PART 5

Reconstructive Surgery

30

Cutaneous Malignancies of the Head and Neck

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INTRODUCTION

Skin cancer is the most common form of malignant disease in Caucasians, and the skin of the head and neck is the site most frequently involved. The ease of early diagnosis and the relative infrequency of metastatic spread usually provide an opportunity for cure at the time of treatment. Basal cell carcinoma (BCC) and squamous cell carcinoma (SCC) make up the majority of the epithelial-derived malignancies in the head and neck.

Early BCC and SCC can be treated by a variety of modalities (each with its own advantages and disadvantages), including conventional surgery, cryosurgery, Mohs' surgery, photodynamic therapy and radiotherapy. Proper treatment planning is essential to provide the patient with the best chance for cure as well as aesthetic and functional results. The extent or aggressiveness of skin cancer should not be underestimated, because inadequate treatment and local recurrence can lead to uncontrollable skin cancer, high morbidity and even death.

For advanced skin cancer, characterized by infiltrative growth into subcutaneous tissue, muscle and peripheral nerves, surgical resection is the treatment of choice. Obviously, this situation requires appropriate preoperative radiological staging, planning, and frequently a more complex means of reconstruction to restore form and function, often followed by postoperative radiotherapy. The search for regional lymph node metastases in the parotid gland and neck is an essential part of the work-up, especially in cases of melanoma, Merkel cell tumours, or aggressive SCC. Also after local curative treatment of these carcinomas one should be on the alert for the outgrowth of occult micrometastases during follow-up.

Since so many physical and biological aspects are involved in the management of head and neck skin cancers, ranging from early disease to advanced aggressive or recurrent tumours,

a multidisciplinary approach is a prerequisite. Ideally a multidisciplinary team should be a collaboration of a dermatologist, a head and neck oncologic surgeon, a pathologist, a radiotherapist, a reconstructive (facial) plastic surgeon, and a prosthodontist. In this way different expertises can be combined for the optimal treatment of a challenging group of skin cancer patients.

EPIDEMIOLOGY AND AETIOLOGY OF SKIN CANCER

More than one third of all cancers originate in the skin, of which 75 per cent include BCC and 20 per cent SCC.[1–5] Melanoma, and a group of relatively rare skin cancers (e.g. Merkel cell carcinoma, sarcoma, malignant adnexal, malignant lymphoid neoplasms of the skin) make up the other 5 per cent.[3,4,6] In the United States over 1 million new cases of skin cancer are diagnosed each year, clearly illustrating the size of the problem from a public health perspective. With an average lifespan of 78 years in the United States, the probability of skin cancer developing during a lifetime was recently estimated to be 1 in 5.[7]

Geographic location is an important factor with respect to the incidence of skin cancer.[1,8] Caucasian individuals with a place of residence closer to the equator have a higher risk of developing skin cancer, suggesting a direct correlation to the exposure to sunlight or, more specifically, to the cumulative amount of ultraviolet radiation exposure.[9,10] Keratinocytes are very sensitive to ultraviolet B (in the range of 280–320 nm) and repeated exposure leads to accumulation of mutations in critical genes that alter normal programmes of cell proliferation, differentiation and death, finally resulting in mutated (pre)cancerous cells. It is therefore not surprising that the majority of non-melanoma skin cancer (NMSC) is found on the sun-exposed face and scalp.[11] Approximately 90 per cent of all BCC, 80 per cent of all SCC, and 15–20 per cent of all melanoma are found in the head and neck region.[12] People with fair skin, fair hair and blue eyes (Fitzpatrick's skin types I and II) are at greatest risk. In individuals with darker pigmentation (Africans, Asians, Hispanics) the risk of skin cancer is lower.

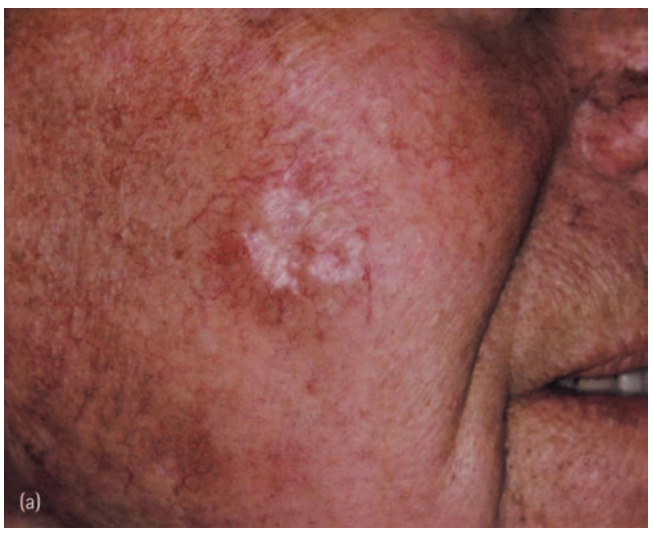
In BCC, intermittent intense sun exposure is suggested to be important,[10,13–16] whereas SCC is more associated with cumulative exposure.[17] Intermittent excessive exposure to sunlight, particularly severe sun burns during childhood, appear to be the most important factor associated with the development of malignant melanoma.[13,16] White populations in sunny climates such as Australia carry the greatest risk. This is demonstrated by the epidemiological finding that migration to sunnier climates (e.g. Australia) during childhood is associated with a 3-fold to 4-fold increased risk of developing melanoma.[9,18]

Another risk population for the development of skin cancer is found in the group of patients with syndromes related to disorders in DNA repair (e.g. xeroderma pigmentosum, basal cell nevus syndrome).[19] Also the group of chronically immunosuppressed patients, for example those with renal transplants, have a significantly increased risk for SCC, of which some may behave in an aggressive fashion.[20] Development of SCC is increased as well in patients with immune disorders such as leukaemia, lymphoma, autoimmune disease or epidermodysplasia verruciformis (a rare hereditary immune deficiency in which human papillomavirus is associated with SCC).[21,22]

TYPES OF SKIN CANCER AND THEIR BIOLOGY

Basal Cell Carcinoma

BCC is the most frequently occurring cutaneous malignancy in Caucasians and has many clinical manifestations. The presentation of a pearly, teleangiectatic papule is typical, but BCC may also resemble an eczematous patch or an atrophic scar with indefinite borders (Figure 30.1). Pigmented BCC may resemble a pigmented naevus or a melanoma. Perhaps the most deceptive clinical pattern is that of the morphoea or sclerosing type.[23] This lesion may be disregarded by the patient or the physician for long periods because it can be macular, whitish and with indistinct margins.



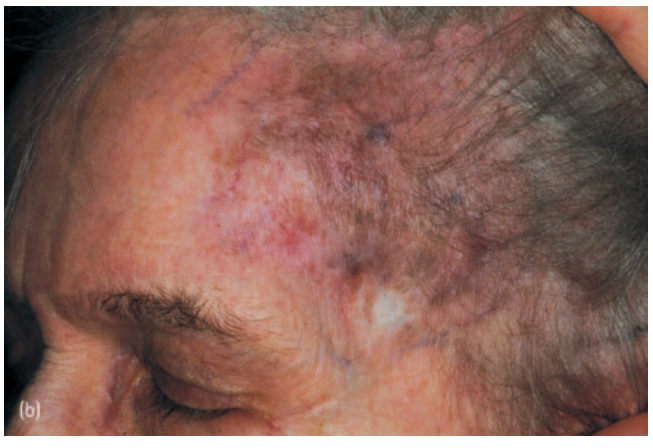


Figure 30.1 ***(a)*** *Infiltrative BCC of the left cheek presenting as a typical pearly, teleangiectatic plaque.* ***(b)*** *Micronodular BCC of the left temporal region presenting as a large eczematous patch with indefinite borders.*

BCC originates *de novo* from the undifferentiated keratinocytes of the basal layer of the epidermis and adnexal structures and has no precursor lesion.[12] All BCC show proliferation of similar basaloid cells: oval in shape with deeply staining nuclei and scant cytoplasm. The malignant cells closely resemble the basal cell layer of the skin and occasionally will display squamoid differentiation.

To minimize the chance of recurrence after therapy, the clinician must be aware of the various clinical growth patterns and the multiple histopathological variations of BCC.[24,25] Histologically, five BCC subtypes can be discriminated with different clinical implications. In order of increasing aggressiveness they are: superficial BCC (10 per cent), nodular or solid BCC (50–70 per cent), micronodular BCC, infiltrating BCC, and morphoeaform BCC (Figure 30.2).[26] Mixed types of different histologies can be found as well. Micronodular, infiltrative, morphoeic and mixed-type BCC tend to grow more invasive and often extend peripherically beyond the apparent clinical margin.[27] Appropriate therapy should therefore be tailored to histopathology obtained by biopsy. For example, a small circumscribed BCC of the cheek can be treated with cryosurgery, whereas an infiltrative BCC of the nasal region might best be treated with Mohs' micrographic surgery to decrease the chance of recurrence (Figure 30.3).

Although metastases are extremely rare in BCC, this complication must be considered when lesions recur repeatedly or when treatment has been delayed for years. In these instances, spread to regional lymph nodes, lungs or bone may occur.[28–31] Although it is assumed that such metastasizing tumours are not classical BCC but rather of adnexal origin or metatypical BCC, one should remain cautious in case of unusual biological behaviour.

Squamous Cell Carcinoma

SCC originates from the keratinizing or spindle cell layer of the epithelium and is often preceded by precancerous skin lesions (actinic keratosis, Bowen's disease) in older patients. Actinic keratosis is the most common precursor to SCC and is characterized by a red, circumscribed, rough and scaly appearance, usually located in the sun-exposed areas of the head and neck (e.g. nose, scalp) in middle-aged and elderly individuals.[32–35] Approximately one per 1000 cases of actinic keratosis per year is estimated to progress into an invasive SCC.[3,35] Bowen's disease is synonymous with carcinoma-in-situ of the skin and represents preinvasive SCC. These lesions present as single, persistent, minimally indurated, erythematous plaques with irregular borders. Microscopically, Bowen's disease demonstrates full-thickness cytologic atypia of the epidermis with an intact basement membrane.

Invasive SCC demonstrates epidermal cells proliferating downward into the direction of the dermis, often producing keratin pearls (Figure 30.4). Clinically, they present as a firm erythematous skin lesion (often covered with a crust), but an ulcerating, easily bleeding lesion is not exceptional (Figure 30.5). Removal of a crust may reveal a granular, rolled margin. Increased tumour thickness and depth of invasion are the most consistent histopathological features of cutaneous SCC that recur and metastasize, but differentiation grade, perineural involvement, clinical size (diameter), immune status of the patient, and anatomical site may also be of importance.[36–38] At presentation, regional lymph node metastases are found in approximately 10 per cent of cases,[37,39,40] which has a major influence on the final outcome of the disease. In these cases local excision of the tumour is combined with therapeutical

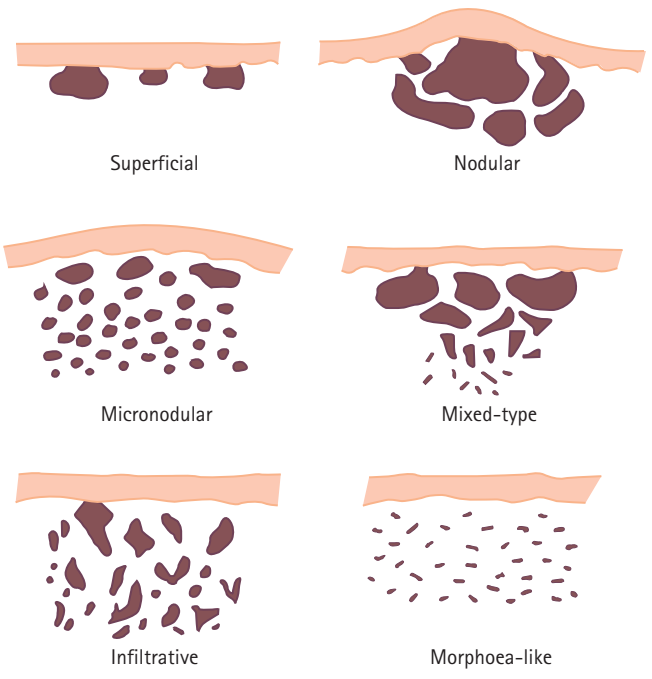


Figure 30.2 *Schematic depicting different histological growth patterns of the subtypes of BCC.*

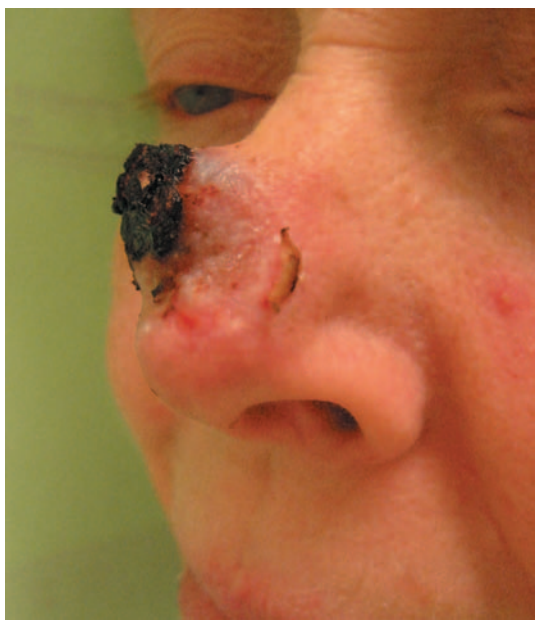


Figure 30.3 *Patient with a recurrent infiltrating BCC of the supratip region. In such cases cryosurgery is obsolete. Treatment options are Mohs' surgery or radiotherapy.*

neck dissection and/or parotidectomy, followed by adjuvant postoperative radiotherapy in the presence of bad prognostic signs.[40,41] Distant metastases are very exceptional, but may occur in lungs, bone and liver, usually in cases of extended regional disease.

Keratoacanthoma has traditionally been thought to be a benign growth that resembles SCC clinically and histologically. It appears as a nodule in clinically normal skin and quickly increases in size to develop into a localized, raised, indurated lesion with a central crater containing a keratin plug (Figure 30.6). Untreated, the keratin plug is extruded spontaneously and the surface exposed 'heals' to leave a slightly depressed flat scar with a raised rim around its margin. The entire sequence takes approximately 3 months to complete, the growth phase and the phase of 'healing' both occupying 6 weeks.

