Review Article

Skin Cancer of the Hand: Current Concepts

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Abstract

Skin cancer accounts for most hand cancers. Prompt recognition of lesions with malignant potential can lead to early treatment and decreased disease burden. Understanding the appropriate diagnostic algorithm for a given lesion facilitates accurate staging, which guides therapy. A multidisciplinary approach that includes hand surgeons, dermatologists, oncologists, and radiation oncologists is often necessary to manage advanced disease. For most invasive tumors, the primary treatment modality remains surgical excision; however, several effective nonsurgical treatments exist for management of unresectable or low-grade cancers.

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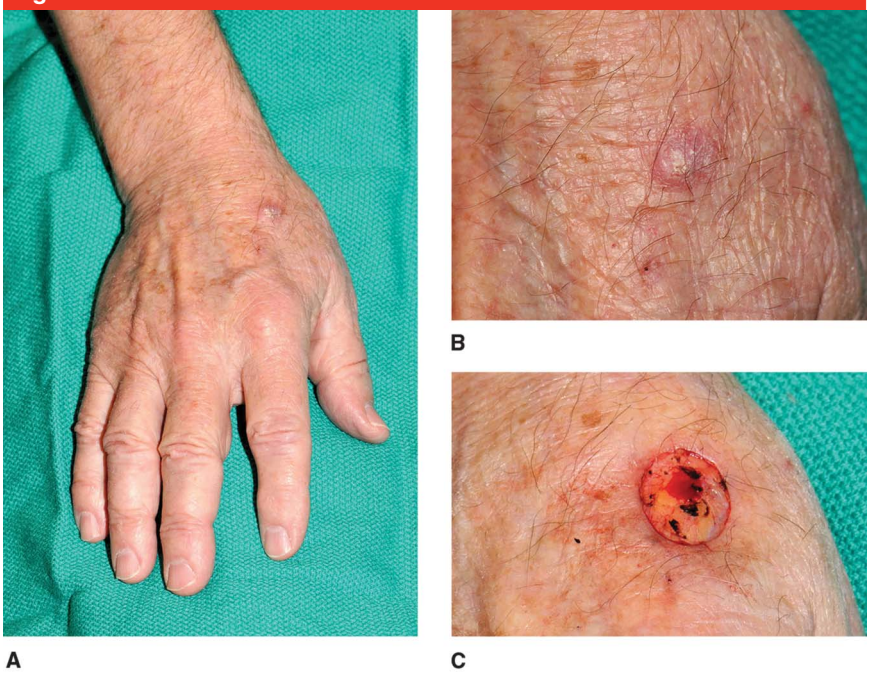
Cancers of the skin are the most common malignancy, with an estimated annual incidence of 1 to 3.5 million cases of nonmelanocytic skin cancers (NMSCs) alone.[1-3] Approximately 10% to 15% of these tumors occur on the hand.[4] Cutaneous melanoma (CM), although far less frequent in the hand, accounts for most of the mortality associated with skin cancer.[5,6] The surgeon must have precise knowledge of the functional anatomy of the hand and its relationship to the specialized overlying skin to ensure adequate tumor extirpation while preserving maximal function.

Diagnosis and Workup

Standard patient workup requires a detailed history of the lesion, including its duration, changes in size and color, and any symptoms (eg, pruritus, pain). A personal history of prior skin cancer, sun and chemical exposure, benign skin lesions, and areas of chronic inflammation are documented, as well. Because both melanoma and NMSC may have a genetic component that contributes to an inherent susceptibility, a detailed family history is obtained. During the physical examination, the size, color, consistency, mobility, precise location, and presence of ulceration or bleeding is determined. A complete neurologic examination of the hand and palpation of epitrochlear and axillary lymph nodes is performed to detect regional disease that may be present in cutaneous squamous cell carcinoma (SCC), Merkel cell carcinoma (MCC), or melanomas that have a tendency to spread via the lymphatic system.

