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Case Report

Basal Cell Carcinoma Surgery: Simple Undermining Approach in Two Patients with Different Tumour Locations

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Abstract

Basal cell carcinoma (BCC) is the most common human malignancy, accounting for the majority of all non-melanoma skin cancers (NMSC). In the past several decades the worldwide incidence of BCC has constantly been increasing. Even though it is a slow growing tumour that, left untreated, rarely metastasizes, it has a distinctive invasive growth pattern, posing a considerable risk for local invasion and destruction of underlying tissues, such as muscle, cartilage, bone or vital structures. Advanced BCCs include such locally invasive or metastatic tumours. Complete surgical excision is the standard therapy for most uncomplicated BCC cases with good prognosis and cure rates. Treatment of advanced forms of BCCs poses significant therapeutic challenges, most often requiring complicated surgery, radiotherapy, and/or targeted therapies directed towards the sonic hedgehog signalling pathway (SHH). We present two cases of large BCCs located on the scalp and posterior thorax, which underwent surgical excision with clear margins, followed by reconstruction of the defect after extensive undermining of the skin.

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Introduction

Basal cell carcinoma (BCC) is the most common human malignancy, accounting for the majority of non-melanoma skin cancers, with worldwide incidence rates increasing at least 2-3 fold in the past few decades [1,2]. It is a slow growing tumour with metastatic incidence rates ranging between 0.0028–0.55% [3]. However, in some cases, these tumours display a locally invasive growth pattern that poses a considerable risk of destruction of underlying cartilage, bone, or vital structures. Most BCCs develop in sun exposed areas of fair skinned individuals, mainly on the head and neck, and less frequently on the trunk and limbs [4, 5]. Besides

cutaneous phototype and exposure to UV radiation, other risk factors known to favor the development of BCC include genetic traits (including xeroderma pigmentosum, epidermodysplasia verruciformis, albinism, Gardner's syndrome, a familial history of skin cancer, or DNA repair deficiencies leading to chromosomal instability), immunosuppression, repeated cutaneous trauma, or exposure to ionizing radiation or other environmental carcinogens (e.g. arsenic, alkylating agents, polycyclic aromatic hydrocarbons) [6-8].

We present two cases of BCCs located on the scalp and posterior thorax, managed by complete surgical excision, followed by reconstruction of the resulting defect after extensive undermining of the skin. This technique allowed for subsequent direct closure with simple sutures and an acceptable cosmetic outcome.

Case report #1 - Scalp BCC

An 86 year-old male was presented to the dermatology department for the diagnosis and treatment of a cutaneous tumour located on his scalp, which had been present for more than two years. The patient reported accelerated enlargement of the skin lesion within the last three months, associated with local pruritus and pain, and denied any treatment or medical attention before presentation. His medical history was positive for glaucoma, while the family history was unremarkable for skin cancer or other significant dermatological conditions.

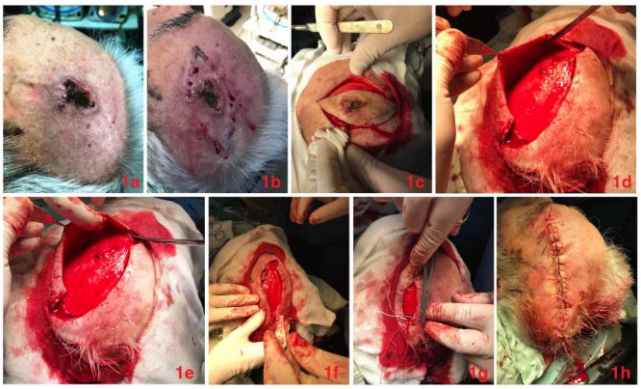

Figure 1: 1a) Cutaneous lesion on the frontoparietal region of the scalp; 1b) Preoperative excision markings with wide margins, bleeding and edema from infiltration of local anesthetic; 1c) Tumour is partially excised showing depth of the excision to the pericranium; 1d-e) Primary surgical defect is extensively undermined in all directions to allow for coaptation of the wound edges; 1f-g) Placement of simple interrupted non-absorbable sutures for scalp defect closure; 1h) Scalp defect is completely reconstructed, ready for antiseptic dressings