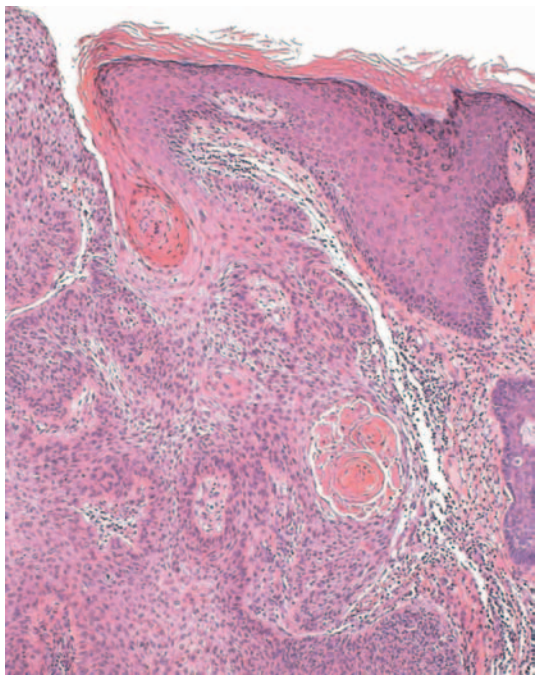


Figure 30.4 *Histological section of an ulcerative cutaneous SCC with groups of abnormal epidermal cells with pleiomorphic and hyperchromatic nuclei, proliferating downward into the dermis. The presence of keratin pearls is typical.*

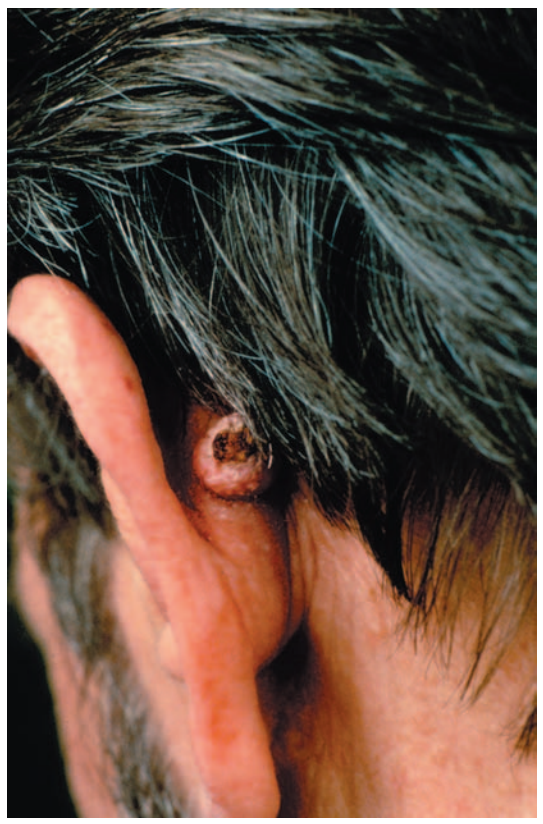
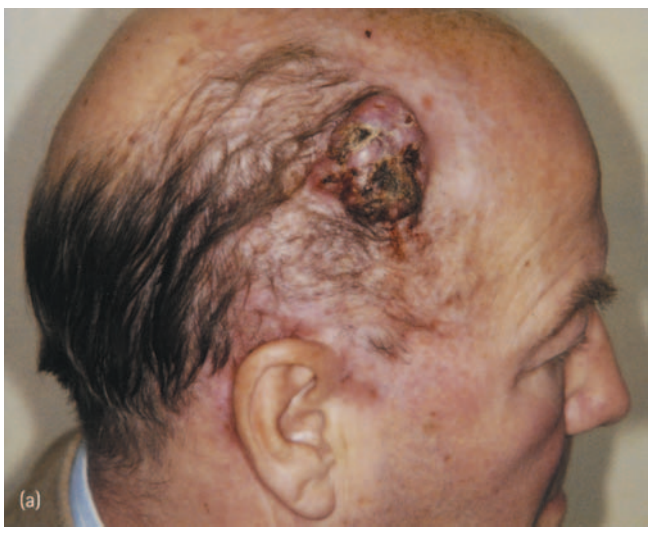


Figure 30.6 *Postauricular keratoacanthoma. Notice the central crater containing a keratin plug.*



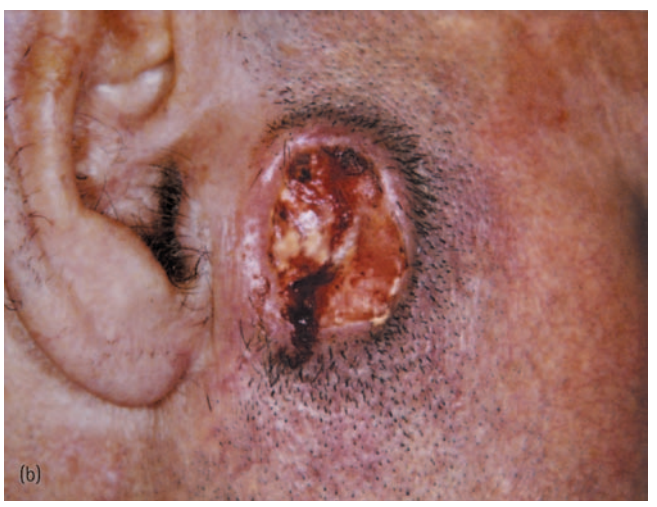


Figure 30.5 ***(a)*** *Patient with a rapidly growing SCC of the right parietal scalp.* ***(b)*** *Patient with a preauricular, ulcerating SCC with a typical rolled margin.*

From a clinical and histopathological point of view it can be extremely difficult to differentiate keratoacanthoma from SCC.[42] There are dermatopathologists and clinicians who regard solitary keratoacanthoma as a well-differentiated variant of SCC deserving an equivalent treatment.[43,44] Therefore, in the absence of definite histology, it is strongly advised to treat any keratoacanthoma as a SCC, because misdiagnosis leads inevitably to inadequate treatment.

Melanoma

Malignant melanoma is a malignancy arising from the melanocytes, the pigment-producing cells of the skin. It accounts for approximately 4 per cent of skin cancers, with more than 41 000 new invasive melanomas and 21 000 new melanomas-in-situ in the United States.[45] About 20 per cent of all melanomas arise in the head and neck. Prognosis is strongly related to the depth of tumour invasion and the presence of regional lymph node metastases.[46] Depth of invasion is determined by Clark levels and, more precisely, Breslow thickness (Figure 30.7). Breslow thickness measures the distance from the granular layer of the epidermis to the point of deepest invasion by tumour cells, and is obtained by excisional biopsy. The definite treatment of melanoma of the skin includes wide re-excision of the initial biopsy site.

Although wide excision of melanoma is curative in some cases, all invasive melanomas have some risk of metastases. The risk of synchronous nodal metastasis is 2–10 per cent in patients with primary lesions <1 mm Breslow thickness. In patients with intermediate lesions (1–4 mm Breslow thickness), the risk of identifiable synchronous nodal metastases is 20–25 per cent.[47] In cases with a regional nodal metastasis, tumour prognosis drops by more than 50 per cent, depending on the number of positive lymph nodes.[48] Nevertheless, therapeutical lymph node dissection is still worth doing and offers a potential chance of cure in melanoma patients with regional lymph node metastases.[48,49] In retrospective studies, adjuvant radiotherapy seems to decrease the risk of neck recurrence,[50,51] but there are no randomized data available to support this. Melanoma usually metastasizes first to the regional lymph nodes and then to distant sites, including skin, subcutaneous tissue, lung, liver, brain, bone and visceral organs. The presence of distant metastases carries a poor prognosis and is often lethal, with a 5-year survival rate of less than 10 per cent. With a population of more than 200 million, in 2002 approximately 7000 Americans died of melanoma.[52]

A great part of malignant melanoma arises from pre-existing melanocytic naevi. *A*symmetry, *B*order irregulations, *C*olour variegations, and large-*D*iameter together form the clinical ABCD guide for evaluating pigmented lesions (Figure 30.8). Three clinical types of malignant melanoma of the skin can be discriminated in the head and neck: superficial spreading malignant melanoma (SSMM), lentigo maligna melanoma (LMM), and nodular malignant melanoma (NMM). SSMM occurs most commonly (30–36 per cent), followed by LMM (24–33 per cent) and NMM (20–29 per cent).[6,12]

SSMM is characterized by irregular asymmetric borders with colour variegation and a size larger than 6–8 mm, showing a comparatively long horizontal growth phase. Later in their

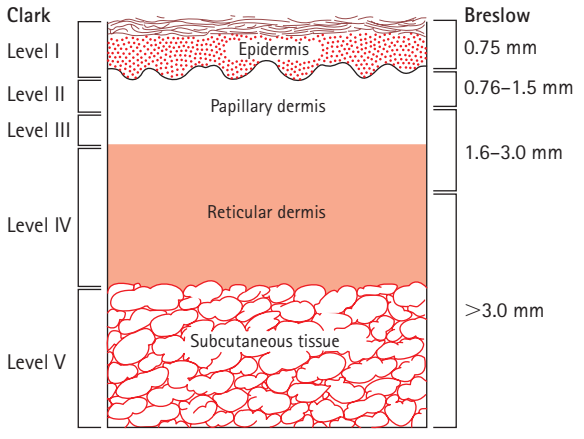


Figure 30.7 *Schematic showing the skin layers and the depth of tumour invasion according to the Clark and Breslow microstaging criteria. Prognosis is strongly related to the depth of tumour invasion in malignant melanoma. Clark levels are classified according to the degree of invasion into the various anatomic levels of the skin. Level I = tumour cells in epidermis only (melanoma-in-situ). Level II = tumour cells extend from epidermis into (but do not fill) papillary dermis. Level III = tumour cells extend from epidermis into and fill papillary dermis. Level IV = tumour cells extend into reticular dermis. Level V = tumour cells extend through the dermis into underlying subcutaneous fat.*

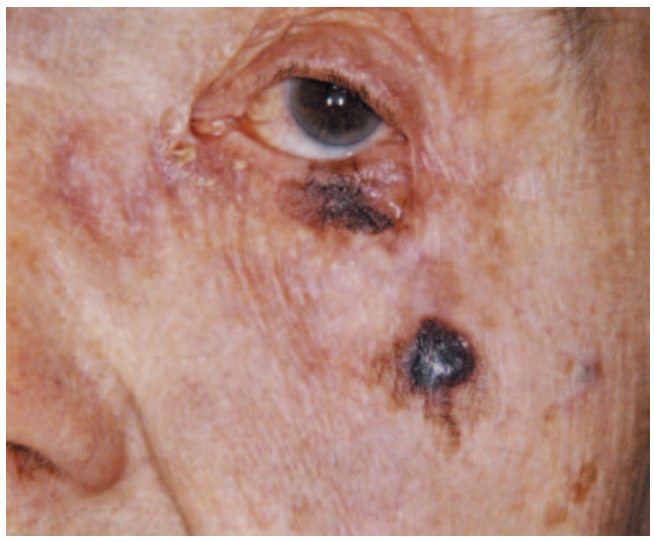


Figure 30.8 *Nodular melanoma of the cheek illustrating the ABCDs of melanoma. This lesion shows asymmetry, irregular borders, inhomogeneous colour with pigment variegation, and a large diameter. The skin below the lower eyelid contains also a patch of lentigo maligna.*

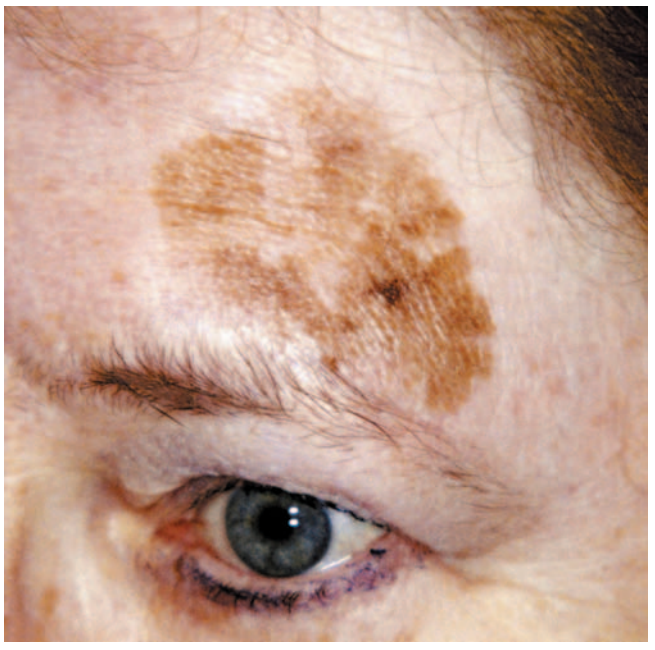


Figure 30.9 *Large patch of lentigo maligna in which lentigo maligna melanoma developed. In such a case incisional punch biopsy of the suspected hyperpigmented area is permitted.*

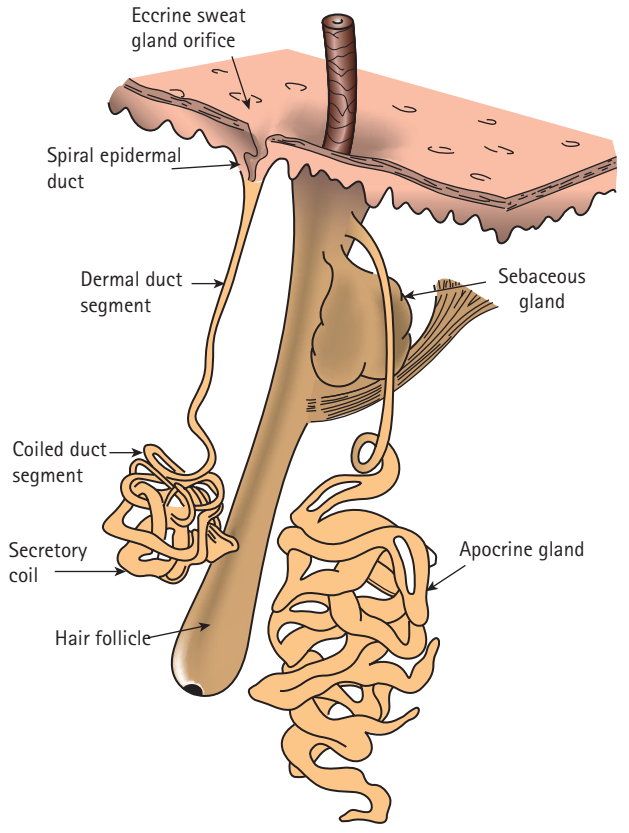


Figure 30.10 *Artist's impression of the skin adnexal structures. Skin adnexal tumours arise from eccrine sweat glands, hair follicles, or sebaceous and apocrine glands.*

natural history, SSMM may show rapid transition into a vertical growth phase, resulting in nodular growth or even ulceration.

LMM occurs on sun-exposed areas with 90 per cent arising on the head and neck.[6,53] It typically appears as a fairly large, flat, brown–black lesion with prominent notching and indentation. Lentigo maligna (melanosis precancerosa Dubreuilh) is the main recognized precursor of LMM and consists of an intraepithelial proliferation of atypical melanocytes, which presents itself macroscopically as a slowly growing patch of irregular hyperpigmentation (Figure 30.9). It is located mainly on the forehead, the temples and the cheeks, especially in elderly Caucasians. Lentigo maligna carries a low but significant risk of progression into invasive melanoma.[54]

NMM are more aggressive than SSMM and LMM and usually present as a pigmented papule that may rapidly become ulcerative with a complete lack of radial growth. Amelanotic melanoma is usually considered a non-pigment producing variant of nodular melanoma and can be confused with benign skin lesions, such as pyogenic granuloma, which frequently results in a diagnostic delay. Given the variable presentations of melanoma, any pigmented lesion that has changed should be evaluated for possible biopsy. Desmoplastic melanoma is an uncommonly encountered variant of amelanotic malignant melanoma and is notorious for its tendency to spread by perineural growth and for its very high rates of local recurrence (approximately 50 per cent). Local recurrence is a significant problem and highly correlates with an increased risk of systemic metastatic disease, especially to the lungs.[55] Treatment consists of wide local incision, sometimes with a margin of up to 3 cm.

Rare Skin Malignancies

Numerous unusual skin malignancies have been described in the literature. Many of them display an aggressive biological behaviour, making wide surgical excision with adjuvant radiotherapy the treatment of choice in most cases. Three types of rare skin malignancies of the head and neck are discussed briefly below.

