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SFORL Guidelines

Guidelines of the French Society of Otorhinolaryngology (SFORL), short version. Extension assessment and principles of resection in cutaneous head and neck tumors

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ABSTRACT

Cutaneous head and neck tumors mainly comprise malignant melanoma, squamous cell carcinoma, trichoblastic carcinoma, Merkel cell carcinoma, adnexal carcinoma, dermatofibrosarcoma protuberans, sclerodermiform basalioma and angiosarcoma. Adapted management requires an experienced team with good knowledge of the various parameters relating to health status, histology, location and extension: risk factors for aggression, extension assessment, resection margin requirements, indications for specific procedures, such as lateral temporal bone resection, orbital exenteration, resection of the calvarium and meningeal envelopes, neck dissection and muscle resection.

1. Aggression risk in malignant cutaneous tumors of the face

The tumors referred to in this section are non-melanocytic tumors at risk of deep extension or recurrent non-melanocytic tumors: sclerodermiform basalioma, aggressive squamous cell carcinoma, trichoblastic carcinoma, adnexal carcinoma (microcystic adnexal carcinoma and sweat-gland carcinoma), Merkel-cell carcinoma and dermatofibrosarcoma protuberans.

1.1. Topographic factors

Skin cancer tends to develop in photo-exposed regions; the head and neck region is particularly at risk (75% of skin cancers). Certain locations are at particular risk of aggressive tumor and recurrence:

- convex photo-exposed regions: cheek, temple;

Abbreviations: AC, Adnexal carcinoma; AJCC, American Joint Committee on Cancer; BAD, British Association of Dermatology; BCC, Basal cell carcinoma; CT, Computed tomography; DFSP, Dermatofibrosarcoma protuberans; FDG, Fluorodeoxyglucose; GCS/GDS, German Cancer Society/German Dermatologic Society; MCC, Merkel cell carcinoma; MCPyV, Merkel-cell polyomavirus; MM, Malignant melanoma; MMS, Mohs micrographic surgery; MRI, Magnetic resonance imaging; MTM, Multidisciplinary team meeting; NCCN, National Comprehensive Cancer Network; NCI, National Cancer Institute; NHMRC, National Health and Medical Research Council (Australia); PET, Positron emission tomography; SCC, Squamous cell carcinoma; SFD, *Société française de dermatologie* (French Dermatology Society); SN, Sentinel node; TNM, Tumor node metastasis; UICC, Union for international cancer control; WLE:, Wide local excision.

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Table 1
AJCC non-melanocytic cancer TNM classification.

T: primary tumor	
TX	Insufficient information for classification of primary
T0	No sign of primary
Tis	In-situ carcinoma
T1	Tumor ≤ 2 cm in longest dimension
T2	Tumor > 2 cm in longest dimension
T3	Tumor extending to deep structures such as muscle, bone, cartilage, jaw or orbit
T4	Tumor with direct or perineural invasion of skull base or axial skeleton
In synchronous multiple tumor, the tumor with the highest T category is counted, with the number of tumors found shown in brackets	
N: regional adenopathies	
NX	Insufficient information for classification of regional lymph-node involvement
N0	No sign of regional lymph nodes
N1	Involvement of 1 regional lymph node, ≤ 3 cm in longest dimension
N2	Involvement of 1 regional lymph node, > 3 cm and ≤ 6 cm in longest dimension or multiple involvement but none > 6 cm
N3	Involvement of regional lymph-node > 6 cm in longest dimension
M: remote metastasis	
M0	No remote metastases
M1	Remote metastasis/es

Table 2
Non-melanocytic TNM cancer staging.

Stage 0	Tis	N0	M0
Stage I	T1	N0	M0
Stage II	T2	N0	M0
Stage III	T3	N0	M0
	T1, T2, T3	N1	M0
Stage IV	T1, T2, T3	N2, N3	M0
	T4	All N	M0
	All T	All N	M1

- peri-orifice regions, as these derive from fusion of embryonic buds on the median line, with low tissue resistance, allowing deep infiltration, especially along nerve axes.

In melanoma, location has relatively little impact on prognosis compared to the major factors of thickness (Breslow's depth) and metastatic involvement (see 1.3, "Histologic factors of poor prognosis", below). Even so, facial locations are considered as being at intermediate risk, and scalp and neck locations at high risk (level of evidence 2) [1].

