Key Clinical Topics in Plastic & Reconstructive Surgery

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Basal cell carcinoma

Approximately 30 different types of skin cancer exist, of which 99% comprise BCCs, SCCs and melanomas. BCC is the most common malignancy in Caucasians. The incidence ranges from 700 per 100,000 in Australia to 2–3 per 100,000 in Hong Kong. The UK and US share a similar incidence of 100–200 per 100,000. The causes have been attributed to sun exposure, racial predilection and composition, as well as lifestyle. The incidence is increasing by up to 10% per year worldwide. It is more common in males but the proportional incidence in females is rising.

The term basal cell carcinoma is a misnomer. BCCs do not arise from the epidermal basal cells but instead from the pluripotent cells of the pilosebaceous adnexa. This accounts for the occasional appendiceal differentiation in these tumours. BCCs are most common on the face (75% on face, of which 25% are on the nose) where cumulative sun exposure is highest. The lesion is generally slow growing, but is locally destructive. The classical features (of the nodular type or rodent ulcer, see below) are raised pearly edges and telangiectasia with or without central ulceration. The picket fence pattern is the classical histological finding, depicted by undifferentiated cells in nodules with peripheral palisading.

Early BCCs may be mistaken for trichoepitheliomas in appearance. Trichoepitheliomas may be differentiated by their predominant midface location and tend to be <1 cm in diameter, multiple in nature and may display an autosomal dominant inheritance pattern.

Dermatoscopes are magnifying devices that allow an optimal view of skin lesions. They utilise non-polarised or cross-polarised light with an intervening liquid medium (usually oil) to reduce glare, resulting in an improved image. Newer devices do not require an oil medium. The dermatoscopic features of BCCs may include:

- Minor degrees of ulceration that were not obvious on clinical examination
- Arborising telangiectasia
- Spoke-wheel areas

As a rule of thumb, BCCs do not metastasise. While an exceptionally small number that have been documented to do so, it is so rare that the diagnosis must be questioned in the presence of metastasis.

There are a large number of morphological subtypes of BCC. The most clinically relevant are as follows:

- Nodular: This is the most common. A combination of nodular growth and ulceration lead to the classical appearance. Nodular BCCs may be pigmented, often unevenly, and may be misdiagnosed as malignant melanoma. The pigmentation is caused by phagocytosis of apoptotic tumour cells that are laden with melanosomes. Pigmented BCCs are more common in darker-skinned races (>75% in Chinese, <5% in Caucasians)
- Superficial: These are most common on the trunk. The lesions are red, scaly and may bear small ulcers. They are easily mistaken for eczema or psoriasis. Islands of normal-looking skin are common within the affected area but true multifocality is rare
- Infiltrative lesions come in two forms:
  - Morpheaform/sclerosing: An intense fibrotic reaction produces a scar-like lesion with ill-defined margins. They can spread locally without causing elevation. They constitute 5% of all BCCs and have an overall incomplete excision rate of up to a third.
  - Non-morpheaform: There is little fibrosis and these lesions are often difficult to see
- Basosquamous lesions are relatively rare and behave more like SCC in terms of growth rate and metastatic potential

Risk factors

- Sun exposure: UVB causes DNA damage (p53 tumour suppressor gene at 9q22). The strongest association is seen with repeated sunburn in childhood. It causes field effect damage. There is a 50% increased risk of

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developing a further BCC after the initial, in the subsequent 5 years. PUVA treatment for psoriasis is a modest risk factor
- Immunosuppression: There is a 10-fold increased risk for BCC in transplant patients, with 50% occurring in the first 5 years. The highest relative risk increase however, is for Kaposi sarcoma at >200-fold, but the condition has an exceedingly low population incidence
- Carcinogens such as aromatic hydrocarbons and arsenic. While rare, arsenic causes multiple superficial BCCs
- Irradiation
- Genetic conditions such as xeroderma pigmentosum and Gorlin syndrome. The latter is autosomal dominant and is caused by PTCH gene mutation on chromosome 9q, resulting in altered sonic hedgehog (SHH) signalling. SHH inhibition is the subject of current salvage medical therapy for BCC in candidates unsuitable for surgery and radiotherapy. Patients with Gardner syndrome (SOD) have soft tissue tumours such as BCCs, osteomas and dermoids
- Pre-existing sebaceous naevus of Jadassohn. This is a congenital hamartoma that is reported to have a 10–20% risk of malignant change. However, most of the lesions previously attributed to BCC were actually benign trichoblastomas. A recent French series quotes a transformation risk nearer to 1%

Treatment

Surgical excision is the standard curative treatment. The BAD/BAPRAS BCC guidelines quote a cure rate proportional to the margins taken. For non-infiltrative BCCs, the cure rates are:

- 3 mm = 86%
- 4 mm = 94%
- 5 mm = 96%

While following such margins in non-cosmetically sensitive areas are not an issue, the bulk of BCC excisional work of the plastic surgeon will be in areas that are. The crucial factors to consider are:

- The structures sacrificed with a larger margin
- The structures sacrificed with recurrence
- The expected frequency of recurrence

By using the location of the BCC, its potential anatomical extensions, the histological subtype and cosmetic unit understanding, a particular margin can be reasonably justified. It is important to realise that the cosmetic unit principle may actually favour a larger margin than that recommended for cure. In these cases, the higher cure rate is an added bonus. Moh's surgery may be a suitable alternative if tissue conservation is paramount. However, it is equally paramount to consider the need for temporising cover as Moh's surgery may be done at a location without access to your expertise. Extensive eyelid resection for example, risks exposure of the globe.