MICROCYSTIC ADNEXAL CARCINOMA

The rare epithelial skin tumours are virtually all adnexal tumours, arising from eccrine sweat glands, hair follicles, or sebaceous and apocrine glands (Figure 30.10). These tumours generally behave in a benign manner, but malignant types exist. For the malignant adnexal tumours it may be argued whether separation into different histological categories is significant, since in general they are all best treated with wide surgical excision and adjuvant radiotherapy.[56] Many are locally aggressive and have a capacity for metastasis. Failure to distinguish BCC from adnexal tumours may be responsible for many of the published reports of metastasizing 'BCC', which in retrospect are in fact adnexal tumours.[28–31]

Microcystic adnexal carcinoma (MAC), which most likely originates from sweat gland ducts, is of specific interest, because it predominantly affects the face. It is a locally destructive

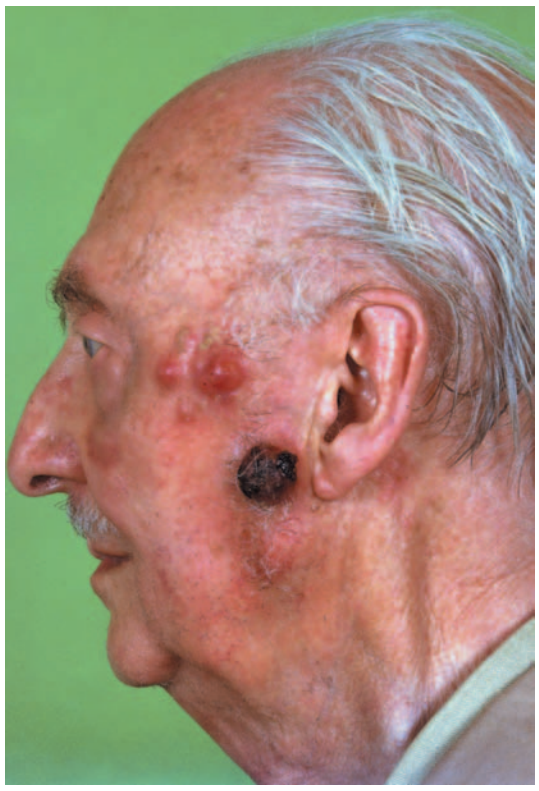


Figure 30.11 *Preauricular Merkel cell carcinoma with satellite lesions. The reddish appearance is more or less typical for this skin tumour.*

adnexal neoplasm with a high rate of local recurrence, but it rarely metastasizes. Frequently it is deeply infiltrating, invading underlying muscle and bone, with invisible extensions far beyond clinically apparent margins and perineural growth. These unapparent extensions make wide excision unavoidable, with Mohs' surgery as an attractive tissue-sparing option. Surgical excision is preferably combined with postoperative radiotherapy to reduce the chance of recurrence. Radiation as a primary treatment has been reported not only as being an ineffective treatment for microcystic adnexal carcinoma, but evidence exists that this modality may induce conversion to a histologically and clinically less favourable neoplasm.[57]

MERKEL CELL CARCINOMA

Merkel cell carcinoma (MCC) originates from the Merkel cells, which are scarcely located in the epidermis and are of a neuroendocrine nature. Most tumours present as a reddish nodule or plaque in the head or neck (Figure 30.11). Ultraviolet (UV) may play a role in the aetiology of MCC, since most tumours occur on sun-exposed areas of skin. MCC has a rapid mitotic growth rate, which is consistent with its aggressive clinical behaviour.

The cornerstone of therapy for patients with localized disease is wide surgical excision, which is combined with therapeutic dissection of the regional lymph nodes in cases of established lymph node involvement. To improve locoregional control rates, postoperative radiotherapy, directed at both the area of surgical excision and the area of nodal drainage, has been considered by many as a useful adjunct in the treatment of MCC.[58–61]

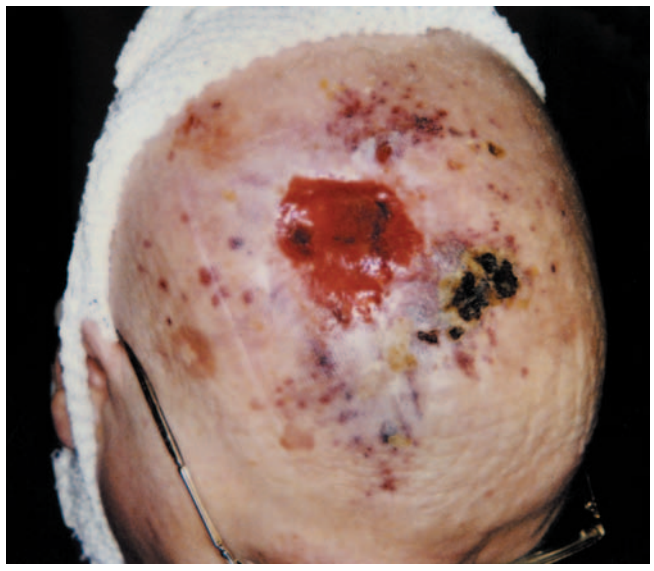


Figure 30.12 *Diffuse angiosarcoma of the scalp bordered by multiple purple–blue macules. This patient died of distant metastases*

ANGIOSARCOMA

Mesodermal tumours arising in the soft tissues of the head and neck are uncommon.[62] Those which occur with any regularity are sarcomas derived from fibrous tissue, blood vessels, fat or muscle. Cutaneous angiosarcoma (CAS), a highly malignant soft tissue sarcoma of vascular origin, accounts for less than 0.1 per cent of all head and neck cancers, and usually presents as a painless enlarging purpuric plaque on the scalp or face (Figure 30.12).[63] Tumours may be nodular, diffuse or ulcerative, and are often multifocal. The rate of lymph note metastases for CAS is 13 per cent, being the highest of all soft tissue sarcomas of the head and neck.[64] Distant metastases develop in up to 50 per cent of patients, most commonly involving lung and liver.[65] The literature suggests that aggressive combined-modality therapy with surgery, radiation and chemotherapy offers the best chance for long-term control in patients with CAS.

DIAGNOSIS AND STAGING

The American Joint Committee on Cancer (AJCC) and the International Union Against Cancer (UICC) have designated uniform TNM classification standards for BCC, SCC and malignant melanoma (Tables 30.1 and 30.2).[66] For BCC and SCC, the same TNM classification is used (see Table 30.1). Although any staging system has the disadvantage that biologically different carcinomas are summarized in one group, the TNM classification is still a useful instrument to categorize these tumours in a standardized fashion. Biopsies are not only used for microscopical assessment or confirmation of the type of primary tumour, but also for establishing the level and depth

Table 30.1 *TNM staging for carcinoma of the skin: BCC and SCC (AJCC 2001)*

Primary tumour (T)			
Tx	Primary tumour cannot be assessed		
T0	No evidence of primary tumour		
Tis	Carcinoma-in-situ		
T1	Tumour = 2 cm in greatest dimension		
T2	Tumour >2 cm to 5 cm in greatest dimension		
T3	Tumour >5 cm in greatest dimension		
T4	Tumour invades deep extradermal structures (i.e. cartilage, skeletal muscle, or bone)		
Nodal involvement (N)			
Nx	Regional lymph nodes cannot be assessed		
N0	No regional lymph node metastasis		
N1	Regional lymph node metastasis		
Distant metastasis (M)			
Mx	Presence of distant metastasis cannot be assessed		
M0	No distant metastasis		
M1	Distant metastasis		
Stage grouping			
Stage 0	Tis	N0	M0
Stage I	T1	N0	M0
Stage II	T2	N0	M0
	T3	N0	M0
Stage III	T4	N0	M0
	Any T	N1	M0
Stage IV	Any T	Any N	M1

of invasion, as well as the presence of negative histological features.[67,68]

Biopsies of the skin can be either incisional or excisional. When there is a fair chance that a lesion is benign, excisional biopsy with a small margin can save valuable skin for cosmetic purposes. Excisional biopsy is also often therapeutic in small BCC with a favourable histology. For larger or aggressive BCC and SCC it is important first to obtain diagnosis by incisional biopsy, in order to make proper treatment planning. Proper diagnosis of malignant melanoma requires excisional biopsy.

Biopsy of the Primary Tumour

INCISIONAL BIOPSY

Incisional techniques used to collect skin samples, including a representative piece of both the epidermis and the dermis, are punch, scalpel and shave biopsy (Figure 30.13). With ulcerating lesions, it is advisable to obtain the biopsy from the edge in order to include a transition zone to normal surrounding skin. Melanotic lesions are preferably diagnosed by excisional biopsy. For melanocytic lesions, an incisional (punch) biopsy is allowed only for a large patch of lentigo maligna, suspicious for containing lentigo maligna melanoma (see Figure 30.9). Shave biopsies of suspected melanomas are never indicated. For malignant melanoma, the type of biopsy (excisional versus incisional) has been shown to influence clinical outcome in terms of survival rate.[69]

Table 30.2 *TNM staging for carcinoma of the skin: melanoma (AJCC 2001)*

Primary tumour after excision (pT)	
pTx	Primary tumour cannot be assessed (includes shave biopsies and regressed melanoma)
pT0	No evidence of primary tumour
pTis	Melanoma-in-situ (Clark level I) (atypical melanocytic hyperplasia, severe melanocytic dysplasia, not an invasive malignant lesion)
pT1	Tumour 1 mm or less in thickness pT1a = without ulceration pT1b = with ulceration
pT2	Tumour more than 1 mm but not more than 2 mm in thickness pT2a = without ulceration pT2b = with ulceration
pT3	Tumour more than 2 mm but not more than 4 mm in thickness pT3a = without ulceration pT3b = with ulceration
pT4	Tumour more than 4 mm in thickness pT4a = without ulceration pT4b = with ulceration
Nodal involvement (N)	
Nx	Regional lymph nodes cannot be assessed
N0	No regional lymph node metastasis
N1	1 node N1a = micrometastasis* N1b = macrometastasis**
N2	2–3 nodes or satellites/in-transit metastases without nodes N2a = micrometastases* N2b = macrometastases** N2c = satellites/in-transit metastases without nodes
N3	4 nodes; conglomerate; satellites/in-transit metastases with nodes
Distant metastasis (M)	
Mx	Presence of distant metastasis cannot be assessed
M0	No distant metastasis
M1	Distant metastasis

Stage grouping (pathological stadium)			
Stage 0	pTis	N0	M0
Stage I	pT1	N0	M0
Stage IA	pT1a	N0	M0
Stage IB	pT1b	N0	M0
	pT2a	N0	M0
Stage IIA	pT2b	N0	M0
	pT3a	N0	M0
Stage IIB	pT3b	N0	M0
	pT4a	N0	M0
Stage IIC	pT4b	N0	M0
Stage III	Any pT	N1, N2, N3	M0
Stage IIIA	pT1a–4a	N1a, 2a	M0
Stage IIIB	pT1a–4a	N1b, 2b, 2c	M0
	pT1b–4b	N1a, 2a, 2c	M0
Stage IIIC	pT1b–4b	N1b, 2b	M0
	Any pT	N3	M0
Stage IV	Any pT	Any N	M1

* Metastasis, found by elective neck dissection, US-FNAC, or sentinel node biopsy
** Clinically detectable metastasis or lymph node metastasis with macroscopically evident extracapsular spread

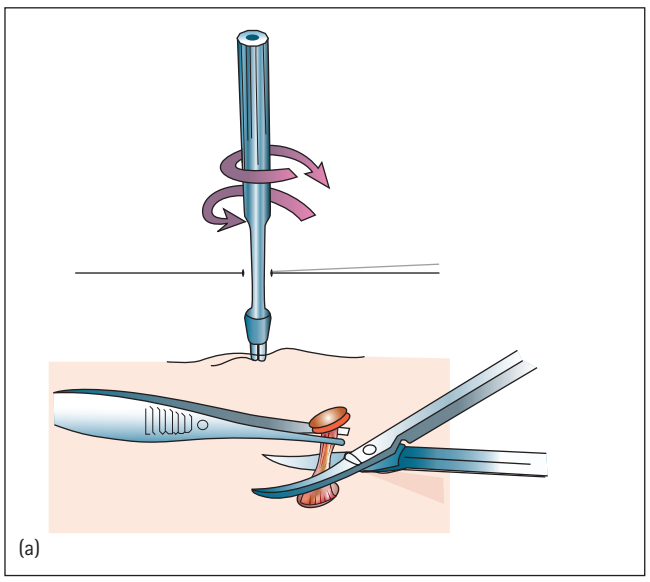


Figure 30.13 *Schematics showing **(a)** punch, **(b)** incisional and **(c)** excisional biopsy.*

EXCISIONAL BIOPSY

An excisional biopsy should contain at least 3 mm of macroscopically normal skin around the lesion (Figures 30.13 and 30.14). It is advisable not to infiltrate the local anaesthetic underneath the tumour, since there is a theoretical chance of seeding tumour cells. For BCC and small SCC, an excisional biopsy with proper margins can be therapeutic. In cases of suspected melanoma, an excisional biopsy is performed to establish the diagnosis before more definite surgery can be planned. Histological evaluation of the entire tumour specimen is needed to find the thickest and deepest part of the lesion, which determines the final Breslow thickness. The Breslow thickness in malignant melanoma forms a guide for the width of the margin of re-excision and also represents the most important prognostic parameter (Table 30.3).

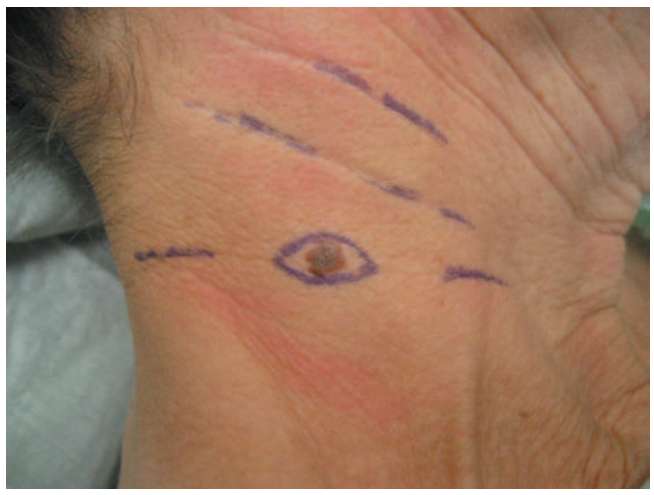


Figure 30.14 *Excisional biopsy of a naevus, which histologically appeared to be seborrhoeic keratosis.*

Table 30.3 *Breslow thickness and generally recommended margin of (re)excision*

Breslow thickness	*Margin of excision*
Melanoma-in-situ	0.5 cm
⩽2.0 mm	1 cm
>2.0 mm	2 cm (at least 1 cm in the face)

Histopathology Report

The report of the histopathologist should minimally include a description of the macroscopy, microscopy and a conclusion.[70] Microscropy should give information about the following items:

- growth pattern (especially for BCC) and differentiation (especially for SCC) of the tumour
- completeness of excision; presence or absence of tumour cells in the resection margins
- perineural invasion, if present
- invasion depth (microscopy)
- in cases of melanoma – Clark level, Breslow thickness, as well as immunohistochemical staining.

Screening for Regional Metastases

Since some cutaneous cancers of the head and neck are potentially metastasizing tumours, treating physicians should be familiar with the lymph drainage system in the neck. All regions of the head and neck contain a rich supply of lymphatics. As holds true for carcinomas of the upper aerodigestive tract,[71] skin cancers of the head and neck also have a specific metastasizing pattern related to the site of the primary tumour.[72,73] Frequently the parotid gland is involved as a first-echelon lymph node basin. Ultrasound-guided fine-needle aspiration cytology (US-FNAC) and sentinel node biopsy have been shown to be of additional value for the detection of regional lymph node metastases, although the latter technique is still under investigation for the head and neck region.

PATHWAY OF REGIONAL LYMPHATIC DRAINAGE

The lymph flow patterns of the facial lymphatics can be categorized as deriving from three major regions: the midface region, the lateral face/frontal scalp region, and the parietal/occipital region (Figure 30.15). The midface drains into lymphatics that follow the facial vessels to the facial, the submental and the submandibular nodes (level 1). The lateral face and the frontal scalp drain into the parotid lymph nodes.[74] The parietal and the occipital part of the scalp drain into the retroauricular and the occipital lymph nodes. From there the lymph flows towards the more deeply located irregular cervical lymph nodes.