1.2. Tumor size

In the 7th edition of the AJCC's TNM classification of non-melanocytic tumor, tumor size no longer counts except to distinguish between stages T1 (≤ 2 cm) and T2 (> 2 cm), [2,3] (Tables 1 and 2).

1.3. Histologic factors of poor prognosis in primary skin tumor

Other than size, histologic prognostic factors play a major role in tumoral aggressiveness and recurrence risk [2,3] (level of evidence 1) (Table 3).

1.4. Immunosuppression

Skin cancer in immunosuppressed patients often shows evolution requiring rapid treatment.

Table 3
Histologic factors of poor prognosis in primary skin tumor.

Cutaneous squamous cell carcinoma	Breslow's depth > 2 mm or Clark level ≥ 4 Perineural invasion Weak differentiation
Basal cell carcinoma	Histologic type: sclerodermiform, infiltrating or metatypic (basosquamous) Perineural invasion
Melanoma	Breslow's depth Ulceration Mitosis count ≥ 1/mm^2 Clark level Vascular, lymphatic and perineural invasion
Merkel cell carcinoma	Diffuse architecture Breslow's depth Mitoses Vascular or lymphatic emboli

2. Extension assessment by imaging

2.1. Local and contiguous extension assessment

2.1.1. Soft tissue extension

MRI is the key examination for detection, local assessment and monitoring of evolution, due to its excellent diagnostic sensitivity in soft tissue (Table 4).

It enables objective assessment of depth extension, to determine the possibilities of resection, and reproducible target measurements for follow-up under radiochemotherapy.

2.1.2. Bone extension

In case of suspected underlying bone extension, CT with bone reconstruction is recommended. Bone involvement is to be strongly suspected in case of cortical lysis and/or permeation, periosteal reaction or osteocondensation in contact with the lesion. Cancellous bone invasion, however, is better assessed on MRI.

2.1.3. Meningeal extension

MRI is the examination of choice for cranial extension. Meningeal invasion is to be suspected in case of thickening and

Table 4
Extension assessment guidelines and radiologic follow-up per type of skin tumor.

Basal cell carcinoma	No systematic extension assessment In case of deep or locoregional invasion lymph-node extension: cervical ultrasound or CT local soft tissue, perineural or intracerebral extension: MRI bone extension: bone scan
Squamous cell carcinoma	In-situ carcinoma and patients without prognostic risk factors: cervical lymph-node ultrasonography In case of prognostic risk factors and/or clinical alarming signs: cervicothoracic CT, abdominal-pelvic CT, cerebral CT In case of risk factors for perineural extension and/or neurologic clinical signs: MRI of intra- and extra-cerebral trajectory of cranial pairs Surveillance: cervical and parotid lymph-node ultrasonography every 6 months for 5 years
Melanoma	Stage II (AJCC): cervical lymph-node ultrasonography Stage III: cervicothoracic, abdominal-pelvic and cerebral CT (full body)
Small cell Merkel's carcinoma	Locoregional and cervical lymph-node ultrasonography + full-body CT (thoracic-abdominal-pelvic and cervico-encephalic) In case of MTM decision: head and neck MRI, brain MRI, PET scan Surveillance assessment: locoregional and cervical lymph-node ultrasonography every 3 months for 2 years, then every 6 months; full-body CT according to initial involvement, especially in case of lymph-node metastasis

contrast uptake in the meningeal envelopes adjacent to the tumoral lysis of the skull.

Guideline 1

In facial tumor with deep extension, head and neck CT and MRI should be associated for exhaustive exploration of the various tissular structures (Expert opinion).

Pre-treatment imaging assessment is essential to management and requires good anatomic knowledge and skill in head and neck imaging, as well as coordination with the clinician (Expert opinion).

2.2. Remote extension assessment

2.2.1. Lymph-node extension

Classical examination is indispensable but shows limited sensitivity (Table 4).

Ultrasonography shows better sensitivity and specificity than simple clinical examination [4] (level of evidence 1). It is also non-invasive, inexpensive and easily reproducible although operator-dependent.

CT provides lymph-node visualization, while being easier for the clinician to interpret and less operator-dependent. It is the reference examination due to its high definition. It has the drawback of being irradiating, and should not be unnecessarily repeated.