Clinical examination revealed a relatively well demarcated, oval shaped cutaneous tumour located on the scalp, featuring a "rolled border" and central ulceration covered by a serosanguinous crust - features consistent with those of basal cell carcinoma (Fig. 1a). Palpation of the submandibular, axillary, preauricular and occipital lymph nodes did not demonstrate enlargement or painful masses. No abnormalities were detected on chest x-ray. Concerning disease progression and invasion, an x-ray of the calvaria did not show any bone involvement. On abdominal ultrasound, prostate hyperplasia, multiple bladder diverticula and a single 1.4 cm cyst of the left kidney were discovered.

After obtaining informed consent from the patient, an elliptical surgical excision of the scalp lesion was performed under local anaesthesia with 2% lidocaine and epinephrine (Fig. 1b–h). The extensive undermining of the post-excisional wound edges was conducted (Fig. 1d-e), followed by primary defect closure by placement of interrupted non-absorbable sutures (Fig. 1f-h) and application of antiseptic dressings. Perioperative antibiotic prophylaxis was performed with administration of 2 grammes of Ceftriaxone q.d. for five days. The patient was discharged with instructions for wound-care and follow-up for suture removal; his postoperative course was devoid of complications. The subsequent histopathological evaluation confirmed the diagnosis of basal cell carcinoma of the scalp. No evidence of metastatic spread was found with imaging procedures or by laboratory blood tests.

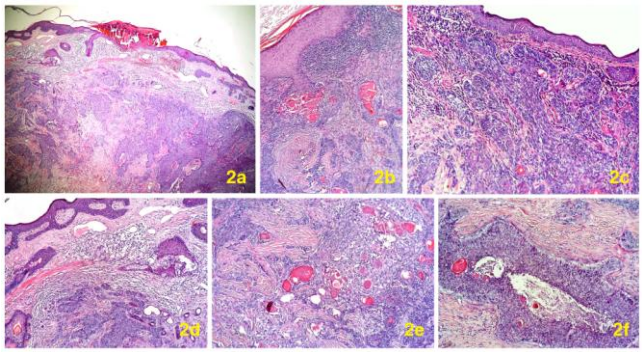

Figure 2: 2a) large dermal tumor; 2b) focal connections between tumor cells and the epidermis; 2c) nodular masses of basaloid neoplastic cells with hyperchromatic nuclei, nuclear pleomorphism, scanty cytoplasm and peripheral palisading of nuclei; 2d) areas of infiltration composed of strands and chords of tumor cells that invade the dermal structures; 2e) foci of abrupt keratinization within some tumor islands; 2f) central necrosis with pseudo-cystic changes

Histopathology: Histopathological examination showed a large dermal tumour (Fig. 2a), focally connected to the epidermis (Fig. 2b), consisting of nodular masses of neoplastic basaloid cells with hyperchromatic nuclei, nuclear pleomorphism, scanty cytoplasm and the peripheral palisading of nuclei typical of basal cell carcinoma (Fig. 2c). There were areas of infiltration composed of strands and chords of tumour cells that invaded the dermal structures (Fig. 2d), as well as numerous foci of abrupt keratinization in the middle of some tumor islands (Fig. 2e). In some areas, there was a cleavage between the tumour cells

and the adjacent fibrous stroma, with mucinous degeneration, and the larger tumour islands showed central necrosis with pseudo-cystic changes (Fig. 2f). These findings were considered typical for a large nodular basal cell carcinoma with infiltrative areas, mucinous stromal degeneration and foci of keratinization.

Case report #2 - Posterior trunk BCC

A 73-year-old male presented to the dermatology department with a large cutaneous tumour located on his posterior trunk that had been slowly growing for more than ten years. The patient denied any treatment or medical attention before the presentation. The patient's medical history revealed previous coronary bypass surgery. At the time of admission, he had been taking a daily dose of acetylsalicylic acid (ASA) as a preventative therapy, which before surgery was replaced with 0.6 ml subcutaneous nadroparin calcium twice daily. On examination, the tumour was located on the left posterior upper trunk. The skin lesion was well marginated, pinkish-grey in colour, with an eroded surface and focal bleeding (Fig. 3a).