For diagnostic as well as therapeutic reasons, the deep cervical lymph nodes are divided into six levels. Two major lymph streams can be identified: the jugular stream that runs along the internal jugular vein (levels 2, 3 and 4) and the cervical accessory stream that runs along the spinal accessory nerve (level 5). In principle, all these lymph nodes can harbour (micro)metastases, making adequate preoperative screening of these nodes a prerequisite when treating melanoma and aggressive non-melanoma skin cancer of the head and neck. In this perspective, the lymph nodes of the superficial lobe of the parotid gland might play a filtering role for skin cancer of the lateral face and frontotemporal region, necessitating parotidectomy in cases of parotid metastases (Figure 30.16).[75]

ULTRASOUND-GUIDED FINE-NEEDLE ASPIRATION CYTOLOGY (FNAC)

The aggressiveness and potential metastatic spread of melanoma, and less so of SCC, are undisputed and strongly related to the

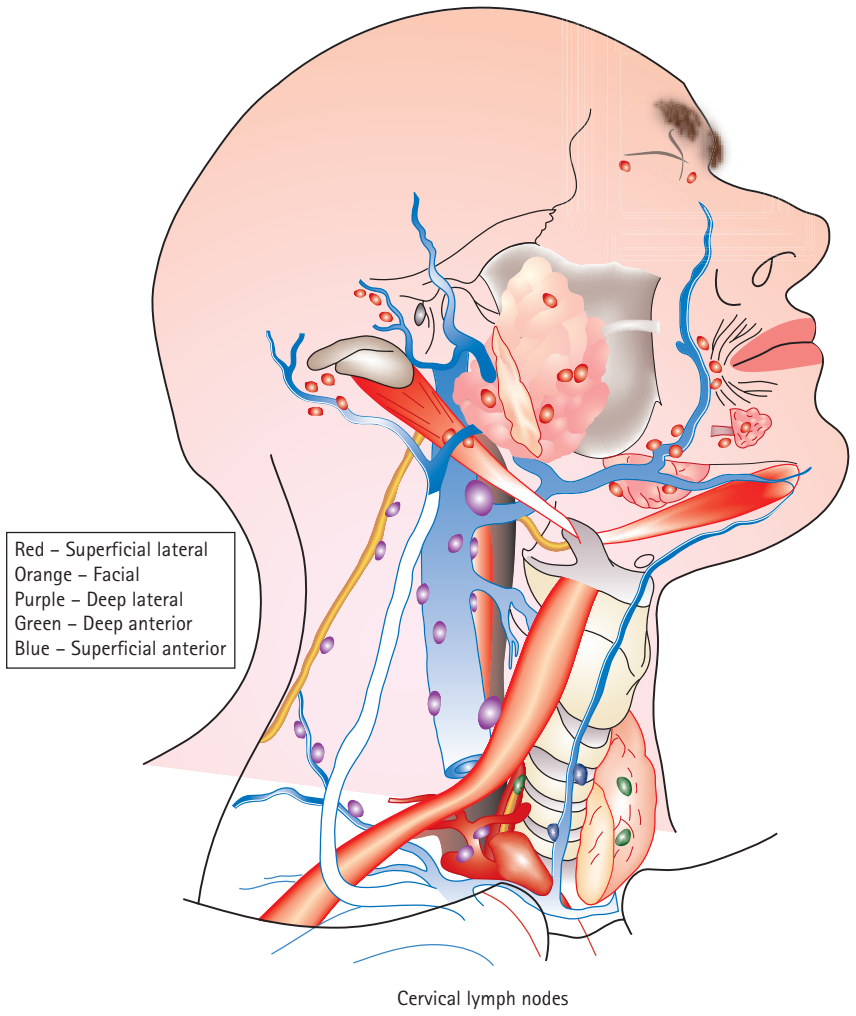


Figure 30.15 *Pathways of regional lymphatic drainage. Note that the lateral face and the frontal scalp drain into the parotid lymph nodes. The parietal and the occipital part of the scalp drain into the retroauricular and the occipital lymph nodes.*

invasion depth of the primary tumour. Ultrasound-guided FNAC has been shown to be the most sensitive tool for the detection of regional lymph node metastases (Figure 30.17). With a chance of detecting pathological lymph nodes with a diameter of 5 mm or more, ultrasound-guided FNAC has been proven to be far more sensitive than CT or MR imaging; albeit this concerned the staging of carcinoma of the upper aerodigestive tract.[76] In patients with SCC or melanoma of the ear, face or anterior scalp, it is important to include not only the cervical lymph nodes in the field of screening, but also the nodes of the parotid gland, the buccal fat path and the nasolabial fold, since these locations might harbour the first-echelon lymph nodes (Table 30.4.).[72,73]

Figure 30.16 *A patient with an aggressive SCC of the left helix with regional metastases to the parotid gland and neck. For this patient, surgical excision with en bloc parotidectomy and modified radical neck dissection (levels 1–5) followed by adjuvant radiotherapy is the best treatment option.*

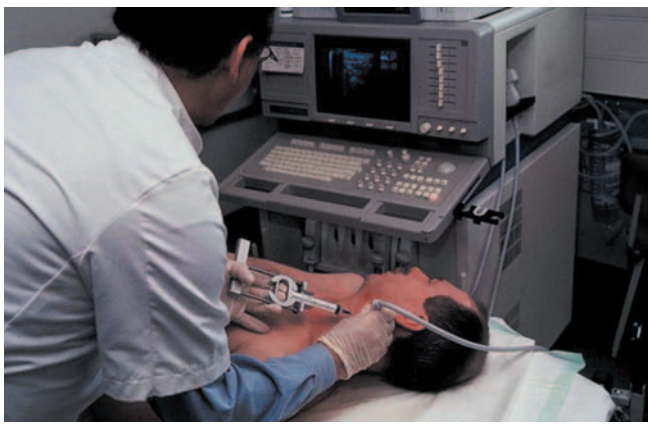


Figure 30.17 *The technique of ultrasound-guided fine-needle aspiration cytology by a radiologist. Fine-needle aspiration biopsy using ultrasound allows detection of micrometastases in lymph nodes with high sensitivity.*

SENTINEL NODE BIOPSY

Recently the value of sentinel node biopsy for melanoma in the head and neck region has been explored. This technique is based on the principle that the sentinel lymph node (SLN), which is the first node to receive lymphatic drainage from the primary tumour, has the highest risk of harbouring micrometastatic disease (Figure 30.18). In sentinel node biopsy, the sentinel node is identified with a radiotracer pharmacon (^{99m}Tc-labelled Colloidal Albumin) that is injected around the primary tumour. When histological investigation reveals this node to be free of tumour, the remaining nodes in the regional lymph node chain are also likely to be free. If the node is found to contain tumour cells, a comprehensive neck dissection should follow. Lymphatic mapping and SLN biopsy have been used successfully for trunk and extremity melanomas, identifying SLNs in more than 80 per cent of patients and establishing the presence or absence of micrometastases with 95 per cent accuracy.[77] However, because the head and neck lymphatic system is more complex than that of other nodal basins (multiplicity of nodes, widespread distribution, frequent location within the parotid gland), the SLN biopsy technique (Figure 30.19) may not be as accurate or appropriate in this region.[78–80]

Distant Metastases

In an asymptomatic patient the rate of detection of distant metastases of SCC and melanoma is extremely low. Chest

Table 30.4 *Pragmatic recommendations for staging evaluation of aggressive cutaneous malignancies of the head and neck*

Squamous cell carcinoma	
N0[a]	Ultrasound-guided FNAC of the neck, parotid gland and nasolabial fold
N+	Ultrasound-guided FNAC (contralateral cervical lymph nodes) Chest X-ray, routine liver function tests (including Alkaline Phosphatase and LDH levels)
Melanoma	
N0[a]	Ultrasound-guided FNAC of the neck, parotid gland and nasolabial fold Chest X-ray, alkaline phosphatase and LDH levels *Facultative:* sentinel node biopsy procedure
N+	Ultrasound-guided FNAC (contralateral cervical lymph nodes) CT lungs, CT abdomen, MRI brain, complete blood count, routine liver function tests (including alkaline phosphatase and LDH levels) *Facultative:* PET-scan, S-100

[a] N0 is defined as no pathological lymph nodes detectable by means of palpation

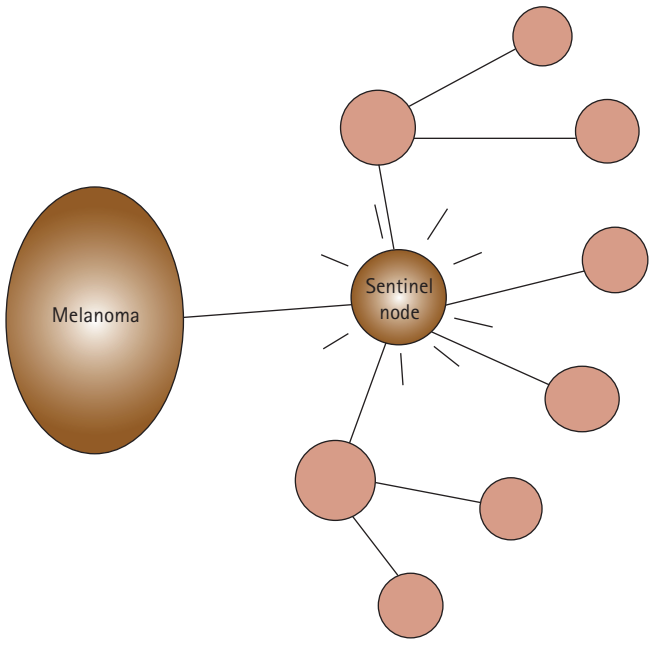


Figure 30.18 *The technique of the sentinel node procedure is based on the principle that the sentinel lymph node, which is the first node to receive lymphatic drainage from the primary tumour, has the highest risk of harbouring micrometastatic disease. The highlighted node represents the sentinel node in this schematic drawing of regionally metastasizing melanoma.*

x-ray and routine evaluation of liver functions (including alkaline phosphatase and LDH levels) are sufficient in screening for aggressive primary tumours with N0 disease. In the presence of cytologically proven pathological lymph nodes, and particularly in cases of multiple or large regional metastases, the chances of distant metastases are increased. In cases of N+ disease, patients with melanoma also need a CT scan of the lungs and abdomen, as well as MRI of the brain.[81] PET scan and serum protein S-100 (a tumour marker for melanoma) are optional, but can enable earlier detection of a distant metastasis in patients at high risk, thereby sparing the patient from debilitating surgery (see Table 30.4).[82–84] When locoregional control has been obtained, early detection of asymptomatic pulmonary melanoma metastases by routine chest radiographs has been shown not to be associated with improved survival.[85]

SURGICAL PRINCIPLES

The physician has a varied armamentarium available to treat malignant cutaneous tumours in the head and neck. Treatment should be tailored to tumour type and location. Definite treatment of melanoma, Merkel cell carcinoma, sarcoma, and malignant adnexal tumours preferably consists of wide excisional surgery, frequently in combination with adjuvant radiotherapy. The treatment of BCC and SCC can include conventional surgery, Mohs' surgery, cryosurgery, radiotherapy

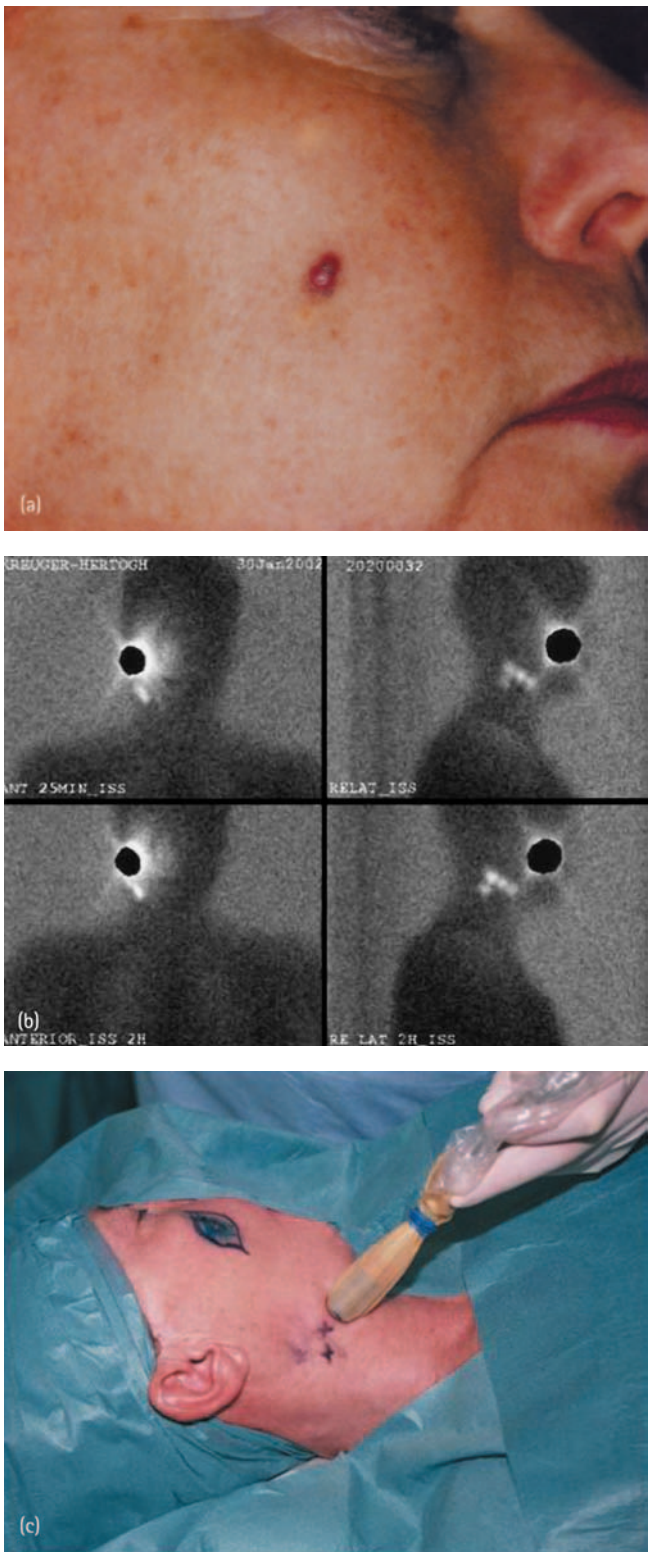
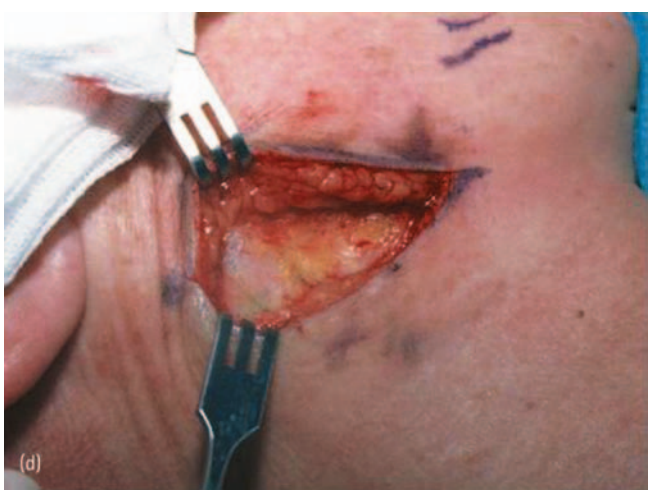


Figure 30.19 *Sentinel node biopsy procedure in a female patient with a nodular melanoma of the cheek.* ***(a)*** *US-guided FNAC did not reveal the presence of pathological lymph nodes. On day 0 the sentinel node(s) are identified by lymphoscintigraphy.* ***(b)*** *After a radiotracer pharmacon (^{99m}Tc-labelled colloidal albumin) is injected around the primary tumour, dynamic images are made using a gamma-scan.* ***(c)*** *The sentinel nodes are marked on the skin.*



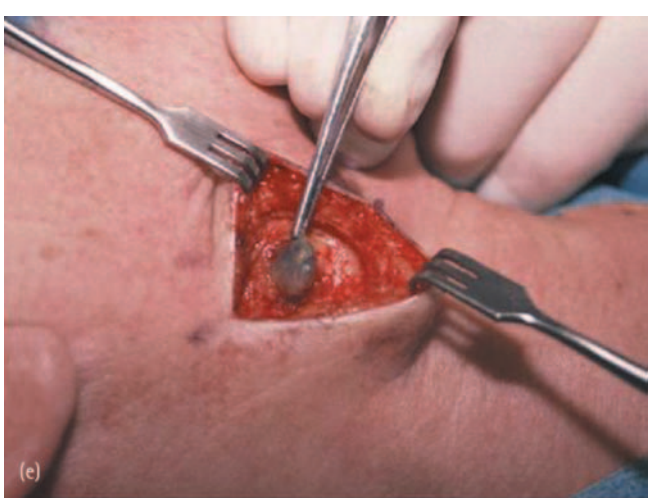


Figure 30.19 ***(d,e)*** *On day 1, three first-echelon lymph nodes could be detected with a small incision and were removed using a gamma probe. Methylene Blue helped in detecting the lymph nodes perioperatively (c,d,e). Microscopically, all three nodes contained melanoma. Therefore, a radical modified neck dissection was performed. (Courtesy O. E. Nieweg)*

or photodynamic therapy and should be tailored based on the following characteristics:

- size and location
- aggressiveness (based on histopathology and biological behaviour)
- primary tumour versus recurrent or multiple recurrent tumour
- patient suitability for surgery
- age, lifestyle and preference.