MRI also shows good definition and easily interpreted images. It is not irradiating, but has well-known material contraindications (clips and metal implants, pacemaker, etc.) and is poorly tolerated by claustrophobic patients.

^{18}FDG PET-CT is effective in screening for remote metastasis, but does not seem preferable to the previous three examinations for diagnosis of locoregional lymph-node metastasis [4] (level of evidence 2). The technique is improving, but does not easily detect < 10-mm adenopathies, with a 2–6% false-positive rate, depending on the series, in both lymph nodes and tissue, due to local scarring, inflammation or infection [5] (level of evidence 4).

Ultrasound- or CT-guided fine-needle aspiration is only contributive when positive; negative findings do not allow extension N status to be determined.

The sentinel node (SN) technique, described by Morton in 1990 [6,7], uses 99mTc, a radiotracer injected around the lesion. Lymphatic drainage basins are located by skin marking by a gamma probe, 2 hours after injection [8] (level of evidence 4). Limited gamma-probe guided skin incisions centered on the skin markings identify the adenopathies serving as initial relay. Any lymph-node specimens are sent for pathologic analysis. Frozen section biopsy is useful in SCC, as it allows dissection in the same step, but is of no interest in malignant melanoma (MM). Difficulty in identifying the SN in case of head and neck skin tumor may be due to masking "background noise" if the tumor site is close to the SN, to the surgeon's learning curve, to excessive tracer injection or excessive interval between injection and surgical location. According to some authors, parotid location is a contraindication to sampling (greater risk of facial nerve lesion than in surgical parotidectomy) [8,9] (level of evidence 4). The new portable gamma-cameras seem to enhance precision [10] (level of evidence 2).

So-called "functional" selective dissection is more reliable, but more invasive, with risk of neural complications (notably VII and XI), scarring and functional impairment, and is therefore indicated if and only if prognosis is sufficiently improved by first-line dissection in case of N0 or complementary dissection in case of SN positivity.

2.2.2. Remote visceral extension

Chest X-ray and abdominal ultrasonography can usefully be replaced by thoracic-abdominal-pelvic CT to screen for lung and liver metastasis, completed by brain scan. Thoracic CT screens for mediastinal adenopathies, pulmonary parenchymatous locations and less frequent pleural and osseous locations.

Abdominal-pelvic CT screens for secondary liver and bone locations.

Contrast-enhanced cerebral CT screens for cerebral-meningeal metastasis.

Assessment may be completed by PET scan (see below, 2.3.2: imaging in melanoma) or SN biopsy.

2.2.3. Perineural extension

Extension should be explored both in the skull-base foramina and perineurally right along the nerve, from the initial lesion up to the intracerebral nucleus; the nerve may be discontinuous, and therefore, the entire trajectory of the cranial nerves should be analyzed.

The nerves most frequently involved are, in descending order: V2, V3, VII [11] (level of evidence 4) and, less frequently, V1 and the vidian nerve.

It is recommended to explore systematically for perineural lesion in case of proven deep extension or risk factors for aggression: lesion of the mid-face or of embryonic fusion areas, recurrent skin tumor, histologically high-grade tumor, and high-growth tumor with elevated risk of perineural infiltration [11] (level of evidence 1).

The reference examination for perineural extension is MRI [11–13] (level of evidence 4). Perineural infiltration usually shows as hypersignal on T2-weighted sequences and uptake in the nerve, which is of increased size. The skull-base foramen involved is usually enlarged. Signal abnormality may extend to the cavernous sinus, trigeminal cave and cerebral parenchyma.

Guidelines for remote extension assessment according to tumor type are presented in sub-section 2.3 (below).

2.3. Remote extension according to tumor type: squamous cell carcinoma, malignant melanoma and Merkel cell carcinoma

While basal cell carcinoma does not require extension assessment, other skin tumors do. We detail below the indications for remote extension assessment in infiltrating SCC, MM and MCC.

2.3.1. Infiltrating SCC

Facial SCC involves a high risk of lymph-node metastasis (0.3–16%, according to series) [14,15] (level of evidence 4).