Diagnosis of suspected skin malignancy is confirmed with biopsy and pathologic examination. Shave biopsy is adequate for superficial lesions without suspicion of melanoma. Pigmented, atrophic, or other lesions that are concerning for melanoma should undergo full-thickness punch or incisional biopsy to determine tumor depth, which is important for staging, prognosis, and treatment purposes. Both biopsy methods are generally performed in the office under local anesthesia. The most indurated or pigmented area is targeted for biopsy unless ulceration is present. In this case, biopsy of the border between

Figure 1



A, Clinical photograph of the dorsal aspect of the hand demonstrating invasive squamous cell carcinoma radially. **B,** Magnified view of the carcinoma. **C,** Clinical photograph of the hand following Mohs micrographic surgical excision of the tumor demonstrating a defect.

grossly normal appearing skin and the tumor is performed to avoid sampling only necrotic tissue with poor pathologic yield. This also aids the pathologist in characterizing malignant tissue in the context of normal skin. Smaller lesions may be excised completely for diagnosis when tension-free closure can be achieved. The orientation should keep the long axis of the lenticular or elliptical incision parallel to the long axis of the extremity, to make reexcision easier, if it is required.

Surgical management of skin cancer is guided by the pathologic diagnosis, size, and characteristics of the tumor. Here, we review the epidemiology, risk factors, diagnosis, and management of various types of skin malignancy.

Nonmelanocytic Skin Cancer

NMSCs include cutaneous SCC, basal cell carcinoma (BCC), adnexal skin cancers, sarcomas, dermatofibrosarcoma protuberans, MCC, and Kaposi sarcoma.[2] Most of these tumors are BCC and SCC, which account for approximately 80% and 20%, respectively, of all NMSCs. The incidence of the tumors has increased over time; this is likely related to risk factors and increased longevity.[1-3]

Squamous Cell Carcinoma

SCC is the most common malignant tumor of the hand; these hand tumors account for 58% to 90% of all hand cancers, and 11% to 16% of SCCs overall.[2,7] Two thirds of SCCs arise on the dorsum of the hand. Compared with BCCs, a greater proportion of SCCs occur on the dorsum of the digits. Subungual SCC is uncommon but remains the most common malignant tumor of the nail bed.[2,4,8] Tumors limited to the epidermis are termed SCC in situ, or Bowen disease. The risk factors and distribution are similar to invasive SCC, but management of these lesions differs significantly.[9]

SCC occurs more commonly in the elderly and in men and has a wide variety of clinical presentations, reflecting the degree of differentiation from small erythematous plaques or nodules to sizable fungating and necrotic masses (Figure 1). Subungual SCC often presents with pain, nail discoloration, or ulceration and must be considered in cases of suspected chronic infection or trauma that does not respond to therapy.[2]

Risk factors for development of SCC are similar to those for BCC, with exposure to ultraviolet radiation posing the greatest risk.[2,4,9-11] Areas of chronic inflammation (eg, sinuses), ulceration, and nonhealing wounds are risk factors for malignant degeneration into aggressive SCC. Less common factors include exposure to arsenic, human papilloma virus, or polyaromatic hydrocarbon.[12] Actinic keratosis is a premalignant lesion resembling SCC. Less than 1% of these lesions progress to SCC; however, approximately 60% of invasive SCCs arise from actinic keratosis.[13] Organ transplant recipients have a 65-fold increased risk of developing SCC, which is likely related to the suppression of mechanisms necessary for immune surveillance.[14]

Diagnosis is confirmed by shave, punch, or excisional biopsy. For suspected invasive lesions, a biopsy at the border of the lesion into at least the mid reticular dermis is recommended. Approximately 5% of SCCs metastasize at 5 years, and a complete physical examination, including palpation of in-transit and axillary lymph node basins, is essential for staging and treatment.[14,15] High-risk lesions are more likely to metastasize, with up to 30% of tumors >2 cm in size.[15] Additional criteria for high-risk lesions are immunosuppression, invasion greater

than the depth of the reticular dermis, poor differentiation, local recurrence, lesions arising in areas of chronic inflammation or hair-bearing areas, depth >4 mm, or perineural invasion.