Most treatment modalities for skin cancer have cure rates that are acceptable, provided they are used in properly selected patients. Cryotherapy is cost-effective, whereas radiotherapy can be indicated for cosmetically and functionally important areas. Surgical excision of skin cancer provides a high cure rate and has the advantage of histopathological control of complete tumour removal. Mohs' surgery reduces the likelihood

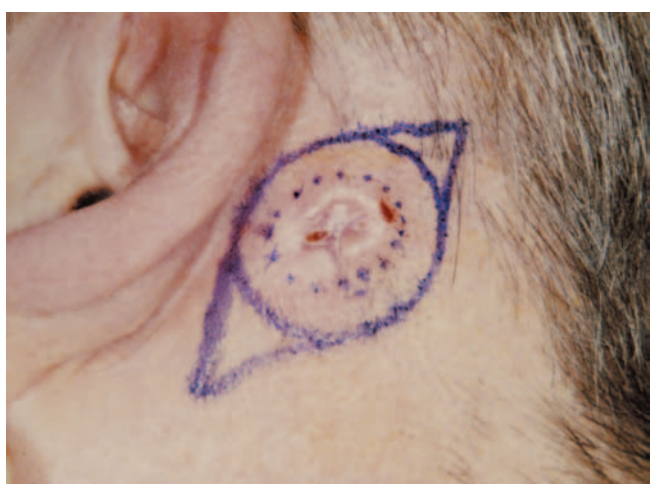


Figure 30.20 *Excision of an infiltrative postauricular BCC. Clinical margins and resection margins should be outlined before injecting local anaesthesia.*

of recurrence, can save valuable unaffected skin, and allows primary reconstruction in the same session. However, especially with primary reconstruction, the surgeon should not risk the chance of an uncontrollable recurrence. Using a split skin graft as an interim method for reconstruction can offer surveillance of the operative site for recurrence. In this period the physician can also await the outgrowth of previously undetected lymph node metastases in the high-risk patient.

Local Excision

When excising skin cancer under local anaesthesia, the visible tumour and resection margins should be outlined with ink before injecting the local anaesthetic (Figure 30.20). Local infiltration of the anaesthetic directly under the tumour should be avoided, especially in SCC and melanoma. Instead, nerve blocks involving the supraorbital, the infraorbital and/or the mental nerve are used, often in combination with field-block anaesthesia around the tumour.

Margin Considerations

BCC AND SCC

Despite its importance, only a few studies provide research data on growth pattern and the margins of uninvolved skin that should be included in the excision.[86] These studies have established that the majority of both BCC and SCC, independent of tumour size, display asymmetrical subclinical growth patterns with one or multiple extensions.[86,87] The magnitude of subclinical outgrowth in BCC is largely related to histological type (e.g. morphoeaform BCC) (see Figure 30.2) and size of the tumour. Suggestions on treatment margins can be made based on these specific characteristics, obtained by incisional biopsy. For example, a small primary nodular BCC with a diameter of 10 mm or less requires a 3-mm margin to include all tumour extensions in 80 per cent of cases.[86–88] In contrast,

morphoeaform or infiltrating type BCC are notoriously deceptive and send out subclinical extensions of 7 mm or more beyond clinically estimated borders.[86,89] Recurrent tumours need notably larger excision margins as well. In general, small SCC requires a therapeutical margin of at least 5 mm, which can be extended depending on the size and the estimated infiltration depth of the primary tumour. Adjuvant radiotherapy is indicated for bad histological growth characteristics, in particular perineural invasion.[90,91]

MELANOMA

A melanoma may contain satellites or in-transit metastases and therefore needs wide excision. Table 30.3 shows the margin of excision that is required for the treatment of melanoma in relation to Breslow thickness, as determined by the excisional biopsy. Lately, there has been a development towards narrower excision margins in the treatment of melanomas in the face. Generally, in the head and neck a margin of at least 0.5 cm should be obtained for non-invasive or melanoma-in-situ, and a margin of at least 1 cm for invasive melanoma (Figure 30.21; see also Table 30.3).[81,92] In some functionally and cosmetically critical areas, surgeons sometimes have to use their best judgement, weighing function and cosmesis against the possible increased risk of local recurrence when performing a narrower excision than recommended. An exception to this rule is provided by desmoplastic melanoma, which requires extensive excision because of its tendency to spread by perineural invasion.[55]

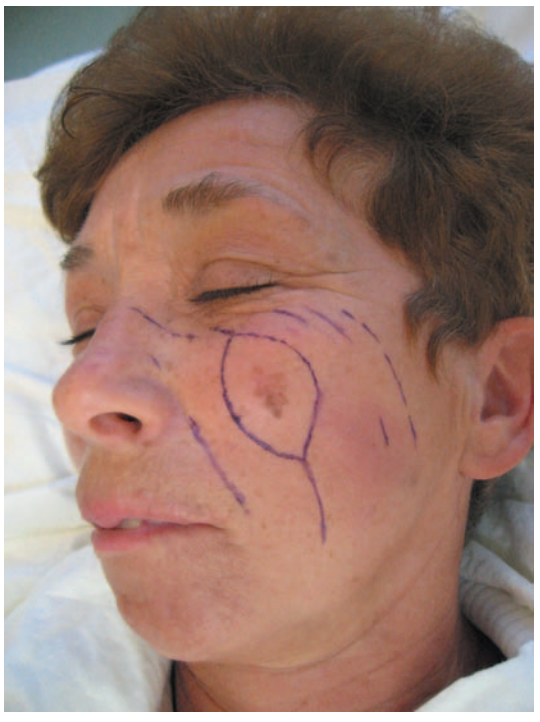


Figure 30.21 *Excision of a superficial spreading melanoma (Breslow thickness 2.1 mm) with a margin of 1 cm and primary closure. In cosmetically critical areas like the face, smaller excisions are allowed than the standard of 2 cm.*

Treatment of Regional Metastases

ELECTIVE AND THERAPEUTIC LYMPHADENECTOMY

Even when lymph node disease cannot be detected by palpation and ultrasound-guided FNAC, there is a fair chance of occult metastases to the regional lymph nodes in patients with SCC and melanoma. In patients with melanoma, the chance for occult regional metastasis is approximately 20 per cent. Therefore a number of institutions used to treat melanoma by elective neck dissection, which refers to an anatomical lymphadenectomy of the primary draining nodal basin in a clinically negative neck (N0).[93] Since 80 per cent of the patients would not benefit from this procedure (overtreatment), and overall no clear survival benefit is achieved, this treatment option has lately been abandoned. The SLN biopsy procedure may add to earlier detection of occult micrometastases, but the effects on overall survival of this technique contrasted with a wait-and-see policy are still under investigation.

In cases of N+ disease, a radical modified neck dissection (lymph node levels 1–5, preserving the spinal accessory nerve and/or the internal jugular vein) is advised, if possible with en bloc resection of the primary tumour (Figure 30.22).[94] Selective neck dissections are less effective and need further study.[95] Therapeutic radical (modified) lymph node dissection offers a potential chance of cure in about one-third of melanoma patients with established regional lymph node metastases.[48,49,95] In cases of N+ neck, patients undergoing regional lymphadenectomy for melanoma or SCC on the ear, face and anterior scalp should also be considered for (elective) parotidectomy.[72–74,96–98] Elective parotidectomy can also be indicated if the facial nerve is in danger when excising the primary tumour.[75]

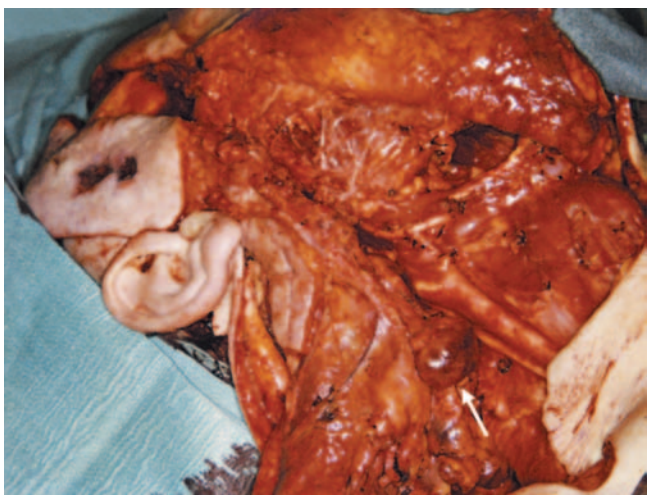


Figure 30.22 *A patient with an aggressive SCC of the temporal region with regional metastases to the parotid gland and neck. Local excision with en bloc parotidectomy and radical neck dissection was required (note the pathological lymph nodes in the neck specimen; see arrow). Adjuvant radiotherapy could not prevent recurrent regional disease. This patient died of lung metastases 15 months after treatment.*

ADJUVANT RADIOTHERAPY

Criteria for adjuvant radiotherapy of the neck and primary tumour region for SCC (and melanoma) should be followed strictly, and are:[50,99]

- angiolymphatic or perineural invasion
- advanced stage of the primary tumour
- deep invasion of bone and cartilage
- inadequate tumour margins
- multiple pathological lymph nodes (>1) and/or the presence of extracapsular nodal spread.

These criteria are similar to those in SCC of the aerodigestive tract and have been shown (in non-randomized studies) to diminish the risk of regional recurrence.[48,49,95,100]

RECONSTRUCTION OF SKIN CANCER DEFECTS

Primary reconstruction of skin cancer defects is safe in most cases, following proper patient selection and reliable histopathological examination techniques. In 'high risk' patients presenting with locally aggressive (recurrent) tumours, reconstruction should be delayed until cure is more certain.

Histopathological Examination Techniques

In order to establish a quality of care in surgery, the methods that are used by the pathologist to examine tumour margins should be understood by the clinician. The more completely the examination of the surgical margin can be performed, the more accurate the chance of cure can be estimated. For practical purposes, vertical transections (transverse or longitudinal sections, quadrant sections or a combination) through representative areas of the specimen are most commonly used (Figure 30.23). Failure to identify residual finger-like extensions in between the sampled areas is one of the most important factors in local recurrence (Figure 30.24).

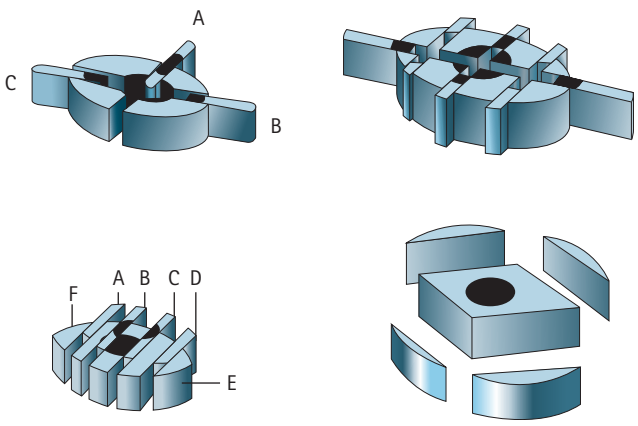


Figure 30.23 *Examples of vertical sectioning techniques used by the pathologist to evaluate the epidermal and deep resection margins.*

Peripheral vertical sectioning techniques are often used to evaluate the epidermal resection margins, and ideally the complete specimen including the deep margins is examined. Routine peripheral sectioning in the case of rectangular or triangular excisions of eyelid, ear, ala or lip does allow a complete check of margins. However, in other tumour locations, Mohs' micrographic surgery using oblique peripheral sections is needed to encompass the peripheral and deep margins (see Chapter 31 on Mohs' surgery). The key to Mohs' surgery is the excision and control of complete peripheral and deep resection margins in one plane, allowing orientation, identification, mapping and re-excision of microscopic tumour extensions (Figure 30.25).[101–106] These extensions can be followed without sacrificing inappropriate amounts of normal tissue.

Mohs' Surgery

MOHS' SURGERY AND PRIMARY RECONSTRUCTION

The concept of Mohs' micrographic surgery was introduced by Frederick Mohs in the mid 1930s. Based on an unconventional histopathological technique, which is discussed in detail in Chapter 31, Mohs' surgery aims to assess 100 per cent of the peripheral and deep margins of the excised specimen (see Figure 30.25). This allows the greatest assurance of complete tumour removal, yielding high cure rates with maximum preservation of uninvolved tissue in aesthetically important anatomical areas (Figure 30.26). Due to its high chances for cure, Mohs' surgery may be specifically indicated for SCC and a subset of BCC. Following the guidelines developed by the American Academy of Dermatology, this subset includes BCC with unfavourable histology or an unfavourable location, large BCC and recurrent BCC. In these cases, Mohs' surgery provides the best prospect of complete tumour removal and may therefore be considered as compulsory when planning for primary reconstruction with local or regional transposition flaps (Table 30.5).