Risk of lymph-node metastasis is increased by the following prognostic factors [16,17] (expert opinion):

- clinical parameters:
  - size > 2 cm,
  - location (lip, ear, nose, non-photo-exposed areas, etc.),
  - poorly visible margins,
  - immunosuppression (major risk factor),
  - local recurrence of SCC,
  - rapid growth tumor,
  - neurologic symptoms of invasion,
  - tumor on scar tissue (burn or trauma), previous radiation therapy, ulcerated tumor site;
- histopathologic parameters:
  - thickness >4 mm and depth (Clark levels IV or V), indicating deep adherence and risk of extension: Clark V lesions > 5 or 6 cm show > 15% remote extension risk [17] (level of evidence 3);
  - moderate or low cellular differentiation;

- form: acantholytic SCC, mucoepidermoid SCC, desmoplastic SCC;
- perineural invasion (2–14% depending on series).

The perineural extension risk factors in SCC are:

- mid-face location;
- embryonic fusion area;
- recurrent skin tumor;
- high histologic grade;
- high growth rate.

In SCC with low risk of evolution, as in in situ SCC, no complementary examinations are required. In high-risk SCC, locoregional lymph-node areas should be examined on ultrasound. Other examinations are to be discussed in the multidisciplinary team meeting (MTM). Some teams use CT and MRI. The precision of PET-CT is improved by coupling to ultrasonography or MRI. SN biopsy should be used only in experienced centers [18] (level of evidence 4). Regarding neck dissection:

- for patients assessed as N0, neck dissection may be decided on in the MTM in case of major risk factors;
- it may be decided on in the MTM in case of positive SN biopsy;
- it is indispensable in N+ patients.

Impact on survival does not differ between radical and functional neck dissection [10,19] (level of evidence 1).

Guideline 2 (Expert opinion)

SCCs with low risk of evolution and in-situ tumors do not require complementary examination, whereas tumors with deep extension or high risk of evolution require cervical ultrasonography (lymph-node assessment). Other examinations (CT, PET-CT and SN) are indicated only on MTM decision. When indicated, SN biopsy should be performed by an experienced team.

NB: Radiologic follow-up.

Although somewhat outside the scope of this article, it should be noted that radiologic follow-up of facial SCC consists of simple clinical surveillance in case of low risk of evolution and locoregional ultrasound scan of the lymph-node drainage basin every 6 months for 5 years in case of risk of aggression [17] (expert opinion). Other assessments are made on MTM decision according to risk level or intercurrent clinical events.

2.3.2. Malignant melanoma

There is a 15% to 20% rate of occult lymph-node metastasis in N0 patients with head and neck melanoma [20] (expert opinion). It is therefore essential for locoregional extension assessment to explore for infraclinical adenopathies if lymph-node area palpation appears normal. The most frequent form of evolution (70% of cases of extension) in melanoma is locoregional spread (in-transit and locoregional lymph-node metastases) and assessment should be performed according to AJCC/UICC stage [11] (level of evidence 2). Systematic SN biopsy is not recommended in clinically N0 patients (expert opinion). The procedure may, however, be performed in MM with > 1-mm thickness or ulceration, positive findings having prognostic value [21] (level of evidence 4), or even, according to certain authors, in thinner MM [22] (level of evidence 4), sometimes associated to ultrasound to improve precision [23]. Slides should be read on immunohistochemistry (S100, HMB45, etc.). Prophylactic functional neck dissection in N0 patients appears to have no impact on overall survival (equal survival with prophylactic, secondary or no dissection) [24] (expert opinion). Neck dissection in case of positive SN reveals further lymph-node metastases in 16–28% of cases depending on the study [25] (level of evidence 3), but does not affect overall survival or metastatic evolution.

Guideline 3

In AJCC stage I N0 melanoma and in situ melanoma, no complementary examinations are necessary (expert opinion).

In stage IIa and b N0 melanoma, lymph-node drainage area ultrasonography should be performed (expert opinion).

In stage IIc and III, ultrasonography should be completed by complementary imaging (CT, MRI or PET-CT) on MTM decision (expert opinion). SN biopsy is an option in clinically N0 patients depending on Breslow's depth and possible ulceration (expert opinion).

N stages other than 0 and positive SN biopsy require imaging on MTM decision.

NB: Radiologic follow-up.

