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Case report

Basal cell carcinoma of the scalp with destruction and invasion into the calvarium and dura mater: Report of 7 cases and review of literature

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ABSTRACT

Basal cell carcinoma (BCC) is the most common skin malignancy in humans. Giant BCC is a rarer entity that is characterised by aggressive biological behaviour. Intracranial invasion by a BCC on the scalp is extremely rare. The gold standard treatment of BCCs is represented by surgical excision with a wide variety of reconstructive techniques. In this paper, we describe the largest series to date of recurrent BCCs with intracranial extension involving the dura mater. We report recurrent giant BCC of the scalp with dura mater invasion in 7 patients. All patients in this series previously had more than 2 operations. Gadolinium-enhanced MRI revealed neoplastic invasion of the meninges and brain tissues. All patients had a multi-disciplinary team approach with the surgical margins ranging between 1 and 2 cm depending on the location and the size of the tumour. 5 of the patients underwent reconstruction of the skin defect by antero-lateral thigh flap, 1 patient underwent reconstruction with pedicled myocutaneous (trapezius) flap, and 1 with a pedicled myocutaneous latissimus dorsi flap. There was a mean follow-up of 5.3 years. 2 patients died due to cardio-pulmonary complications in the neuro-intensive care unit. A multi-disciplinary team approach and early aggressive tumour resection followed by sophisticated reconstructive and aesthetic procedures appears to be a reliable and realistic treatment modality for invasive BCC.

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1. Introduction

Basal cell carcinoma (BCC) is the most common skin malignancy in humans. It is usually slow growing with limited ability to invade adjacent structures, or to metastasize. Intracranial invasion by a BCC on the scalp is extremely rare. Giant BCCs by contrast, is a rarer entity that is characterised by aggressive biological behaviour, deep tissue invasion with infiltration of the dermis and involvement of extradermal structures such as bone, muscle and cartilage [1]. Almost 90% of BCCs occur on the head and neck, and have a low mortality rate (<0.1%) and complete resection of these tumours is curative in most cases, but when large in size, and invading deep structures, can be very challenging to treat [2,3]. Giant and recurrent BCCs frequently require aggressive surgi-

cal resection, which often creates difficulties with reconstruction [4].

Only a handful of single case-reports exist on BCCs of the scalp with direct intracranial extension as seen in Table 1 [5–13]. Of these only one study reports a known survivor. We present the largest series to date of 7 patients that have had previously operated, recurrent BCCs with intracranial extension involving the dura mater. We present the longest mean follow-up of 5 years amongst the 5 surviving patients having normal post-operative states and no recurrences (2 of 7 died of medical complications unrelated to tumour invasion) as seen in Table 2. These patients required complex surgical management, requiring a multi-disciplinary surgical approach involving neurosurgery, plastic surgery, and ENT surgery. In this study, we report a unique case-series of 7 patients with BCC of the scalp with direct intracranial extension, with improved clinical benefit without any complications following careful planning of the most feasible reconstructive procedure.

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Table 1
Reported cases of BCC with direct intracranial extension.

Author	Age	Gender	Location	Size of Tumour (cm)	Extent of invasion	Treatment	No. of operations	Outcome	Follow up
Mikhail [5]	63	F	Left parieto-occipital scalp	15 × 15	Dura	Excision with drafting	1	Alive	4 years
Parizel [6]	82	M	Scalp, vertex	8 × 10	Cerebral cortex	Excision with grafting	1	Dead	11 months
Long [7]	48	M	Occipital scalp	Unknown	Cerebellum	Trapezius and pectoralis major flaps	4	Dead	3 years
Ko [8]	61	M	Frontoparietal scalp and face	17 × 12	Cerebral cortex and lateral ventricle	Unknown	Unknown	Dead	3 weeks
	70	F	Frontal scalp, eyes, nose	20 × 15	Cerebral Cortex	Unknown	Unknown	Dead	4 years
Schroeder [9]	47	F	Left frontoparietal scalp	Unknown	Cerebral cortex	Excision with grafting	2	Dead	3 years
Gormley [10]	36	M	Occipital scalp	1.8 × 1.2	Dura	First excision and inoperable recurrence	2	Unknown	Unknown
Kovarik [11]	57	F	Right frontal and temporal scalp, left orbit, zygomata and ear	Unknown	Dura	None	0	Dead	On presentation
Bouwman [12]	69	M	Bilateral frontal scalp	15 × 15	Dura	Latissimus dorsi flap	1	Unknown	Unknown
Kleydman [13]	87	F	Nasal bone	6.3 × 4.1	Spinal canal	Nasal reconstruction with lining flaps, cartilage grafts and a forehead flap	2	Dead	6 years