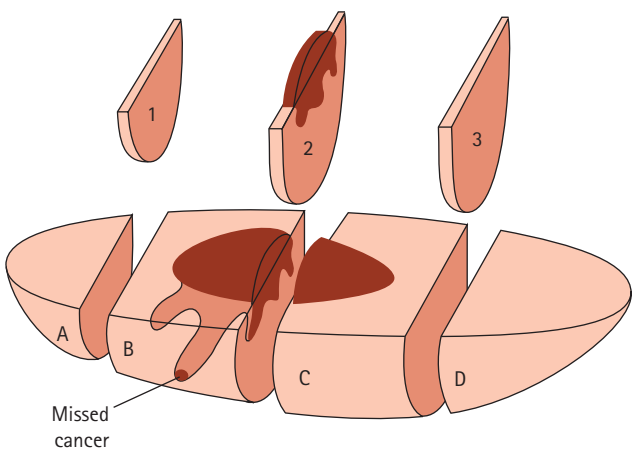


Figure 30.24 *Example of a transverse sampling technique failing to identify a residual finger-like extension in between the sampled areas.*

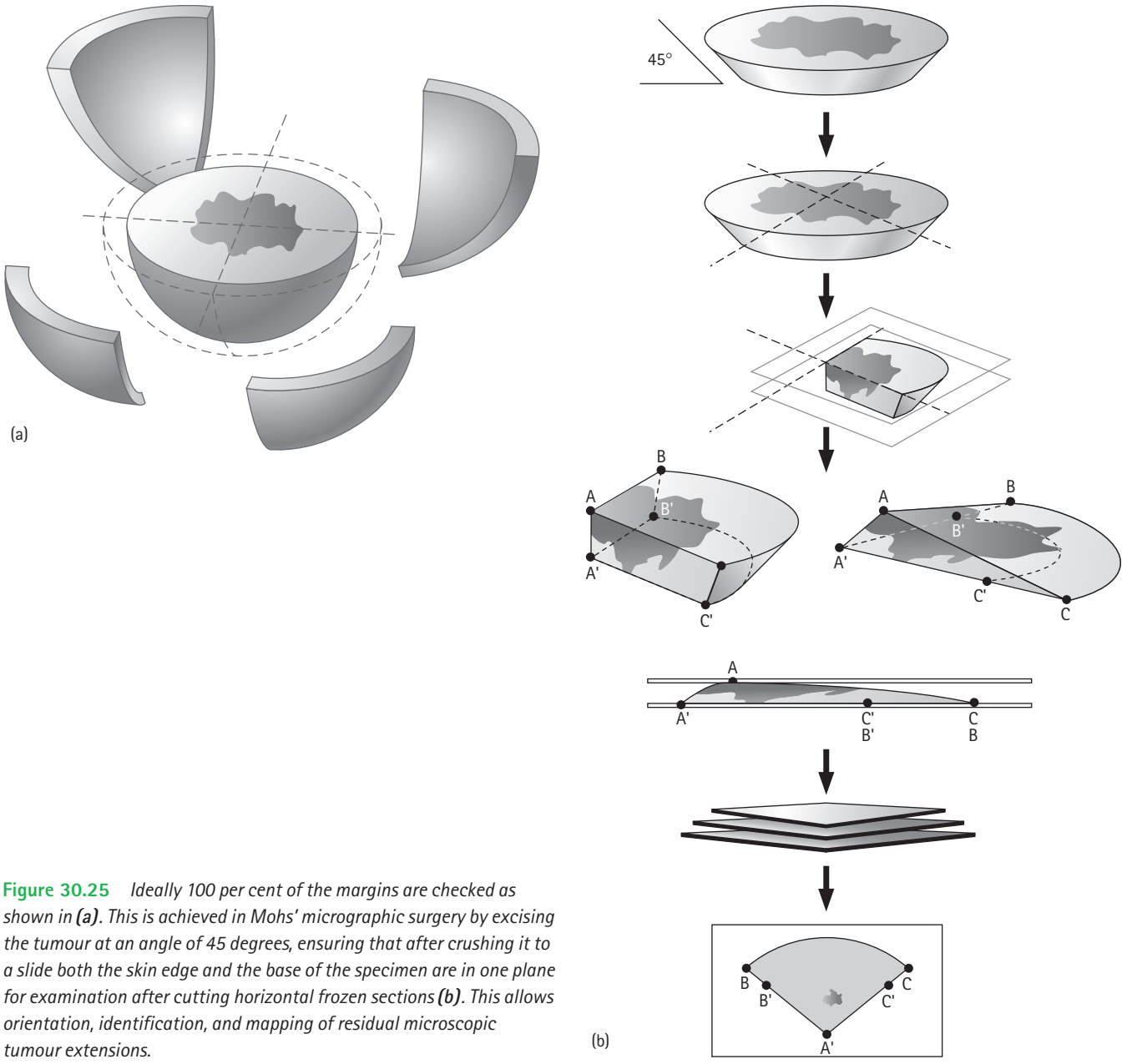


Figure 30.25 *Ideally 100 per cent of the margins are checked as shown in* ***(a)****. This is achieved in Mohs' micrographic surgery by excising the tumour at an angle of 45 degrees, ensuring that after crushing it to a slide both the skin edge and the base of the specimen are in one plane for examination after cutting horizontal frozen sections* ***(b)****. This allows orientation, identification, and mapping of residual microscopic tumour extensions.*

MOHS' SURGERY AND COST/BENEFIT RATIO

It should be realized that the Mohs' surgery technique lays a heavy burden on logistics from both the department of surgery and that of pathology, since several tissue preparations and repeated microscopical slide examinations are requested. For small primary tumours with minimal chance of recurrence, routine procedures are also efficient and very cost-effective. Often these tumours can be closed primarily without undermining of the adjacent skin, thus avoiding tumour seeding in a case of irradical resection. Mohs' surgery involves more expense related to longer operating time and additional laboratory assistance. However, when performed in collaboration with a pathology department, specific equipment such as cryostat and microscopes are already available. As Mohs' surgery greatly reduces the likelihood of recurrence, and allows immediate reconstruction in the same session, it is cost-effective especially in the treatment of recurrent tumours or primary tumours with a high incidence of recurrence following standard treatment.[107] Although 5 per cent of Mohs' surgeons believe that all BCC require Mohs' surgery, most of them will agree that this is excessive use of resources, despite the extremely high cure rates.[108,109]

Delayed Reconstruction

Surgical delay in wound reconstruction should be considered, sometimes even after Mohs' surgery, when there is any doubt about the completeness of resectioning.[110] Particularly in

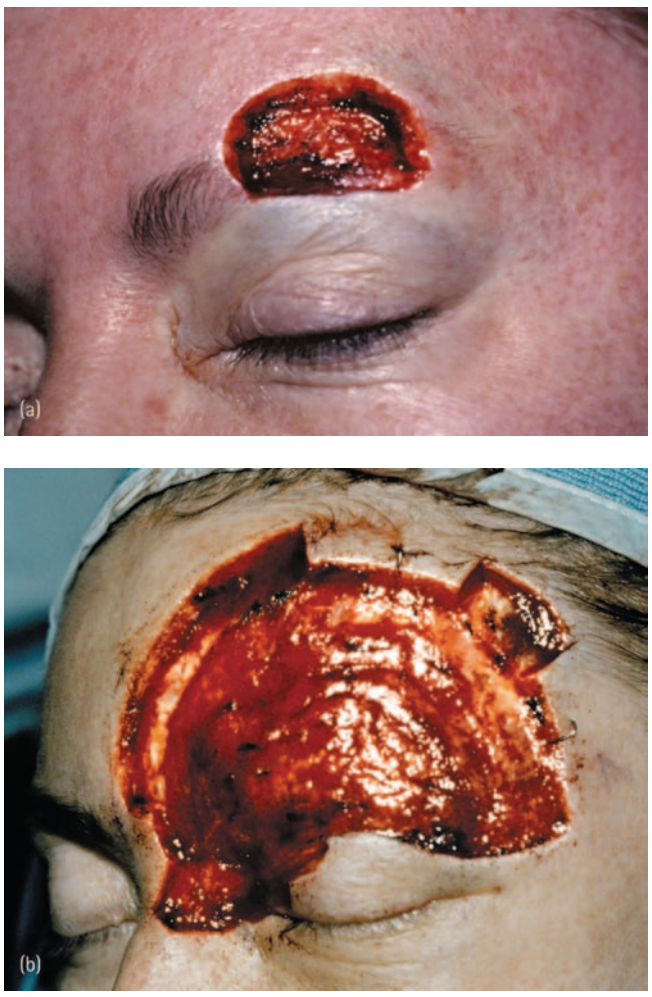


Figure 30.26 *Defect after first excision including a 3-mm margin of apparently healthy normal tissue (morphoeaform BCC).* ***(a)*** *Note the apparently uninvolved forehead skin around the defect.* ***(b)*** *Final defect after seven stages of Mohs' micrographic surgery. Valuable skin of the upper eyelid could be conserved, which simplified reconstruction.*

Table 30.5 *The ladder of reconstruction*

Primary closure
Secondary granulation
Unvascularized skin transplant
Local flap
Regional flap
Vascularized transposition with micro-anastomosis

largely aggressive skin tumours, for example in cases of perineural growth or deep bony invasion, delayed reconstruction is preferred.[36,111] When there is an increased chance of local recurrence it is better to avoid primary reconstruction and to attempt primary closure (facilitating re-excision) of the defect to provide the best possible long-term cosmetic and functional result (see Table 30.4). However, when closure of a wound requires considerable reconstructive procedures (e.g. a transposition or rotation flap) with extensive undermining (and

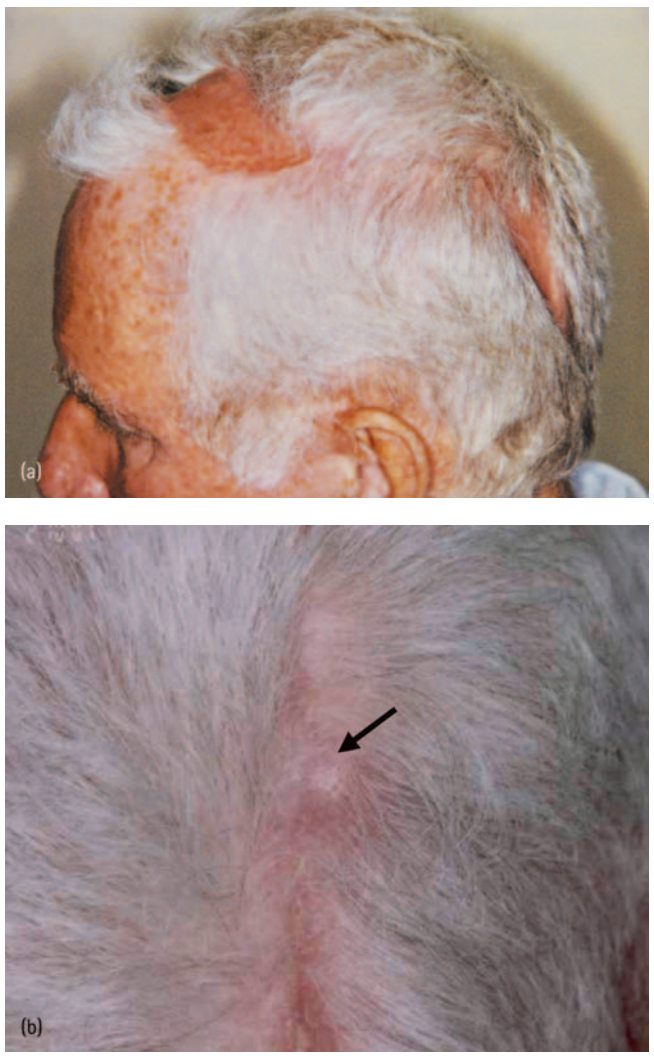


Figure 30.27 ***(a,b)*** *Patient treated in another institution with multiple irradical excisions of a SCC of the scalp. Finally, a large defect was reconstructed with rotation flaps after extensive undermining of the surrounding skin, whereas delayed reconstruction and skin grafting should have been the treatment of choice. After 6 months the patient was referred with local recurrence on the scalp and deep cervical metastases.*

possible tumour seeding) of the adjacent skin, delayed reconstruction is advised (Figures 30.27 and 30.28). Because of the danger of extensive local recurrence after reconstructive procedures in these specific cases, the timing of the reconstruction should be delayed to a later stage until more certainty has been obtained that no signs of tumour regrowth have evolved. If a delay in reconstruction is considered, the surgeon can choose from several alternative treatments, including secondary-intention healing, and split- or full-thickness skin grafting (Figures 30.29 and 30.30). Healing by secondary intention is often forgotten as a valuable alternative to immediate surgical reconstruction of a wound. Especially in concave areas of the face (Figure 30.31), the functional and cosmetic results of secondary-intention healing are equal to the results of more complex reconstructive surgery.[112]

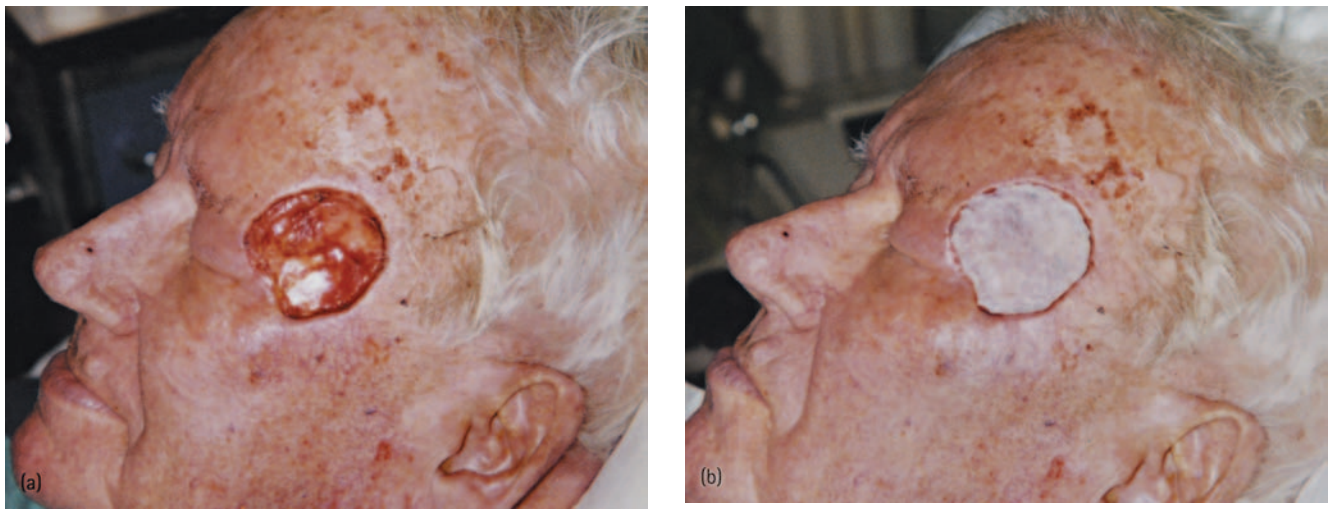


Figure 30.28 ***(a,b)*** *Example of wound closure with a split skin graft, in this case after removal of a SCC on the temple of a 91-year-old patient. The split skin graft was postoperatively stored in the refrigerator and positioned 1 day later to dry on the granulating wound defect. This procedure saves valuable operating time, saves the patient the discomfort of a bolster dressing, and gives excellent cosmetic results.*

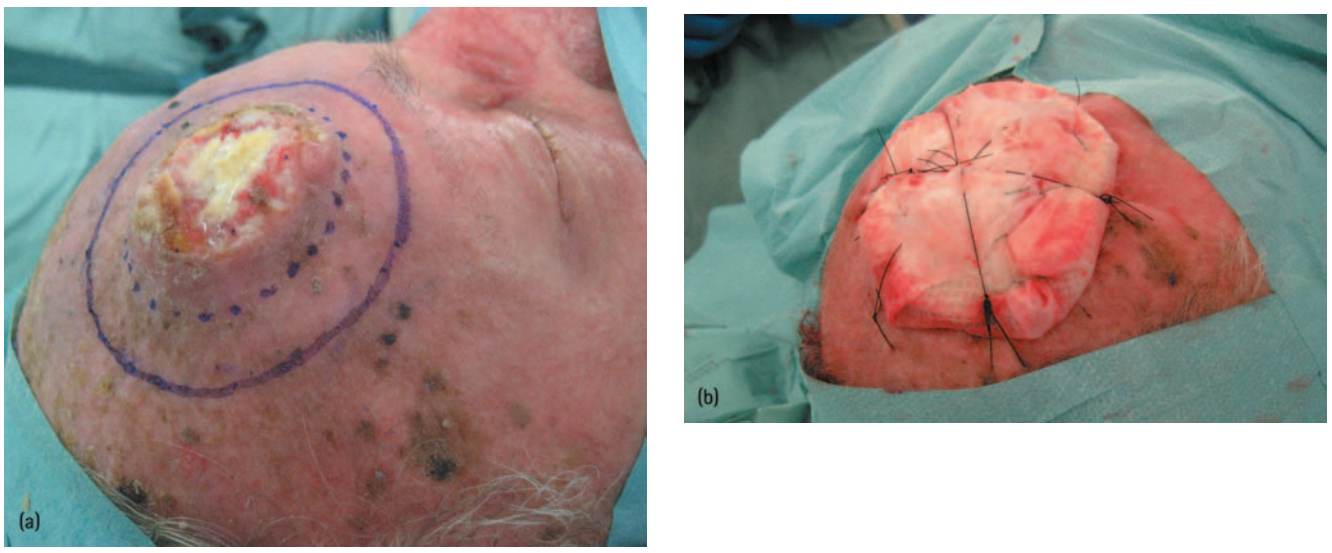


Figure 30.29 ***(a,b)*** *SCC insufficiently responding to treatment with XRT. The tumour was excised with wide margins. Delayed reconstruction was indicated in this aggressive tumour with periost fixation. The defect was closed with a split skin graft and bolster dressing after removal of the tabula externa with an otologic drill.*

ALTERNATIVE TREATMENTS TO SURGERY

In certain cosmetically and functionally important areas such as the nasal tip, nasal ala, lip, ear pinna and eyelid, conservation of tissue is essential when a tumour is excised. These sites have limited amounts of tissue for simple functionally and cosmetically elegant reconstructions. For these locations, alternative treatment modalities other than conventional or Mohs' surgery might be considered. Radiotherapy or photodynamic therapy are reported to offer cure rates of better than 90 per cent for small and superficially growing SCC, both with excellent cosmetic results. Also, cryotherapy can be effective in treating small BCC in the elderly, and is a very cost-effective procedure.

