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The changing face of dermatological surgery

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ABSTRACT Changes in clinical practice within dermatology have led to a resurgence of dermatological surgery as a sub-specialty. The dermatologist's skill-set not only includes the diagnosis and management of rashes but also increasingly the diagnosis and appropriate surgical management of both benign and malignant lesions. Skin cancer, particularly basal cell carcinoma, accounts for a large proportion of a dermatological surgeon's caseload, with choice of treatment ranging from simple cryosurgery and curettage through surgical excision and Mohs micrographic surgery with challenging fascioplastic reconstruction. Although opinions regarding the relative efficacy of Mohs surgery vary, it has revolutionised the management of cutaneous malignancy in the USA and is influencing dermatology worldwide.

KEYWORDS basal cell carcinoma, Mohs micrographic surgery, skin cancer, squamous cell carcinoma

LIST OF ABBREVIATIONS Basal cell carcinoma (BCC), Mohs micrographic surgery (MMS), National Institute for Health and Clinical Excellence (NICE), squamous cell carcinoma (SCC)

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INTRODUCTION

The history of dermatology reveals it to be as much a surgical specialty as a branch of internal medicine. In recent years, this traditional niche has reasserted itself. Compared with 40 years ago, when rashes made up more than 90% of the referrals to a dermatologist, today about half the referrals are for diagnosis, and increasingly management, of lesions that may be skin cancers, or at least may be easily confused with skin cancer. These large changes in clinical activity reflect age-specific increases in skin cancer rates, changes in demography and the growth of sub-specialist outpatient-based surgical dermatology. In most parts of the UK, patients that would once have been admitted to hospital and treated under general anaesthesia by plastic surgeons are now managed in dermatology as outpatients.

Skin cancer is the most common cancer in UK populations, with the majority seen in outpatient dermatology clinics being basal cell carcinomas. Squamous cell carcinomas are the next most common, followed by melanomas. However, much outpatient dermatology is, in large part, a screening activity, distinguishing between lesions that require definitive surgical treatment and those that can be returned to primary care with or without a biopsy. The expertise the dermatologist brings is, therefore, not just diagnostic, but familiarity with a range of surgical techniques, from simple cryotherapy, through standard excision, to Mohs micrographic surgery and fascioplastic reconstruction. Consequently, many units liaise closely, and have joint surgical lists, with oculoplastic and maxillofacial surgeons.

In this brief review I highlight some of the aspects of training that are often neglected by those considering skin surgery as 'minor', before describing MMS. Mohs surgery is still an area where different opinions are held, but its development continues to have a major influence on dermatology worldwide.

ANATOMY AND UNDERMINING PLANES

For the safe performance of head and neck skin surgery, knowledge of the underlying anatomy – including relaxed skin tension lines; effects of vectors on free margins such as the eyelid, lip and nose; the pathway of the facial nerve, particularly the temporal and mandibular divisions; and the pathway of the spinal branch of the accessory nerve – is a prerequisite. Nerves, both sensory and more importantly motor, along with blood vessels, are at risk both during surgical excision and while undermining. Judicious undermining in the correct plane (see Table 1) minimises the risk of nerve injury, reduces wound tension, allows for greater wound eversion and assists in the establishment of haemostasis, optimising wound healing and cosmesis.

Nerve blocks

Equipped with the appropriate anatomical knowledge, a variety of regional nerve blocks can easily be performed on the face to minimise patient discomfort and reduce

TABLE 1 Recommendations for undermining planes

Site	Plane
Scalp	Beneath galea
Forehead	
– small defects	Subcutaneous fat
– large defects	Beneath galea
Temple	Superficial fat above cranial nerve (CN) VII (temporal)
Zygomatic arch	Superficial fat above CN VII (temporal)
Cheek	Superficial subcutaneous fat
Beard area	Deep to hair follicles
Nose	Above perichondrium/periosteum
Jawline	Superficial fat above CN VII (mandibular)
Posterior triangle of neck	Superficial fat above spinal accessory nerve

distortion of local tissue. The infraorbital nerve block can be carried out either by the intraoral or percutaneous route, as can the mental nerve block. Blocking the infraorbital nerve as it exits the infraorbital foramen anaesthetises a large area including the medial cheek, nasal side wall, nasal alar and ipsilateral upper lip. A regional nerve block of the lower lip is carried out by a mental nerve block as it exits the mental foramen.