In 2010, the American Joint Committee on Cancer (AJCC) published the seventh revision (AJCC-7) of the tumor-node-metastasis staging system for cutaneous SCC.[16] The system classifies the primary tumor designation; regional nodal metastases, including microscopic disease; and distant metastases. The updated system includes major changes to the primary tumor designation, now taking into account high-risk features in addition to tumor size and adjacent tissue involvement (Table 1).[14]

Table 1

Tumor-Node-Metastasis Staging System for Cutaneous Squamous Cell Carcinoma[14]

Stage	Description
T	Primary tumor
TX	Primary tumor cannot be assessed
T0	No evidence of primary tumor
Tis	Carcinoma in situ
T1	Tumor ≤2 cm in greatest dimension with less than two high-risk features[a]
T2	Tumor >2 cm in greatest dimension or a tumor of any size with two or more high-risk features[a]
T3	Tumor with invasion of maxilla, mandible, orbit, or temporal bone
T4	Tumor with invasion of skeleton (axial or appendicular) or perineural invasion of skull base

[a] High-risk features include perineural invasion; location (primary site ear, primary site nonglabrous lip); depth (2-mm thickness, Clark level IV); and differentiation (poorly differentiated or undifferentiated)

Sentinel lymph node biopsy (SLNB) is an emerging technique used for staging of NMSC in high-risk patients with clinically negative nodes. A case series and meta-analysis of 11 studies, including 83 patients, found metastases in 16.9% of patients (range, 4.5% to 44%).[15] Tumor size >2 cm was found to be an independent risk factor for a positive sentinel node. Another study on staging of cutaneous SCC using the AJCC-7 criteria reported a positive sentinel node in 11.2% of patients with T2 tumors and in 60% of those with T4 lesions.[17] Prior studies have reported a higher rate of metastatsis for SCC of the hand (range, 6% to 28%).[7,18]

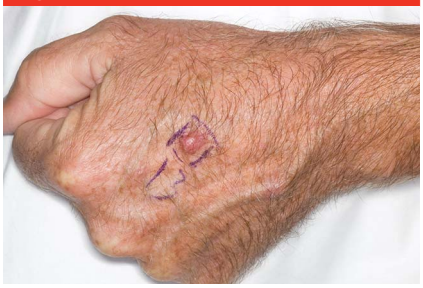
Management of invasive SCC is primarily surgical. Several nonexcisional treatment options exist for small and superficial low-risk lesions. In a 30-year review of 446 patients with SCC, cryosurgery with liquid nitrogen had a 5-year cure rate of 94%.[8] Cryotherapy is reserved for superficial, well-defined lesions of <1 cm and well differentiated. An alternative therapy for similar low-risk lesions is electrodessication and curettage, with similar success rates (96%) reported in the literature.[9]

Radiation therapy is an important alternative treatment option for patients who are poor surgical candidates, but it is not a first-line treatment given its adverse effects, lack of margin control, and prolonged treatment duration. For primary tumors, a 5-year cure rate of approximately 90% has been reported.[8] Somanchi et al[19] reviewed 25 patients with SCC of the hand and fingers treated with high-dose rate brachytherapy. The authors reported no differences in posttreatment range of motion, grip strength, two-point discrimination, or Disability of the Arm, Shoulder, and Hand scores. All patients had acute skin reactions, and 17 of 25 had persistent skin changes at follow-up.[19]

Adjuvant radiation therapy (ART) is a treatment option for high-risk SCC with perineural invasion, but clear guidelines for use of this treatment modality are lacking. In a systematic review that compared the outcomes of surgical monotherapy with those of surgical excision and ART for management of high-risk tumors, the authors found no difference between the two treatment modalities with regard to local recurrence, regional or distant metastases, or disease-specific death in patients with perineural invasion.[20] The caliber of nerve involved appears to affect outcomes, with nerves >0.1 mm demonstrating worse outcomes regardless of the treatment modality used.

To achieve 95% clearance, traditional margins for wide local excision (WLE) are 4 mm for a low-risk lesion and 6 mm for a high-risk lesion.[21] In a prospective review of 29 patients with SCC who underwent excision with an average 5-mm margin, Thomas et al[22] found that complete excision was achieved with negative pathologic margins in all patients. Using histologic sectioning, the authors found that a 4-mm margin yielded complete excision in 97% of cases. In a recent study of 86 patients with SCC of the hand treated with WLE, Mohs micrographic surgery (MMS), or shave excision followed by curettage and cryotherapy, Askari et al[7] reported a 33% recurrence rate at 5 years and a 50% recurrence rate at 10 years. Bilateral disease, multifocal disease, tumors of the web space, and a history of skin cancer

Figure 2



Clinical photograph of the dorsal aspect of the hand demonstrating a nodular basal cell carcinoma.

were all associated with recurrence. Recurrent tumors developed in 34.8% of patients treated with MMS, in 20.5% of those treated with WLE, and in 50% of those treated with shave excision. Surgical method, margin, and depth of tumor were not correlated with recurrence when negative margins were achieved.