Primary Radiotherapy

Radiotherapy (XRT) has been used successfully to treat cutaneous malignancy, in particular for small and medium-sized lesions. Properly delivered, radiation treatment of BCC and SCC produces results comparable with those of surgery (local control better than 90 per cent), and with excellent cosmetic results, although in the long run local depigmentation and skin atrophy may develop.[113,114] For the treatment of primary tumours, radiotherapy can therefore be well used on the eyelid, ala, tip of the nose and other sites where tissue-sparing, function and cosmetic result are crucially important or where surgical excision would involve extensive reconstructive surgery, such as the nose or lip (Figure 30.32).

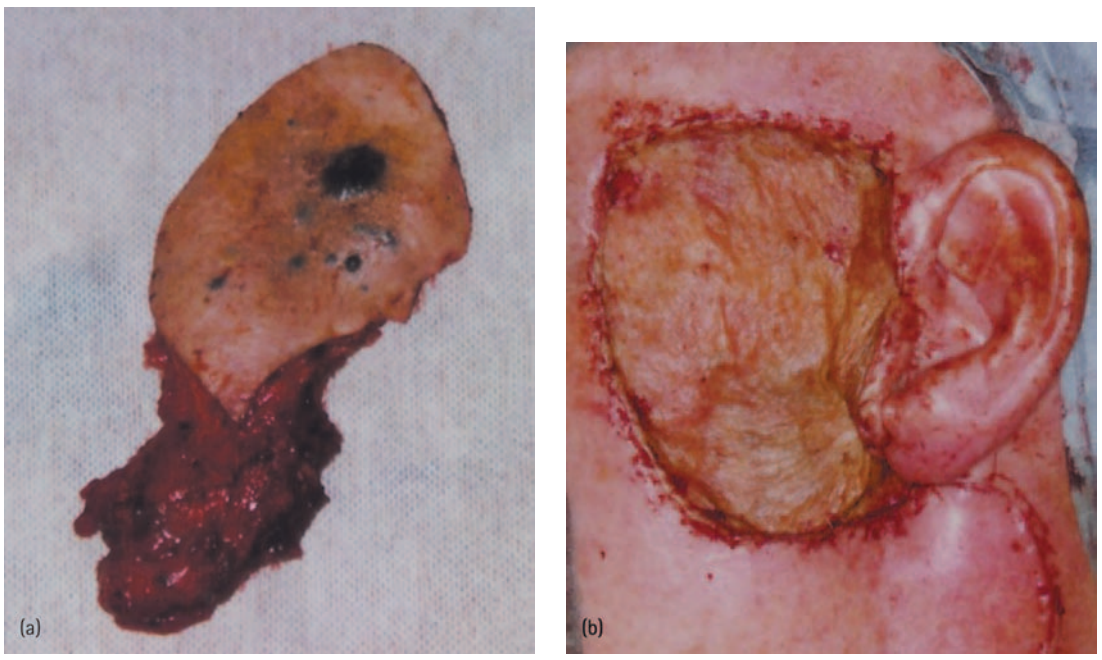


Figure 30.30 ***(a,b)*** *Wide excision and superficial parotidecomy of a nodular melanoma with multiple satellite lesions. The defect was closed by airtight closure with a split skin graft and vacuum drainage.*

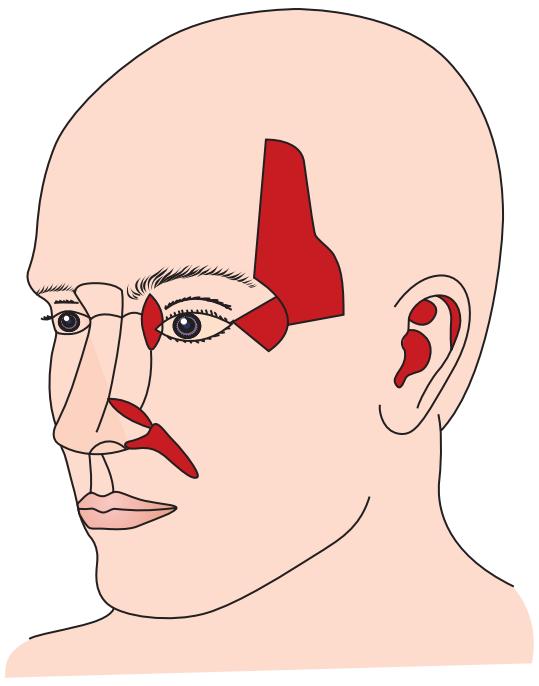


Figure 30.31 *Secondary-intention healing can be a valuable alternative to immediate surgical reconstruction of wounds, especially in the concave areas of the face that are shown in the figure (dark coloured areas).*

Lead shields are used to protect the uninvolved surrounding tissues (Figure 30.33). XRT for skin cancers is given in a highly fractionated schedule (18×3 Gy) and therefore requires a prolonged course of treatment, which may be cumbersome for the elderly patient group. Furthermore, whereas surgical scars improve with time, the cosmetic end-result

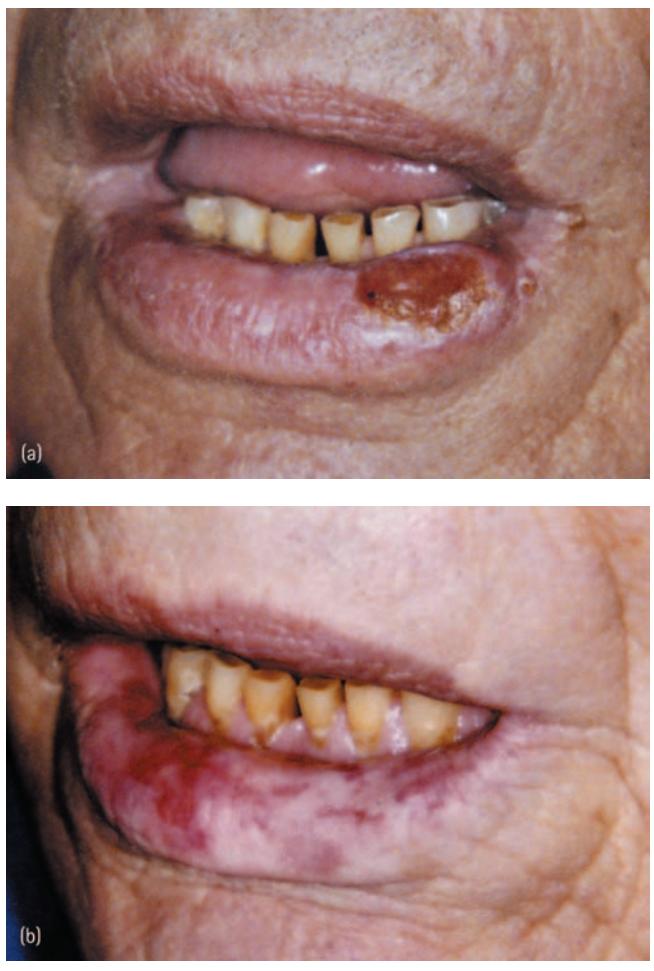


Figure 30.32 *A patient with an SCC of the lower lip* ***(a)*** *before and* ***(b)*** *after XRT, with a nice cosmetic and functional result.*

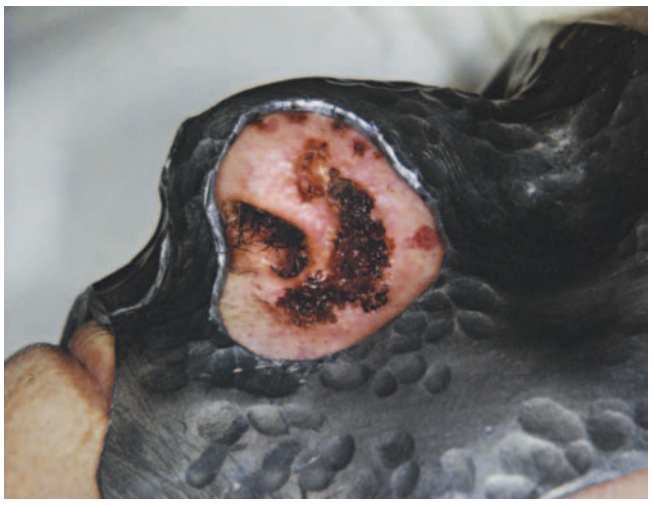


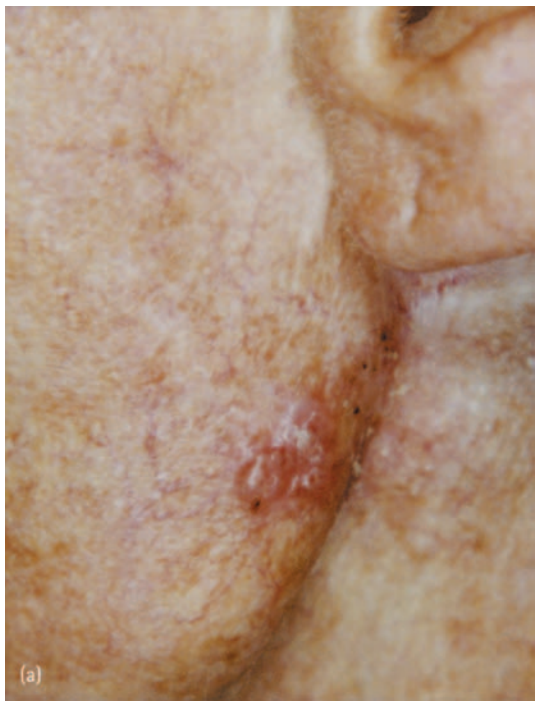
Figure 30.33 *Protecting lead shield in a patient with an SCC of the nasal ala treated with XRT.*

after XRT tends to worsen in some patients. Due to the potential for radiotherapy-induced carcinogenesis, XRT is also relatively contraindicated in young patients.[115,116] The production of permanent alopecia in hair-bearing regions is also an important factor to consider. Tissue for histological examination and control of margins is unavailable, which make it impossible to ensure the adequacy of treatment. In addition, recurrent tumours after XRT tend to be aggressive and difficult to manage.[117] Adequate follow-up is therefore required to detect possible tumour recurrence at an early stage.

Cryotherapy

Cryotherapy uses frostbite to create cold injury to the tumour and its periphery. Usually liquid nitrogen (boiling point −198.8°C) is used, because it is the only agent that can realize reliable deeper destruction. Freezing results in intracellular and extracellular ice crystals followed by vascular stasis, causing tissue anoxia and necrosis. Healing occurs by secondary intention.

Various cryotherapy techniques have been developed, but the so-called 'open-cone spray' technique is now generally preferred.[118] Similarly to XRT, tissue for histological examination and control of the margins is unavailable. The chance of recurrence for primary BCC after cryotherapy (8 per cent) is higher than with Mohs' surgery (1 per cent) and equal to XRT (9 per cent), and in the face the technique is therefore not indicated for skin cancers with unfavourable signs – such as recurrent BCC, large BCC, BCC with bad histological prognostic features, or BCC in cosmetically or functionally important locations.[117,119] However, cryotherapy can be very effective in treating nodular and superficial BCC on the cheek, forehead and eyelids of elderly patients, not least because it is a time- and cost-effective procedure (Figure 30.34 and 30.35). According to a recent survey of the literature, the recurrence



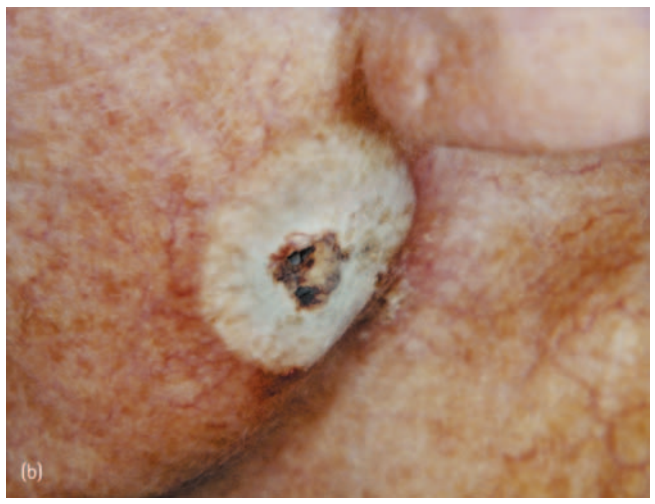


Figure 30.34 ***(a,b)*** *A patient after parotidectomy for a pleiomorphic adenoma who developed a BCC on the angle of the mandible. Since the marginal branch of the facial nerve was at risk, the lesion was treated with cryosurgery after elevating the skin from the underlying soft tissue by infiltration with local anaesthesia.*

rate is dependent on tumour diameter and therefore cryotherapy is indicated only in lesions with diameter less than 12 mm. As holds true for many treatments, cryotherapy requires experience to achieve maximum efficacy.