A particularly useful regional block to anaesthetise the nasal tip, which is especially painful with local anaesthetic infiltration, is the external branch of the anterior ethmoidal nerve as it exits at the junction of the nasal bone and cartilage.

Other techniques to minimise the discomfort from local anaesthetic infiltration include slow subdermal injection using a narrow gauge (30G) needle of anaesthetic at room temperature. Inexperienced practitioners often inject local anaesthetic far too quickly, at 3–5 ml in less than 10 seconds. Injecting the same volume over a 40–60-second interval causes less discomfort for the patient.

RECONSTRUCTION LADDER

Dermatological surgeons will often consider numerous options when facing the decision of how best to reconstruct a surgical defect, ranging from the simple (the 'KISS' principle: 'keep it simple, stupid') to complex, depending on patient and wound characteristics. The simplest option may be secondary intention healing, allowing nature to take its course by leaving the wound to granulate. Excellent cosmetic results can be obtained using this underappreciated technique, particularly at concave sites such as the temple, nasoalar groove, scapha of the ear and medial canthus (see Figure 1a–c). Wounds on convex surfaces give less predictable results. Occasionally, wounds may be partially closed using guiding

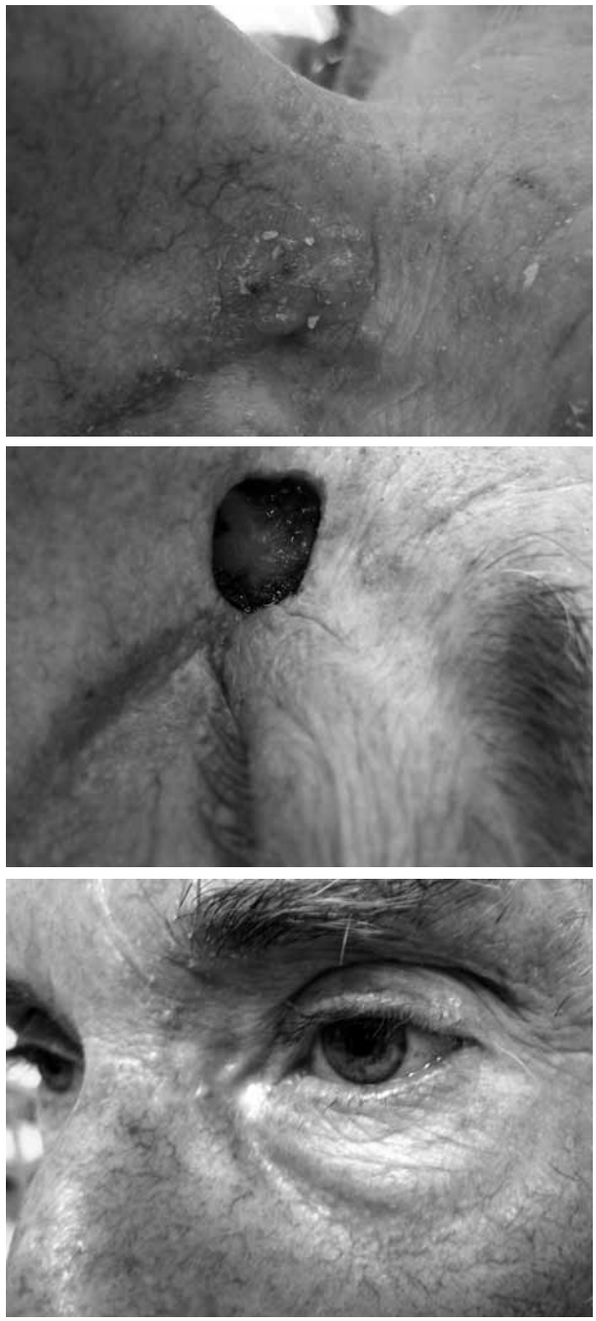

FIGURE 1 Secondary intention healing:
(A) Well-defined nodular basal cell carcinoma left medial canthus.
(B) Surgical defect left medial canthus/nasal side wall lying symmetrically above and below the medial canthal tendon and therefore suitable for secondary intention healing.
(C) Result at three months following secondary intention healing.

sutures to assist wound contracture in the direction of the sutures. This is an option if direct or side-to-side closure is not suitable.