MMS may decrease the rate of local recurrence in patients with high-risk or recurrent tumors. This technique aims to achieve complete circumferential, peripheral, and deep margin assessment by mapping the lesion and repeatedly sampling more tissue as needed to remove all cancer cells, while preserving the maximal amount of uninvolved tissue. This is in contrast to the traditional method of using permanent or frozen section, which allows assessment of approximately 1% to 2% of the total surgical margin.[9] MMS involves serial sectioning of the specimen along the short axis, perpendicular to the margins of interest. Clearance rates of 97% to 100% with MMS have been reported.[9] For SCC of the nail bed, cure rates as high as 96% have been reported.[23]

Basal Cell Carcinoma

BCC is the second most common skin malignancy of the hand, accounting for 2% to 3% of the overall 800,000 malignancies diagnosed annually.[2,24] The risk of developing BCC increases with advancing age, and this carcinoma is most commonly seen in patients after the fourth decade of life. The histopathological classification of BCC divides these lesions into high- and low-risk categories.[25] Nodular BCC is the most common low-risk lesion.[2,25,26] It typically appears as a pink or flesh-colored papule, often with central ulceration and a pearl-like quality (Figure 2). Telangiectasias also are common.[24,26]

High-risk lesions typically have an indistinct border, with subclinical or microscopic extension; they also have a higher rate of incomplete surgical excision and local recurrence than do low-risk lesions.[25] High-risk subtypes include superficial, micronodular, morpheaform, and infiltrative lesions. The morpheaform and infiltrative subtypes tend to be locally destructive and have the highest rates of local recurrence. In addition, BCC may behave more aggressively in patients younger than 35 years. Nodular and superficial forms may contain melanin and can mislead the diagnosis.[24,26]

Most BCCs of the hand are located on the dorsum, with 87% occurring between the wrist crease and metacarpal heads and becoming progressively less frequent more distally.[4] BCC on the palmar surface is rare. These lesions are typically slow growing, and metastasis is rare. The risk of metastasis is increased in tumors >3 cm in diameter, independent of histologic subtype. Unlike SCC, BCC has no precursor lesion.[12,24,26,27]

Ultraviolet radiation is the main risk factor for BCC, with a complex relationship between the timing, duration, and pattern of sun exposure.[24] Other risk factors include exposure to ionizing radiation or arsenic, the use of photosensitizing drugs, immunosuppression, fair skin, male sex, advanced age, and genetic variants.[1-3,24,25] Compared with the general population, patients with a history of BCC have a 10-fold increased risk of developing another tumor.[11]

Management of BCC is primarily surgical (primary excision or MMS) and has the advantage of facilitating pathologic evaluation.[2,24,27] For low-risk, well-defined primary lesions on the arm, cryosurgery or curettage and electrodessication have yielded cure rates of 95% at 5 years.[24] These methods are not recommended for recurrent tumors, morpheaform lesions, or aggressive subtypes.

The current treatment guideline for excision of BCC of the hand is excision of a 4-mm margin of normal tissue around the edge of the visible tumor.[4] A meta-analysis that examined the best surgical margins for BCC reported a 86% ± 12% chance of negative pathologic margins with the use of 4-mm margin, which yielded a recurrence rate of 2.0% ± 2.1%.[27] The authors concluded that excision with a 5-mm margin for a tumor of any size provided the best chance of achieving a 95% cure rate. A 3-mm margin can be reliably used for tumors <2 cm in diameter without frozen section control. In a study of recurrent BCC after incomplete resection, tumors with positive microscopic margins had a mean recurrence rate of only 27%.[28] Lesions with positive margins should undergo reexcision or MMS at the time of identification to decrease the chance of recurrence and avoid a more complicated and debilitating surgery in the future.[28] Surgical excision of the morpheaform, infiltrative, or micronodular subtypes of BCC has yielded much higher rates of positive pathologic margins in 18% to 44% of cases.[2]

