>[15]</sup> 1997	5	N/A	N/A	N/A	N/A	Surgery	3 dead out of 5
Gupta <i>et al.</i> , <sup>[7]</sup> 2005	1	50	Female	Right parietal	Left hemiparesis	Surgery	Dead
Etlik <i>et al.</i> , <sup>[6]</sup> 2005	1	15	Female	Left frontal	Right hemiparesis	No treatment	Dead
Horch <i>et al.</i> , <sup>[9]</sup> 2005	1	63	Male	Left frontal	No deficit	Surgery, radiotherapy, and chemotherapy	Dead
Sedira <i>et al.</i> , <sup>[17]</sup> 2006	1	N/A	N/A	N/A	N/A	Surgery	N/A
Sengul <i>et al.</i> , <sup>[18]</sup> 2009	1	64	Male	Medial frontoparietal	Left hemiparesis	Surgery	Dead
Neubauer <i>et al.</i> , <sup>[16]</sup> 2010	1	48	Male	Parietal medial	No deficit	Surgery and radiotherapy	N/A
Wollina <i>et al.</i> , <sup>[22]</sup> 2011	1	67	Male	Frontal	No deficit	Surgery and radiotherapy	N/A
Agrawal <i>et al.</i> , <sup>[11]</sup> 2015	1	18	Male	Medial frontoparietal	No deficit	Surgery	Dead
Wollina <i>et al.</i> , <sup>[23]</sup> 2019	3	80	Male	Right parietal	No deficit	Palliative	N/A
		83	Female	Medial occipital	No deficit	Palliative	N/A
		67	Male	Medial frontal	No deficit	Surgery	Dead (traffic accident)

N/A: Data not available

cutaneous malignancies of the scalp can be successfully treated in many instances with proper excision and management. To establish a clear treatment strategy, preoperative imaging is crucial for defining the extent of invasion. CT and MRI are complementary.<sup>[1,15,16]</sup> CT is more accurate for identifying bony invasion, while MRI detects better dural and brain involvement.<sup>[23]</sup> After excision, reconstruction of large scalp defects is a challenging endeavor and is best approached with a multidisciplinary team. Local flaps should be used to cover full-thickness scalp defects and for those involving the calvarium, free tissue transfer should be considered.<sup>[3,22,23]</sup> Combined efforts from a neurosurgeon and a plastic surgeon are necessary to allow safe tumor excision and adequate flap reconstruction of the defect.<sup>[18,20]</sup> Lang *et al.* suggested that postoperative radiation be employed as a result of multiple cases of satellite lesions leading to recurrence, even after being cleared by Mohs surgery.<sup>[13]</sup> Multidisciplinary care is reported to be important for SCC in its different locations; Liao *et al.* compared two subgroups of patients on the fact that they had multidisciplinary care or not, overall survival rate and recurrence free survival were significantly higher for the first group.<sup>[14]</sup>

Recurrence factors are more common in patients who are immunosuppressed, as well those who have tumors with perineural invasion, poor differentiation, deep extension, and those of large size.<sup>[12]</sup> Clear excision margins is also reported to be a recurrence free factor as reported by Tan *et al.*<sup>[19]</sup> Prognosis

of SCC of the scalp is similar to that of SCC at other cutaneous areas of the body. However, the extent of dural invasion is an indicator of poor prognosis. van Tuyl and Gussack have reported in a retrospective review that patients who had dural involvement had 22% survival rate after 3 years whereas those without dural involvement had a survival rate of 83%.<sup>[21]</sup> Local and regional relapse rate is not clearly estimated, it varies from a series to another from 4% to 15%.<sup>[2,4]</sup> Recurrence seems to occur in short- and mid-term delays, Estall *et al.* and all noticed no long-term recurrence in their 235 case series.<sup>[5]</sup>

Death rate due to this tumor seems to be low, Estall *et al.* reported 59% of overall survival and 94% of disease specific survival which suggests that only a small proportion died specifically because of their tumor, age comorbidities were responsible of most deaths.<sup>[4]</sup>

## CONCLUSION

Treating a SCC can be challenging when diagnosed at an advanced stage. A multidisciplinary team is needed to perform a delicate surgery. Although significant advancements have been made, further study is needed for cases with advanced disease.

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### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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### Conflicts of interest

There are no conflicts of interest.

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