If the above options are not suitable then a graft may be considered. Full thickness skin grafts are usually preferred to split skin grafts for facial defects, as they offer a more

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FIGURE 2 The nasolabial interpolation flap and paramedian forehead flap:
(A) Infiltrating morphoeic basal cell carcinoma left nasal alar.
(B) Full thickness nasal alar defect following Mohs micrographic surgical excision.
(C) Left paramedian forehead flap planned, based on left supratrochlear artery, under local anaesthesia.
(D) Paramedian forehead flap developed in fat distally and beneath galea proximally to maintain vascular pedicle.
(E) Forehead defect closed primarily with distal portion and allowed to heal by secondary intention.
(F) Flap lying alongside surgical nasal defect, demonstrating adequate length of pedicle to ensure tension free.
(G) Nasal alar recreated with cartilage baton from helical rim to provide support, and paramedian forehead turnover flap to provide mucosal and epithelial lining following thinning of distal flap.
(H) Pedicle divided at three weeks.
(I) Flap inset following pedicle division.

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favourable cosmetic result. Potential donor sites are: upper eyelid skin for contralateral upper or lower eyelid defects; pre-auricular, post-auricular or conchal bowl skin for nasal defects; and supraclavicular or inner upper arm skin donor sites for larger defects. Local random flaps such as advancement, rotation or transposition of tissue are the next step up the reconstruction ladder and require knowledge of tissue dynamics. Axial flaps, such as the nasolabial interpolation flap and paramedian forehead flap, are on the top rung of the ladder (see Figure 2a–i).

The disadvantage of the interpolation flap is that it is a two-stage procedure over an interval of 2–3 weeks. Its advantage is that it can be easily performed under local anaesthesia. The choice of flap will depend on the defect site and the size and location of the skin reservoir with the best match for colour, thickness, structure and pore pattern. Restoring functional integrity, such as maintaining the nasal airway and oral sphincter, overrides aesthetic considerations.

MOHS MICROGRAPHIC SURGERY

This form of surgical excision has been refined considerably from the procedure first described by Dr Frederic Mohs in the 1930s. It is a surgical technique offering precise mapping of the skin tumour, usually BCC, and allows for, in theory, 100% microscopic margin control using horizontal frozen sections. This is not to be confused with frozen vertical sections, which are relied upon for intraoperative margin control of tumours in a plastic surgery theatre setting. Such vertical sections (i.e. bread-loaf sectioning) carried out on routine histological specimens include less than 1% of total margin. This small percentage explains, in part, recurrences of apparently completely excised tumours.

There are two basic principles on which MMS depends. First, that the BCCs grow contiguously, for which there is some supportive data from three-dimensional computer modelling studies. Secondly, that all tumour cells need to be removed in order to optimise cure rates, a point for which the evidence is less clear cut.

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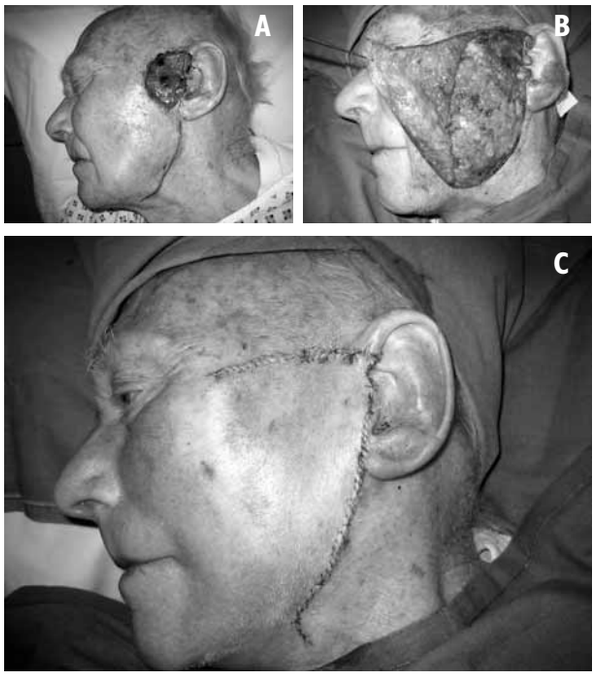