MMS is recommended for management of BCC of the hand in the setting of a morpheaform lesion, aggressive features, and recurrent tumors.[2,26,29] Successful MMS typically requires more levels of excision

and results in larger defects.[26] This technique has the lowest recurrence rate of any treatment modality, with cure rates of 99% to 100% reported compared with 94% to 96% in historical controls for surgical excision.[29] Recurrent tumors often develop a more aggressive histologic appearance, and management of these lesions with MMS is far more effective than with surgical excision, with reported recurrence rates ranging from 2.4% to 5.6% and 12.1% to 17.4%, respectively.[24,29]

Merkel Cell Carcinoma

MCC is a rare, aggressive cancer of neuroendocrine cell origin. Merkel cells are located in the basal epidermal layer and are part of the slowly adapting receptor system, which is responsible for light touch discrimination. MCC most commonly occurs in white men, and the incidence increases with age. The mean age at diagnosis is 68 years.[12] In the United States, the incidence is 0.23 to 0.6 cases per 100,000 person years, with approximately 470 new cases reported annually.[30,31] Twenty percent to 40% of MCCs occur in the hand and upper extremity.[12,31]

The lack of evidence-based data makes determination of additional risk factors for occurrence and prognosis difficult. Risk factors include personal history of SCC, BCC, or actinic keratosis; immune deficiency; and secondary hematologic malignancy.[30,32] Reported risk factors for poor prognosis are regional node involvement, male sex, systemic disease, tumors >5 cm, and primary location in the trunk, head, or neck.[31]

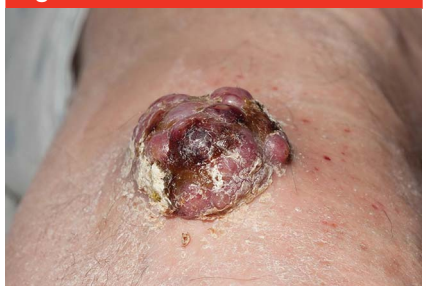
MCCs are typically asymptomatic, firm, nontender, rapidly growing intracutaneous lesions with a bluish-red coloration (Figure 3). Regional lymph node involvement at the time of diagnosis has been reported in 20% to 25% of patients; however, 50% to 59% ultimately have regional disease.[31,33] Fewer patients have distant metastases at diagnosis (5%), with 34% to 36% having distant metastases following initial treatment.

Radiographs of the chest and CT of the primary tumor and regional lymphatics are recommended as part of the diagnostic workup. SLNB may be used in the setting of clinically negative regional nodes to determine whether node dissection is necessary. Tumor staging in as many as 35% of patients with MCC will be upstaged.[32,33] MCCs are staged based on the absence of regional lymph node involvement (stage I), the presence of positive regional nodes (stage II), or the presence of distant metastases (stage III).

Management of MCC involves wide excision, with a 2- to 3-cm margin and regional lymphadenectomy for patients with regional disease at the time of diagnosis. Despite the use of wide excision, local recurrence rates of 25% to 33% have been reported.[30,31] In a study of 34 patients who underwent primary excision of an MCC with 2- to 3-cm margins that extended to the deep fascia, Dancey et al[30] found that a 2-cm margin resulted in an incomplete pathological excision rate of 50% and a local recurrence rate of 33%. No incomplete excisions were reported in patients who had a 3-cm margin, and a recurrence rate of only 10.5% was reported.

The efficacy of MMS for management of MCC is unclear. Boyer et al[34] reviewed 45 patients with stage I MCC treated with MMS, 20 of whom also received ART. Most of the tumors (80%) were <2 cm in diameter. At 2-year follow-up, there was one marginal recurrence and three in-transit metastases in the group treated with MSS alone compared with no marginal recurrences or in-transit metastases in the group treated with MMS and radiation.