Although somewhat outside the scope of this article, it should be noted that radiologic follow-up in MM comprises:

- no systematic paraclinical work-up in AJCC stage I (grade II);
- in stage II and III, as well as complete clinical examination every 3 months for 5 years, lymph-node drainage area ultrasonography every 3 to 6 months is justifiable without being indispensable (expert opinion). The need for and rhythm of surveillance imaging should be decided in the MTM.

2.3.3. Merkel cell carcinoma

MCC is rare but aggressive, to be differentiated from neuroendocrine or small-cell skin cancer. Abnormal DNA repair is implicated in MCC [26], generally affecting patients over 50 years of age. Lymph-node invasion is considerable (50–80% depending on the series) (level of evidence 4). Fifty percent of patients receiving prophylactic neck dissection show micrometastasis according to Goepfert et al. [27] (level of evidence 4). Most authors therefore recommend complementary examination (CT, MRI and PET) as of initial assessment [28,29].

Guideline 4 (Expert opinion)

In Merkel cell carcinoma, cervical ultrasonography should be systematic, as should thoracic-abdominal-pelvic and head-and-neck CT, given the frequency of metastasis. MRI and PET-CT are to be discussed in MTM, as is SN.

In clinically N0 patients, surgical revision to enlarge resection after histologic diagnosis may be completed by SN biopsy with extemporaneous examination, or primary prophylactic neck dissection according to MTM decision. In non N-0 stages, neck dissection is mandatory, and classical 3-monthly clinical and ultrasound follow-up should include imaging as at initial assessment.

NB: Radiologic follow-up.

Although somewhat outside the scope of this article, it should be noted that radiologic follow-up in MCC comprises:

- iterative clinical examination every 3 months for 2 years, then every 6 months;
- locoregional ultrasonography and full-body CT or PET-CT at a rhythm decided on in MTM.

Table 5
Indications and interest of imaging examinations according to tumor location.

Topography	Examination	Specific analyses
Periorbital region	MRI	Eyelids Orbit contents: extra- and intra-conic fat, muscles, eyeball, optic nerve, nerve V2 Tear ducts
	CT	Orbit edge Papyraceous plate Orbital floor/roof Maxillary/ethmoid sinus bone walls Skull base with neural foramen
Auricular region	CT	Tympanic bone, mastoid, petrous pyramid arcade
	MRI	Pinna Nerve VII Meningeal/brain tissue
Nose, lips, cheek, parotid region	MRI	Cutaneous, fatty, muscular, cartilage and neural (V2, V3, VII) structures, parotid gland
	CT	Superior maxillary, zygoma, zygomatic arcade, mandibular bone, sinus walls, skull base with neural foramen
Scalp and forehead	CT	External/internal cortical bone, diploe, frontal sinus
	MRI	Intracranial meningeal and cerebral extension, nerve V1

2.4. Remote extension assessment according to tumoral topography

Table 5 presents indications for imaging according to tumoral topography.

3. Definition of safe margins in cutaneous resection

This section excludes the question of resection margins in melanoma with deep extension, considered as a general disease.

Malignant tumors are resected with lateral and deep safety margins, as they frequently show microscopic extension, leading to local recurrence. Resection should be guided by histologic diagnosis and by tumor subtype and depth of invasion as determined by prior biopsy. Prior biopsy is not mandatory for clinically typical nodular basal cell carcinoma (BCC) and is contraindicated in suspicion of melanoma. The reliability of the histologic study of the margins can be enhanced if the surgeon indicates which areas are most clinically suspect. Extemporaneous examination is an alternative, using frozen sections to provide information and guiding any intra-operative revision, but cannot be used in certain complex histologic diagnoses [30–32] (level of evidence 4). The reference technique is Mohs micrographic surgery (MMS), in which iterative sectioning is guided by intra-operative margin analysis on frozen sections, with complete visualization of lateral and deep margins, after an initial resection restricted to the macroscopic tumor [33–34] (level of evidence 1) [35] (level of evidence 4). This technique improves cure rates, maximizing sparing of healthy tissue, which is especially interesting where the face is concerned. It is, however, available in only a few centers in France, making it poorly adapted to the high rate of skin tumor and the reality of the French health care system. “Slow-Mohs” is a variant in which margins are checked as in MMS but with analysis on paraffin-conserved sections performed some days later, requiring iterative surgical revision and covering [36] (level of evidence 4). In centers that do not perform MMS or Slow-Mohs, two-step resection is possible, based on classic (i.e., partial) histopathologic margin analysis. Any revision and defect covering is postponed for a few days, depending on the pathology results. Compared to the standard procedure, two-step resection thus avoids sacrifice of flaps in case of initially incomplete resection.