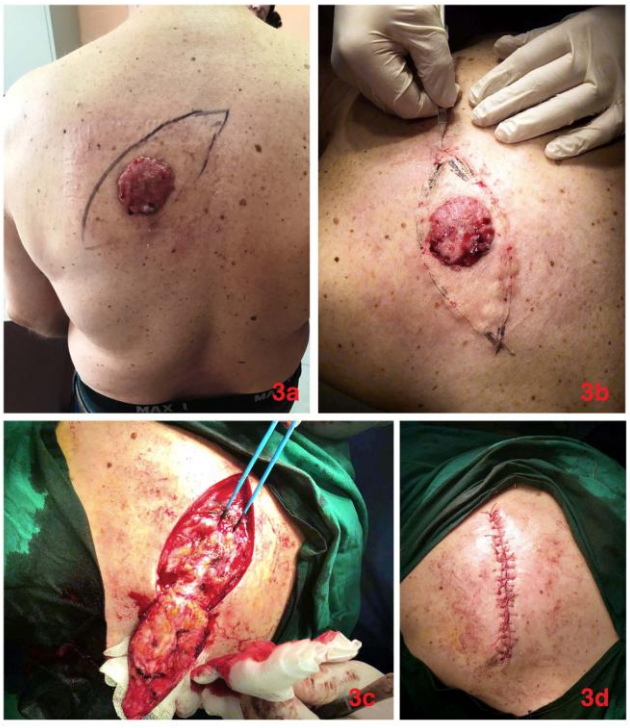

Figure 3: a) Skin lesion on the left posterior upper-trunk region; b) Preoperative excision markings, bleeding and oedema from local anaesthetic infiltration; c) Tumour is partially excised, showing substantial bleeding and performance of electrocautery hemostasis; d) Primary surgical defect is completely reconstructed, ready for antiseptic dressings

No regional lymphadenopathy could be identified by clinical examination. Considering the long duration and morphology, a provisional diagnosis of basal cell carcinoma was made.

Chest x-ray and lymph node ultrasonography of the axillary and inguinal lymph nodes did not show any evidence of disease progression or tumour spread. Abdominal ultrasonography revealed morphologic findings consistent with pyelonephritis and light hydronephrosis and urology and nephrology consults were requested. Informed consent was obtained from the patient before surgery. The upper-trunk skin lesion was then surgically excised in an elliptical manner with wide margins under local anaesthesia with 2% lidocaine and epinephrine (Fig. 3c). Substantial intraoperative bleeding was encountered, and electrocoagulation was employed. Following rigorous hemostasis, the extensive undermining of the wound edges in all directions was performed to allow for direct wound closure. The surgical defect was first approximated using absorbable subdermal sutures followed by placement of simple interrupted non-absorbable sutures (Fig. 3d), and application of antiseptic ointment wound dressings. Postoperative antibiotic prophylaxis consisted of Clarithromycin 500 mg q.d. for ten days. There were no postoperative complications, and the patient was discharged with instructions for daily wound care. Follow-up visits were scheduled, and all sutures were removed at day twenty post-operatively.

Histopathology: The tumour consisted of tightly packed large dermal nodules and interconnecting strands of basaloid cells with monomorphic nuclei, scanty cytoplasm and peripheral nuclear palisading. The majority of tumour nodules showed central cystic degenerative changes and pseudo-glandular spaces with mucinous contents (Fig. 4a-c).