Figure 3

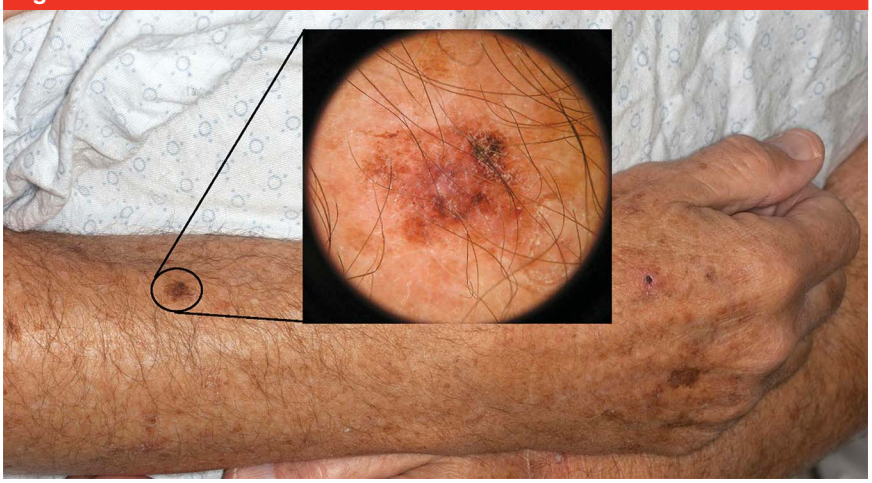


Clinical photograph of the dorsal forearm demonstrating a large Merkel cell carcinoma.

This difference was not statistically significant. Overall 5-year survival was 79%.[34] Other studies have shown that MMS has no significant benefit over WLE.[32]

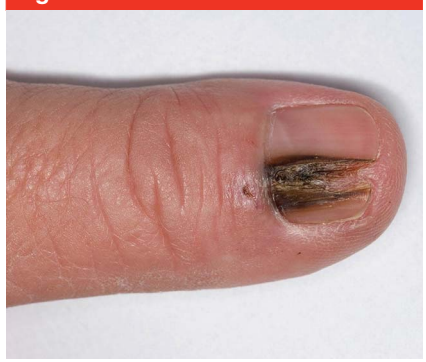
Mortality associated with MCC remains high, with 5-year survival rates ranging from 30% to 79% for tumors at all locations.[32] The reported survival rate for patients with MCC of the extremity is as high as 74.3%.[32] Women and those aged <65 years with tumors of the hand and upper extremity have better survival rates than do men and those older than 65 years. Limited data suggest that ART may help improve locoregional control, and McAfee at al[33] recommended the use of ART for regional nodes regardless of initial involvement. A review of 11 series that included 441 patients with MCC suggested that ART may significantly decrease local recurrence rates, with a mean recurrence rate of 10.5% (range, zero to 33%) with radiation and a recurrence rate of 52.6% (range, 6% to 100%) without radiation.[35] Senchenkov et al[32] retrospectively evaluated 38 patients with MCC of the extremity. Although a significant survival advantage with the use of ART was not shown, 8 of the 11 patients who had node-positive disease received ART and had a survival rate of 75%. The three remaining patients were deceased at final follow-up.

Figure 4



Clinical photograph of the forearm demonstrating a lentigo maligna melanoma. Inset, Dermoscopic view with magnification ×10.

Figure 5



Clinical photograph of the thumb demonstrating a subungual malignant melanoma.

Malignant Melanoma

CM accounts for 78% of all skin cancer deaths.[36] There are four major histologic subtypes; the superficial spreading subtype is the most common, representing 70% of lesions. In decreasing order of frequency, the remaining subtypes include nodular melanoma (15%), lentigo maligna melanoma (13%), and acral lentiginous melanoma (ALM; 2% to 3%). ALM occurs in the acral regions, including the plantar surface of the foot, palm of the hand, and in the nail apparatus.