Photodynamic Therapy

Photodynamic therapy (PDT) utilizes a systemic photosensitizing drug that is selectively concentrated in tumour tissue and that, after being activated by exposure to light of a specific wavelength (652 nm), induces tumour necrosis by the

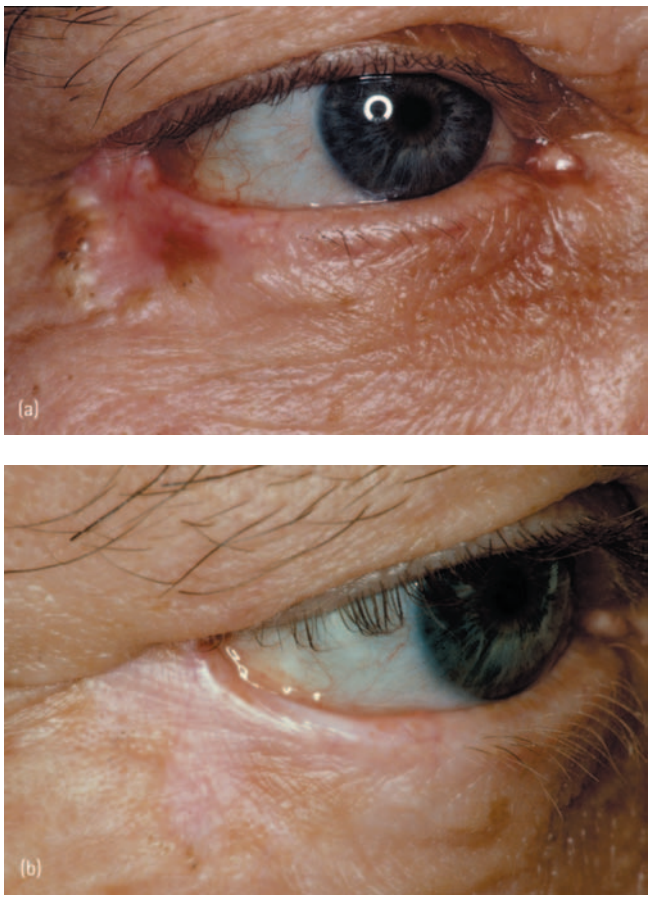


Figure 30.35 *A patient with a nodular BCC of the lower eyelid,* ***(a)*** *before and* ***(b)*** *after cryotherapy.*

formation of radical products (type I mechanism) or intracellular singlet oxygen (type II mechanism). In selected cases, skin tumours seem to be an ideal indication for PDT, because skin can be illuminated directly and the therapy success control is easy.[120] PDT is most useful in patients with basal cell syndrome who are suffering from multiple malignant skin tumours, since several lesions can be illuminated in one session, or in elderly patients who were previously treated with external-beam XRT on specific locations. Multiple repeat treatments are well tolerated, are without systemic morbidity and are amenable to local anaesthesia or intravenous sedation. A limitation is the restricted penetration depth of 5 mm, which means that only superficially growing BCC and SCC are suitable for treatment. The photosensitizing drug is costly, and skin phototoxicity after treatment remains evident for 2–3 weeks (after intravenous application), a period during which patients have to avoid extensive light exposure.

Recently, a topical sensitizer (methyl 5-aminolevulinate, MAL) has been developed that circumvents the problem of extensive photosensitivity and is less painful than previous ALA formulations.[121] Although compared to surgery there is a trend for higher recurrences with MAL-PDT,[122,123] controlled studies with topical MAL-PDT have shown that this treatment is effective in treating BCC patients at risk of complications and poor cosmetic outcome when using conventional therapy.[124]

The higher penetration depth of mTHPC (meta-tetrahydroxyphenylchlorin) seems to achieve better local control rates, but more substantial clinical evidence is needed.[125]

FOLLOW-UP

Patients at high risk for recurrence or metastatic spread need to be followed closely for long periods. Following treatment of BCC, the patient should be clinically examined for recurrent tumour once every 6 months for the first 2 years and once every year for the next 3 years, according to the Dutch guidelines for treatment of BCC. Thereafter, the patient should be examined for new primary tumours at yearly intervals by a dermatologist. Prospectively, it has been found that 36 per cent of patients who develop a BCC will develop a second primary within the next 5 years, usually in the sun-exposed head and neck region.[126] Early diagnosis and treatment of recurrent BCC or another primary BCC is desirable since treatment of the disease in its earliest stages results in less patient morbidity.[107,127]

SCC and melanoma have definite metastatic potential. It is important to stress that, unlike many malignancies, melanoma has a tendency to recur many years after the primary tumour has been removed. Therefore, these patients need to be followed very closely for long periods. According to the consensus of the Dutch Melanoma Working Party, a follow-up period of 5 years is sufficient for patients with a melanoma with greater than 1–2 mm Breslow thickness (provided there are no histological signs of regression) and of 10 years when the Breslow thickness is greater than 2 mm. The patient should be actively involved in the follow-up (inspection, palpation), whereas regular routine blood tests, radiological examination and ultrasound scanning are not considered to be worthwhile. Excessive exposure to ultraviolet radiation should be discouraged.[92]

CONCLUSIONS

A variety of treatment modalities are used for the treatment of skin cancer. Most of them result in high cure rates, provided they are used in properly selected patients. Knowledge of biological aggressiveness of certain cutaneous head and neck cancers is a prerequisite in this selection process. Decision-making in treatment requires a dedicated multidisciplinary approach of a dermatologist, a surgeon with head and neck oncological expertise, and a radiotherapist. In this respect, the burden of therapy of the individual skin cancer should always be balanced with emphasis on function, cosmesis and psychological circumstances.

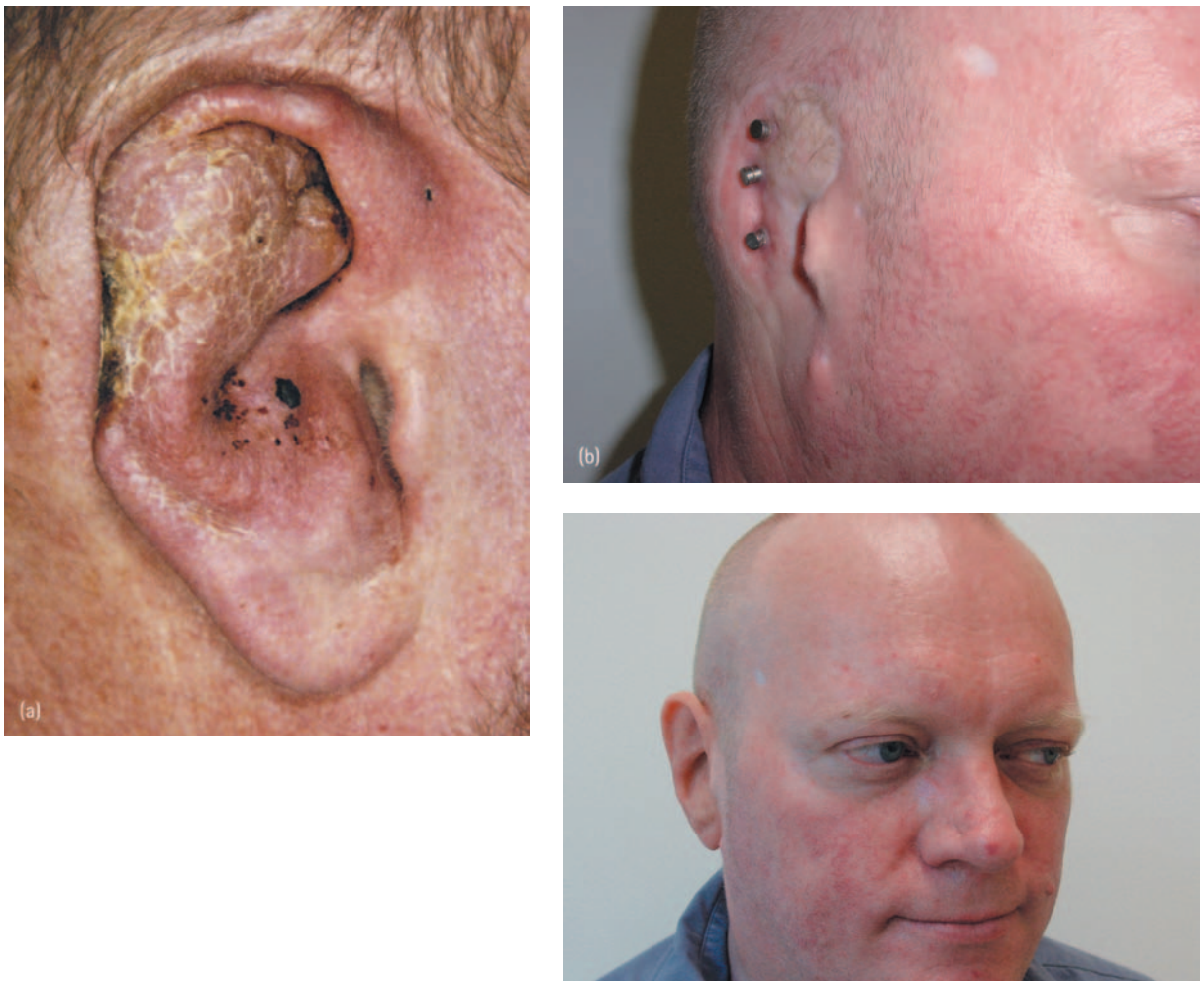
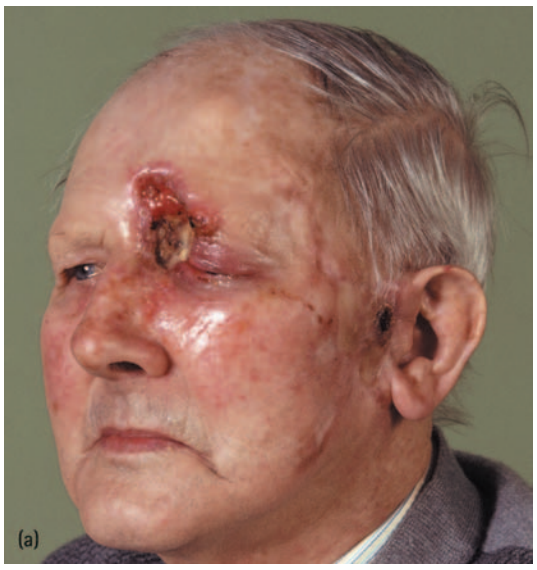
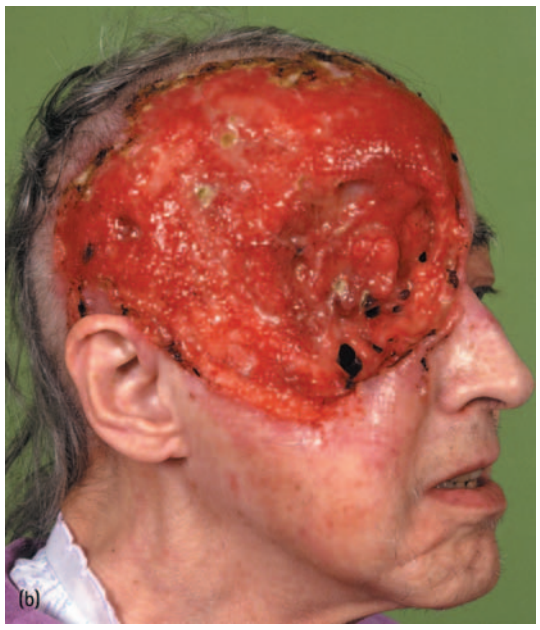


Figure 30.36 ***(a)*** *A large infiltrative BCC of the ear.* ***(b)*** *After amputation, skin grafting and implantation of osseo-integrated implants, the ear was reconstructed with a silicone prosthesis* ***(c)****.*

Cryotherapy can be effective in treating small BCC in elderly patients, and is a very cost-effective procedure. Primary radiotherapy is reported to offer cure rates comparable to conventional surgical excision and can be indicated for cosmetically and functionally important areas. Surgical excision of skin cancer provides a high cure rate and allows for histopathological control of margins. Mohs' surgery reduces the likelihood of recurrence, can save valuable unaffected skin, and allows primary reconstruction in the same session. In some indications the use of a prosthesis is preferred (Figure 30.36).

Although important, cosmetic or functional concerns remain secondary to cure and should therefore not compromise safe and complete tumour removal. Few clinical situations are more difficult than uncontrollable, recurrent skin cancer of the head and neck (Figure 30.37 and Figure 30.38). Knowledge of the management principles and identification of the high-risk patient is therefore important to obtain a successful outcome and to minimize morbidity of treatment. In these cases a skin graft may be applied as an interim method for reconstruction and will facilitate surveillance of the operative site for recurrence. In cases of aggressive skin cancer with metastatic potential, screening and management of regional lymph nodes in the parotid gland and neck is an essential part of the overall treatment.





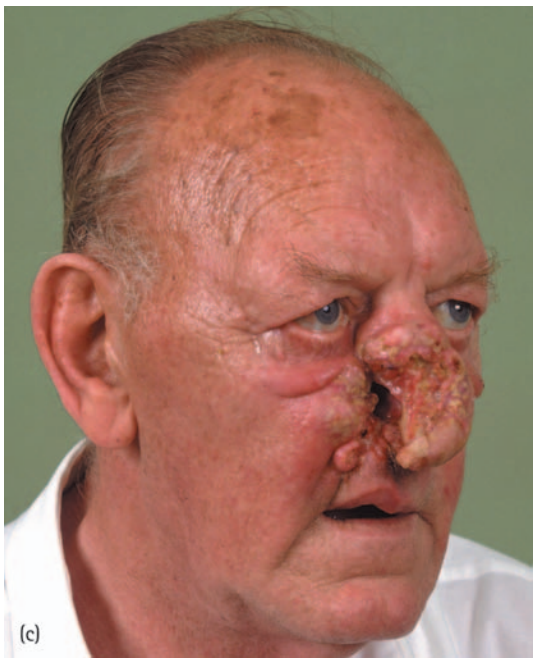
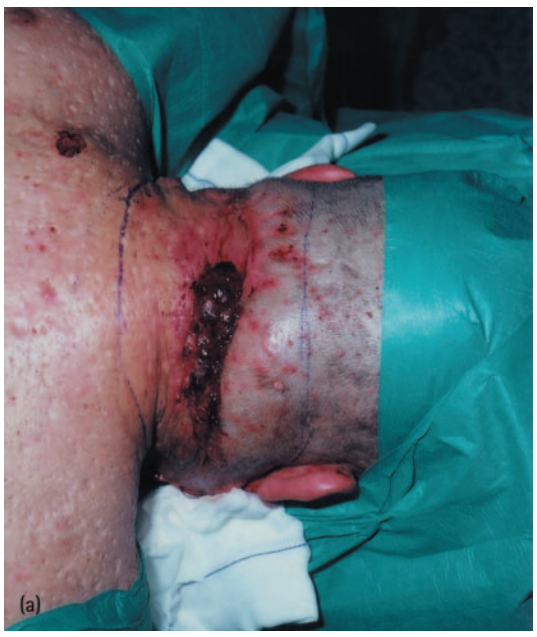


Figure 30.37 ***(a)*** *Recurrent SCC of the medial canthal region after inadequate surgery with invasion of the underlying bone.* ***(b)*** *Extensive recurrent BCC with lethal invasion of the dura. Defect after excision and exenteration of the orbit.* ***(c)*** *Recurrent SCC of the nose after inadequate surgery, requiring total amputation.*



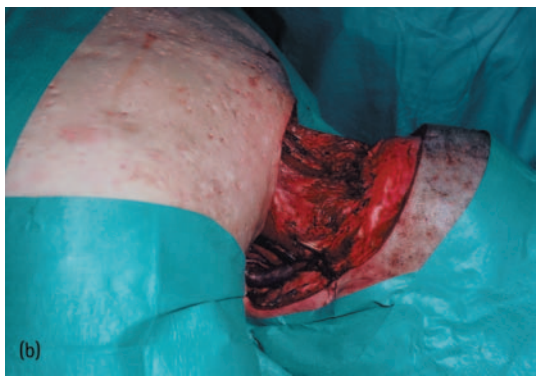


Figure 30.38 ***(a)*** *A patient with several incomplete excisions of an SCC of the posterior neck in another institution, was referred with a deepy infiltrating recurrent lesion and extensive bilateral regional metastases.* ***(b)*** *He was treated by wide surgical excision with en bloc bilateral neck dissection, reconstruction with bilateral pedicled lattisimus dorsi muscle flaps, skin grafting and adjuvant radiotherapy.*

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