Guideline 5
The Mohs technique should be used where practically feasible (expert opinion).

3.1. Guidelines for margins in sclerodermiform basalioma [36–44]

Guideline 6
Ten-millimeter lateral margins should be respected in sclerodermiform basalioma, whether recurrent or not, to be adapted according to location and extended in case of large tumor (Recommendation grade A). Deep margins should extend to the hypodermis and reach, while respecting (unless invaded), the aponeurosis (forehead), perichondrium (ear, nose) and periosteum (scalp) (Recommendation grade C). No complex closure should be performed before obtaining intra- or postoperative assessment of resection quality (Recommendation grade C). MMS should be considered in sclerodermiform basalioma of facial area H (Recommendation grade C), facial BCC exceeding 2 cm (Recommendation grade A) and recurrence (Recommendation grade A), while allowing for the difficulty of access to MMS in France.

3.2. Squamous cell carcinoma (SCC) [45,46,36,47,37]

Guidelines for MMS in SCC reflect the differences in access to the technique in different countries [48–52] (level of evidence 1). Guidelines on MMS indications vary widely between different scientific societies: BAD, NCCN, NHMRC, NCI, GSC/GDS [49–52].

Guideline 7
Four-millimeter lateral margins should be respected (Recommendation grade A) in low-risk SCC and at least 6-mm margins in high-risk SCC (i.e., with at least 1 recurrence risk factor: see section 2.1.3.1, above) (Recommendation grade A). Margins should be increased to 10 mm or even more in case of cumulative risk factors for infraclinical extension: incomplete primary resection, high histologic grade, Clark level V, perineural invasion (Recommendation grade C).

Deep margins should be proportional to lateral margins, preferably reaching the periosteum in the forehead and scalp and the muscular aponeurosis in the neck. Resection should usually cross nose and ear cartilage (expert opinion).

It is often difficult to respect intended margins without impairing functional prognosis. Such cases require highly specialized management (Recommendation grade C).

3.3. Adnexal carcinoma (AC)

There are at present no published scientific guidelines for surgical treatment of AC. It is not unusual for diagnosis to be founded on definitive histology of the surgical specimen, which reduces the possibilities of earlier guidance of resection. AC is usually classified as eccrine sweat-gland carcinoma, apocrine sweat-gland carcinoma, sebaceous carcinoma or pilar carcinoma [53,54] (level of evidence 4). For the purposes of the present treatment guidelines, AC is classified by 3 levels of aggressiveness: low malignancy with

rare recurrence; mainly local malignancy with frequent infraclinical extension and perineural invasion; and systemic malignancy with high risk of local recurrence, regional and visceral metastasis and death.

Guideline 8

Five-millimeter lateral margins should be respected in low-malignancy AC (superficial eccrine porocarcinoma and trichilemmal carcinoma) (Recommendation grade C); 10 mm in mainly locally malignant AC other than microcystic adnexal carcinoma (trichoblastic carcinoma, eccrine mucinous carcinoma, malignant pilomatricoma, cystic adenoid carcinoma and eccrine syringomatous carcinoma) (Recommendation grade C); 10 to 20 mm in systemically malignant AC (apocrine sweat-gland carcinoma, infiltrating eccrine porocarcinoma, ocular and extra-ocular sebaceous carcinoma, spiradenocarcinoma and hidradenocarcinoma) (Recommendation grade C); and $\geq$ 20 mm in microcystic adnexal carcinoma (Recommendation grade C). Deep margins should extend to the hypodermis and reach, while respecting (unless invaded), the aponeurosis (forehead), perichondrium (ear, nose) and periosteum (scalp) (Recommendation grade C). MMS should be used in first intention in microcystic adnexal carcinoma (Recommendation grade B) and considered in infiltrating eccrine porocarcinoma, ocular sebaceous carcinoma (Recommendation grade C) and in difficult, notably peri-orifice, locations (Recommendation grade C), while allowing for the difficulty of access to MMS in France.