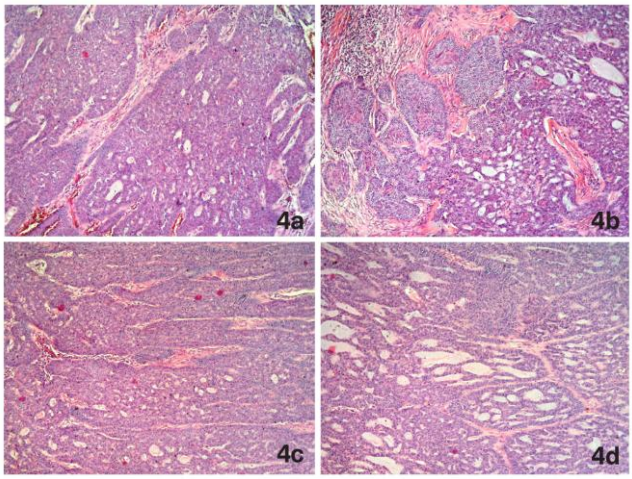

Figure 4: a-c) central cystic degenerative changes and pseudo-glandular spaces with mucinous content; d) cribriform pattern with some resemblances to adenoid cystic carcinoma

Some of these areas resembled the cribriform pattern usually associated with adenoid cystic carcinoma (Fig. 4d). These features were typical for a large nodular basal cell carcinoma with cystic change, sometimes referred to as adenoid basal cell carcinoma.

Discussion

The main molecular alterations responsible for the development of BCCs include the activation of the sonic hedgehog signalling pathway caused by acquired mutations in the PTCH and SMO genes [9] and also mutations in P53 and melanocortin-1 receptor genes [10, 11]. Standard therapy for the majority of BCCs is complete surgical excision, with good prognosis and cure rates. However, advanced BCCs, comprising locally advanced lesions and tumours with metastatic spread, pose significant therapeutic challenges and are, most often, difficult to treat. Advanced BCCs management is complex, requiring complicated surgery, radiotherapy or targeted therapies directed towards sonic hedgehog signalling pathway (SHH), either alone or in combination [12, 13].

Tumour size and location, the patient's general condition, and the physician's experience with particular therapeutic modalities are key considerations. Undermining plastic surgery has proven to be a good alternative to complex grafts or flaps for the treatment of selected cases of locally advanced BCCs, with the advantage of being less traumatic, allowing for good intraoperative control of clinical margins and good esthetic results [14]. Basal cell carcinoma is the most frequent cutaneous neoplasm worldwide. "Advanced" BCC, though a loosely defined term, comprises locally advanced and metastatic tumours. In a systematic review of the literature, Archontaki *et al.* (2009) analysed clinical and paraclinical data of 51 patients diagnosed with giant BCCs [15]. These investigators found a higher incidence of giant BCCs among elderly males aged between 60-70 years old. Tumours developed over a mean period of 14.5 years; they were located mostly on sun-exposed areas, primarily on the back, followed by the face and upper extremities, and with an average diameter of 14.77 cm [15]. Histopathologic examination revealed a predominance of the nodular BCC subtype [15]. There was a very high rate of post-interventional complications, including local recurrences or metastases in 38.3% of cases [15]. Mohs micrographic surgery is currently considered the gold standard therapy for advanced BCCs, followed by wide surgical excision with complete control of tumour margins. Metastatic BCC now has an improved prognosis due to the discovery of targeted therapies directed towards signalling pathways like a sonic hedgehog, including the international availability of new drugs such as vismodegib and sonidegib [16, 17]. Recent research has shown that, even though therapy with hedgehog inhibitors is not always curative for extensive BCCs, when used in conjunction with surgical treatment, it can significantly decrease the morbidity associated with surgical therapy while increasing the chances of obtaining complete resections [20]. Basal cell carcinoma of the trunk accounts for approximately 10 % of all BCCs [18], while those of the scalp region tend to be less common, with incidence rates of 2.6% [19]. Large tumour size and perineural invasion are associated with aggressive subtypes, and incomplete excision rates seem to be higher in such cases [19]. Therefore, Mohs micrographic surgery or standard surgical excision with wide margins is the best treatment options in advanced forms of BCC.

In conclusion, undermining or extendable plastic surgery is a simple surgical approach with proven benefits concerning closing-tension of skin defects, especially in the scalp region. Published data confirm the fact that undermining can decrease tension at the wound margins, allowing good intraoperative control of these margins with diminished trauma when compared to more elaborate plastic surgical procedures and with potentially better results [14, 21].

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