Table 2
Current case series.

Case	Age	Gender	Location	Dural defect (cm)	Size of tumour (cm)	Metastasis	Reconstruction	No. of operations	Outcome	Follow up
1	75	F	Posterior scalp	7 × 7	8 × 8	No	Trapezius	2	Alive	4 years
2	80	F	Anterior scalp	3 × 3	4 × 2	No	ALT	5	Alive	7 years
3	57	F	Left parietal	10 × 10	14 × 12	No	ALT	4	Dead	5 years
4	88	F	Left frontal	5 × 8	10 × 9	No	ALT	6	Dead	8 years
5	57	M	Neck	3 × 2	13 × 13	Yes	ALT	3	Alive	4 years
6	76	F	Crown	5 × 5	12 × 10	No	Latissimus dorsi, then trapezius	3	Alive	6 years
7	67	M	Behind left ear	3 × 3	5 × 5	No	ALT	3	Alive	3 years

ALT – antero-lateral thigh.

2. Subjects and methods

2.1. Case 1 – Ulcerative lesion involving the left posterior scalp region and reconstruction with pedicled myocutaneous trapezius flap

A 75 year-old female, presented with a complaint of an invasive, non-healing ulcerative lesion involving her posterior scalp region. 7 years prior, she underwent a resection of a BCC and skin reconstruction. The lesion was biopsied at re-presentation, with histology revealing nodular BCC. Radiological investigation showed bone, muscle and dura mater invasion (Fig. 1). The skin lesion was excised with a 1 cm margin; the infiltrated muscles and occipital bone were then removed. The affected area of dura was excised and the defect repaired with a 7 × 7 cm duraplasty from facia lata. The skin defect was repaired using an 11 × 11 cm pedicled trapezius muscle flap.

2.2. Case 2 – Ulcerative lesion involving the paramedian anterior scalp region and reconstruction with an antero-lateral thigh flap

An 80 year-old female, initially presented 18 years prior with a non-healing ulcerative lesion involving her anterior scalp region. 6 years later, she was diagnosed with a BCC, and underwent 5 operations and 5 courses of chemotherapy. Despite this, the tumour continued to progress, with radiological studies showing invasion of the bone and dura (Fig. 2). Skin, bone and dura mater lesions

were removed with the patient undergoing a duraplasty and cranioplasty. The defect was reconstructed by an antero-lateral thigh (ALT) flap.

2.3. Case 3 – Ulcerative lesion involving the left parietal scalp and reconstruction with a pedicled latissimus dorsi flap

A 57 year-old female was diagnosed with BCC 4 years prior to presentation, having underwent 2 operative procedures. She re-presented with a non-healing ulcerative lesion involving the left side of her scalp. Imaging studies showed invasion of the parietal bone and dura (Fig. 3). Skin, bone, dural lesions were removed, and the damaged parietal lobe was decorticated. Duraplasty was undertaken with a facia lata graft. Soft tissues were reconstructed by means of a pedicled latissimus dorsi flap and skin was reconstructed with an ALT flap.

2.4. Case 4 – Lesion involving the left frontal bone with eyebrow arch and superior orbital wall without invasion into the globe

A 66 year-old female, had undergone an excision of a left frontal sebaceous cyst 24 years previously. The lesion re-presented, and was non-healing. Following biopsy, a diagnosis of BCC was made, which was surgically removed, with postoperative radiotherapy. Despite this, the tumour progressed and radiological investigations showed skin, bone and dura mater invasion, with further tumour

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