3.4. Merkel cell carcinoma (MCC)

MCC is a rare primary neuroendocrine skin tumor, aggressive, with high risk of recurrence and locoregional and remote metastasis. Treatment associates surgical resection, radiation therapy and chemotherapy, but is poorly codified due to the rarity of the condition and lack of randomized prospective comparative studies [55] (level of evidence 4) [56,57] (level of evidence 3).

Guideline 9

Most cases of MCC are treated by wide local excision (WLE) of the primary and the drainage lymph nodes.

Regardless of tumor size, if there is no regional or remote metastasis, resection of primary MCC should be total, with histologic margin analysis.

In the face, where WLE is difficult, a 1-cm lateral margin may be enough if validated in MTM (Recommendation grade B) or Mohs micrographic examination may be used.

Reconstruction can usually be associated in the same step, or later in case of extensive tumor, ensuring safe margins and preferably using simple techniques so as to facilitate surgical site surveillance (Recommendation grade B).

SN biopsy-resection should be performed in the same step as resection of primary MCC (Recommendation grade B). If SN examination finds tumoral invasion, complementary neck dissection is indicated, even though it is uncertain whether this improves overall survival (Recommendation grade C).

3.5. Dermatofibrosarcoma protuberans (DFSP)

DFSP is a rare fibroblastic skin tumor which is nevertheless the least exceptional skin sarcoma. The clinical aspect is of a large embossed multinodular tumor adhering to the surface of the skin and infiltrating the dermis and hypodermis often beyond palpable limits.

Overall annual incidence is estimated at 1–4 per million and sex ratio is close to 1. Diagnosis is usually in the 3rd or 4th decade of life, although all ages may be affected [60] (level of evidence 4).

DFSP is an essentially local sarcoma of low-to-intermediate malignancy. Remote metastasis is rare.

MMS considerably reduces the risk of incomplete resection and unnecessary sacrifice of healthy tissue.

There are few specific studies of head and neck DFSP treatment.

Guideline 10 [58,59]

Regarding adjuvant treatment in MCC, it is recommended to associate radiation therapy to surgery, as it provides benefit in terms of locoregional recurrence and overall survival (Recommendation grade B). Chemotherapy has been tried in remote metastasis, but at present, no prognostic benefit has been demonstrated (Recommendation grade B).

Guideline 11

The choice of surgical technique for DFSP should take account tumor size and location and the blemish resulting from surgery. In head and neck locations, Mohs micrographic surgery (MMS) is recommended in first intention, due to the difficulty of wide local excision (WLE) in this region (Recommendation grade B). MMS should be performed by a team with dedicated experience, as it is difficult. If MMS is not available, WLE with 2–4-cm lateral margins is recommended, ablating the aponeurosis in depth. All margins should be examined on histology before final reconstruction. If there is any doubt as to the completeness of resection, total skin graft rather than flaps should, if possible, be used, to enable detection of deep recurrence (Recommendation grade B).

3.6. Angiosarcoma

Cutaneous angiosarcoma is rare, mainly encountered in elderly subjects in the head and neck region; it accounts for 4–5% of skin sarcomas [61] (level of evidence 2). It is locally highly aggressive and also gives rise to metastasis, mainly in lung and liver [62] (level of evidence 3). This explains the poor prognosis, with 25–50% overall 5-year survival, depending on the series [63] (level of evidence 3).

Guideline 12

In angiosarcoma, the widest possible resection (2–5 cm margins) should be performed, while allowing acceptable quality of life (Recommendation grade C).

4. Resection principles according to topography: practical questions

4.1. When to perform parotidectomy? [64–69]

The parotid is the main site of lymph-node metastasis in facial carcinoma (SCC, AC) and melanoma. Its lymphatic network is rich, draining the temporal region and cheek.

Guideline 13

In immunocompetent patients with temporal or auricular skin tumor exceeding 2 cm in size or showing deep infiltration (thickness > 4–5 mm) and in immunosuppressed patients, parotid MRI should screen for infraclinical metastasis (Recommendation grade B). In clinically and radiologically N0 patients, SN biopsy is an option (Recommendation grade C).

Prophylactic parotidectomy is not recommended in immunocompetent patients without clinical metastasis (Recommendation grade B).

The parotid regional should be monitored clinically every 2 months in non-immunocompetent patients or in case of unfavorable anatomopathologic factors (Recommendation grade B).