- Frozen section (FS): Retrospective reviews show that lesions that can be excised with 3–4 mm margins (5 mm for SCC) do not benefit from FS. There is only an 85% concordance between FS and the gold-standard paraffin-fixed sections
- Incomplete excision: Incomplete excision rates range from 2–18% and are most frequent in the danger areas such as the medial canthus, external auditory canal and alar base. Tumours tend to extend deeper at these locations as these are lines of embryonic fusion
  - The risk of incomplete excision in a re-excision of an incomplete excision is 30–50%
  - Of these 30–50%, 40% progress to clinical recurrence
  - Incompletely excised lesions should be re-excised if possible
- Recurrence: BCCs greater than 2 cm in size or of an infiltrative type have a higher recurrence rate. Recurrent lesions tend to be more aggressive in behaviour thus a wider excision margin of 5–10 mm is often suggested. However, there is no evidence for this at present
- Moh's micrographic surgery (MMS): The lesion is excised and the base of the specimen is mapped out with a 2 mm tangential shave of the wound bed. If the tangential shave reveals tumour abutting the deep margin, another tangential shave is taken and the process repeated until

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a complete excision is achieved. This minimises the amount of normal tissue removed and is especially useful in areas where maximal tissue preservation is paramount, or where margins are visually indistinct. A 95–99% complete excision rate is reported for primary BCC, and rates in excess of 90% for incompletely excised BCC. However, it is extremely time and labour intensive and is unnecessary for the majority of BCCs, which are small and simple

Other treatments

- Curettage with or without electrodesiccation: The lesion is scooped out piecemeal along its natural plane of cleavage between tumour and normal tissue. In general, tumour tissue is softer than normal dermis and is amenable to curettage, whereas dermis is not. Sclerosing BCCs and previous scars are hard and do not curette well. The base usually cauterised, although there is little evidence that this improves oncological clearance. The recurrence rate is quoted at 10%, but the study subjects are very heterogeneous, lack uniform protocols, and no margin information provided for valid comparison. It is inappropriate for recurrent, morphoeic or high-risk lesions
- Cryotherapy with liquid nitrogen has a comparable 10% recurrence rate. As it is destructive, no histological information is obtained. The treated area needs to exceed the lesion margin by 4–6 mm. Despite this, cryotherapy for BCC has higher recurrence rates than curettage and is unsuitable for recurrent lesions
- Radiotherapy is an effective alternative primary treatment for superficial BCCs with cure rates of up to 94%. It is not recommended for young patients as the risk of carcinogenesis, ulceration, pigmentation, chondritis and long-term cosmetic impairment is significant. The latter may be minimised with the newer fractionated regimes

Newer treatments

- 5% Imiquimod (Aldara, 3M Pharmaceuticals) is an immuno-modulator that acts on Toll-like receptors and stimulates the local production of cytokines, especially the interferons that destroy the tumour. It is applied topically for 6 weeks with an 85% response rate. It recently attained FDA approval for the treatment of superficial BCCs, in addition to actinic keratosis and genital warts. Long-term results are being assessed
- Photodynamic therapy utilises laser or non-laser light energy to activate a chemosensitising agent that has been sequestered by the target cells. One such agent, topical methyl aminolevulinate 16% (Metvix), is taken up by malignant cells and converted to porphyrins that are then activated by red light (570–670 nm) causing selective cellular destruction. Treatment is usually repeated after a week. Due to the limited tissue penetration of light, only superficial lesions are suitable for treatment. The overall response rate is 85% in selected lesions with tumour thickness predicting outcome. While the cosmetic outcome is good, clearance rates are inferior to surgical excision. It is not widely used in UK for this purpose
- Topical 5% fluorouracil can be used to treat multiple superficial BCCs. The prolonged treatment time and higher recurrence rates make it a less favoured option except for low risk, non-facial lesions
- Ablative CO_2 lasers have been used for low-risk lesions but also suffer from lack of histological examination

Others

- Oral retinoids may be useful in preventing or delaying the formation of new tumours. It has been used in conditions such as Gorlin syndrome, XP and in transplant patients, as well as those with widespread severe actinic damage. The protection stops when the medication is discontinued

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- Intralesional interferon α2b and BCG vaccine injections have been described. Whilst the use of intralesional bleomycin electrochemotherapy may be effective, long-term follow-up data is lacking. These are unconventional and are should be considered measures of last resort.

Follow-up

There is a 36–50% risk of another BCC in the 5 years after excision. Six-monthly follow-up is recommended for 5 years, but policies are highly variable. GP involvement attenuates the appearance of the true resources required for monitoring such a common tumour in the UK population.

Further reading

Telfer NR, Colver GB, Morton CA, et al. Guidelines for the management of basal cell carcinoma. Br J Dermatol 2008;159:35–48.

Related topics of interest

- Melanoma
- Squamous cell carcinomas
- Ultraviolet light

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Key Clinical Topics in Plastic & Reconstructive Surgery

Key Clinical Topics in Plastic & Reconstructive Surgery is an indispensable and practical guide for clinical practice and exam revision. Written by recognised experts in the field, this book is an authoritative and up-to-date guide to plastic surgery and common conditions that require restructuring or repair.

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