FIGURE 3 Defect reconstruction:
(A) Large pre-auricular cheek defect following Mohs excision of basal cell carcinoma.
(B) Extensive undermining of cervicofacial rotation flap under local anaesthesia.
(C) Flap sutured into place having obtained haemostasis.

Mohs micrographic surgery allows for tumour excision with normal tissue conservation by mapping the location of any residual tumour and removing the involved skin. Thus normal healthy tissue need not be sacrificed unnecessarily, which is of particular importance at critical sites such as those around the eye, nose and mouth.

Prior to the first Mohs layer being taken, a debulk excision or curettage of the tumour is performed. In the case of well-defined nodular BCCs, as opposed to infiltrating morphoeic BCCs, the curette is particularly useful in delineating tumour margins and is a helpful tool prior to standard surgical excision, aiding completeness of excision. Following the debulk of tumour, a Mohs layer is taken with a 1–2 mm margin around the debulk site with careful attention to avoid 'button holes' or perforations in the base of the layer. All of the tissue margins are then examined histologically, with any residual tumour seen on the histological horizontal sections mapped precisely on the patient and the involved tissue removed until there is tumour clearance. Most Mohs surgeons examine their own frozen section slides as they operate. Dermatological surgeons using MMS are involved in challenging defect reconstructions with the reassurance of tumour-free margins (see Figure 3a–c).

Mohs micrographic surgery is now the treatment of choice for BCCs and some SCCs in the US, and collectively accounts for the single most common and most expensive surgical procedure reclaimed from Medicare and private health insurance companies. In the UK, the availability of MMS is patchy, particularly in Scotland, but it is becoming increasingly popular 'south of the border'. It is now recommended that each cancer network should have a Mohs service as part of the NICE guidelines for the management of skin cancers.

As MMS is time-consuming, expensive and requires adequate training, it has not yet replaced standard surgical excision in tumour management in the UK, but tends to be reserved for large, ill-defined, infiltrating or recurrent tumours at critical sites. If standard surgical excision is performed for small (<2 cm), well-defined BCCs, the suggested surgical margin is 4 mm to give a 95% cure rate, with a 4–6 mm margin recommended for SCCs. Individuals lacking experience in cutaneous surgery tend to compromise surgical margins to aid surgical closure, with the increased risk of incomplete tumour excision. A marker pen should be used to delineate the tumour edge, which may be more apparent by stretching the surrounding skin in the case of BCCs, following which the recommended surgical margin should be drawn.

As with all surgical procedures, outcomes and recurrence rates are operator-dependent. The five-year recurrence rate of primary BCCs treated by MMS is reported to be less than 1% in several case series. This compares with an average five-year recurrence rate of around 9% using standard excision. There has only been one randomised control trial comparing MMS with standard excision of BCCs, and although questions can be asked about the exact design of the study, there was no formally significant difference in recurrence rates of both primary and recurrent BCCs at 18 months. It is unlikely that data from a single study are going to radically change clinical practice.

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KEYPOINTS

- Basal cell carcinoma is the most common malignancy in Caucasian populations.
- Knowledge of head and neck anatomy is a prerequisite for undertaking surgical procedures of the face.
- The recommended surgical margins for basal cell carcinomas and squamous cell carcinomas treated by standard surgical excision are 4 mm and 4–6 mm, respectively.
- Mohs micrographic surgery is a tissue-sparing technique offering complete histological margin control of resected skin tumours.
- Mohs micrographic surgery is indicated for large, ill-defined, infiltrating or morphoeic basal cell carcinomas on the head and neck.

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