When parotid metastasis is detected, conservative facial nerve parotidectomy should be performed and completed by targeted lymphadenectomy in clinically N0 patients, followed by radiation therapy to the parotid area, but without irradiating the neck if lymphadenectomy is negative (Recommendation grade B).

In case of clinically infiltrating carcinoma adjacent to the parotid, *en bloc* parotidectomy should be associated to skin resection.

4.2. When to perform lateral temporal bone resection? [70]

Guideline 14

Extension assessment should be performed in case of tumor in the external auditory canal or adjacent areas, to determine indications for and type of lateral temporal bone resection (Recommendation grade C).

4.3. When to perform orbital exenteration? [71–76]

Guideline 15

In tumors strictly limited to the eyelid, without scleral invasion, resection may be performed, respecting established safe margins. One or both eyelids should be repaired so as to guarantee protection of the eyeball (Recommendation grade C).

In case of superficial extension to the tunica conjunctiva bulbi of the sclera (tumor remote from the sclero-corneal junction, with mobile sclera connective layer over a fibrous layer), resection without exenteration may be performed (Recommendation grade C).

In case of painful loss of vision, exenteration is formally indicated if the procedure respects safe margins (Recommendation grade C).

In case of invasion of the fibrous layer of the sclera or oculomotor or acuity disorder, the eyeball cannot usually be spared. Evisceration (resection of eyeball content by decortication without resection of the sclera) and enucleation (resection limited to the eyeball, sparing the adnexa) are not generally indicated. Exenteration is the most logical attitude to guarantee safe margins (Recommendation grade C).

Postoperative adjuvant radiation therapy is recommended after wide resection involving exenteration (Recommendation grade C).

Rehabilitation after exenteration preferably consists of implanting a craniofacial prosthesis (Recommendation grade C). Filling by a thick flap should be avoided, as hindering prosthetic rehabilitation (Recommendation grade C).

In locally advanced carcinoma inoperable due to local extension or general health status precluding heavy surgery, medical management should be proposed in a palliative perspective (Recommendation grade A).

In palliative contexts, fractionated radiation therapy may be proposed as analgesic (Recommendation grade B).

Targeted therapy, such as Hedgehog pathway inhibitors in locally advanced BCC (GDC-0449: Vismodegib) is not to be considered outside of clinical trials (Recommendation grade B).

4.4. When to perform skull or meningeal resection? [77,78]

Guideline 16

In tumors that are perfectly mobile with respect to the deep bone, resection is performed above the periosteal plane, respecting established safety margins (Recommendation grade B).

If mobility is reduced or periosteal infiltration or external cortical erosion is found intra-operatively, bone rasping may be performed down to the diploe (expert opinion). Pathologic bone analysis of deep margins is made impossible by the chosen bone resection technique (expert opinion).

In case of bone invasion confirmed on CT, skull resection should be performed by a double team with a neurosurgeon. Meningeal adherences to the internal side of the skull generally require meningeal plasty repair (autologous or synthetic) associated to the same step. Superficial tegument cover may use a local rotation flap associated to a skin flap to the donor site, or micro-anastomosed free flap (Recommendation grade C).

Radiation therapy is recommended as postoperative adjuvant in case of bone invasion confirmed on histology (Recommendation grade A).

In locally advanced carcinoma inoperable due to local extension or general health status precluding heavy surgery, medical management should be proposed in a palliative perspective (Recommendation grade A).

In palliative contexts, fractionated radiation therapy may be proposed as analgesic (Recommendation grade B).

Targeted therapy, such as Hedgehog pathway inhibitors in locally advanced BCC (GDC-0449: Vismodegib) is not to be considered outside of clinical trials (Recommendation grade B).

4.5. Principles of lymph-node resection in cutaneous facial tumor [79–83]

Guideline 17

In lymphophilic tumor, exhaustive lymph-node staging should be performed (Expert opinion).

Lymph-node treatment should be given to all clinically, radiologically or histologically N0 patients (Expert opinion).

4.6. When to perform muscle resection?

Guideline 18 (Expert opinion)

In the face, muscle resection always follows carcinologic criteria for safe margins, with maximal sparing of structures.

Progress in surgical techniques allows more extensive resection, improving local control, while providing acceptable esthetic and functional results.

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