Up to 24% of CMs occur in the upper extremity, with only a 0.9% to 3% incidence in the hand.[37] The ALM subtype accounts for 29% to 51% of hand melanoma, with the dorsal hand being the second most common location of CM of the hand.[4,36,37] ALM occurs in the palm in 14% to 33% of patients but is more commonly found in the lower extremity.[4,6,37] ALM is characterized by proliferation of atypical melanocytes along the dermoepidermal junction in a lentiginous pattern.[6] Subungual melanoma of any subtype is most common in the thumb, representing 33.8% to 61% of cases.[37,38] ALM occurs more commonly in the darker pigmented subpopulation, with 36% occurring in blacks compared with 1% in non-Hispanic whites.[37]

The overall incidence of CM has increased 1% to 3% per year since 1981 or 2.1 cases per 1,000,000 person years in 2005.[37] Given the advances in the diagnosis and management of CM, the number of deaths has not sharply increased. History of trauma and the presence of nevi on the soles are the two consistently reported risk factors for the development of CM of the hand and foot. When compared with controls, the relative risk of developing a CM associated with prior trauma is 5.0.[37] Unlike other subtypes of CM, ultraviolet radiation and sun exposure have not been established as risk factors for ALM. Genetic factors also play a role in development of CM, with CM occurring in approximately 10% of patients who have two or more relatives affected by the condition.[39]

Melanoma should be suspected with any pigmented lesion because 20% to 40% of melanomas arise from a preexisting nevus.[40] The ABCDE system or the Glasgow 7-point checklist is helpful for determining which lesions warrant investigation. Under the ABCDE system, clinical features suggestive of melanoma are asymmetry, border irregularity, color variegation, diameter >5 mm, or evolution of a pigmented lesion. Superficial spreading melanoma generally presents as variably pigmented flat macules or plaques with irregular borders. Typically, nodular melanoma is characterized by darkly pigmented raised, pedunculated, or polypoid lesions, and are often the most difficult to diagnose at an early stage. Lentigo maligna melanomas begin as tan-brown macules that develop foci of hyperpigmentation and irregular raised areas that signify transition to a vertical growth pattern (Figure 4). ALMs present as darkly pigmented brown to black macules or patches. Subungual melanoma is a distinct diagnostic entity, given the specialized anatomy of the nail bed and surrounding structures, and application of the ABCDE criteria often is not possible. Longitudinal pigmentation of the nail bed, melanonychia striata, is a finding often present in subungual melanoma, and other causes such as trauma, medication, lentigo, benign nevi, or metabolic causes must be ruled out if present for >2 months[41] (Figure 5).

Table 2

Differential Diagnosis for Melanoma

Atypical melanocytic nevus
Blue nevus
Cherry hemangioma
Common melanocytic nevus
Dermatofibroma
Keratoacanthoma
Lentigo
Melanonychia striata
Pigmented actinic keratosis
Pigmented basal cell carcinoma
Pyogenic granuloma
Seborrheic keratosis
Spitz nevus
Subungual hematoma
Traumatized nevus

Table 3

Tumor-Node-Metastasis Staging System for Cutaneous Melanoma[16]

Classification	Description
Primary Tumor	
TX	Primary tumor cannot be assessed
T0	No evidence of primary tumor
Tis	Melanoma in situ
T1	≤1.0 mm A: Without ulceration and mitoses $<1/mm^2$ B: With ulceration or mitoses $\geq 1/mm^2$
T2	1.01–2.0 mm A: Without ulceration B: With ulceration
T3	2.01–4.0 mm A: Without ulceration B: With ulceration
T4	>4.0 mm A: Without ulceration B: With ulceration
Regional Lymph Node	
NX	Patients in whom the regional nodes cannot be assessed
N0	No regional metastases detected
N1	One lymph node A: Micrometastases B: Macrometastases
N2	Two or three lymph nodes A: Micrometastases B: Macrometastases C: In-transit metastasis /satellite(s) without metastatic lymph nodes
N3	Four or more metastatic lymph nodes, or matted lymph nodes, or in-transit metastasis/satellite(s) with metastatic lymph node(s)
Distant Metastasis	
M0	No detectable evidence of distant metastases
M1a	Metastases to skin, subcutaneous, or distant lymph node, normal serum LDH
M1b	Lung metastases, normal LDH
M1c	Metastasis to other visceral metastases with a normal LDH, or any distant metastases and an elevated LDH

LDH = lactate dehydrogenase

Dermoscopy, or epiluminescence microscopy, is a valuable tool for evaluating pigmented lesions. This noninvasive technique uses a 10× magnifying lens along with polarized light or liquid medium to eliminate reflection and allow visualization of the subsurface epithelium and papillary dermis colors and structures. In a meta-analysis of 9 studies that compared the diagnosis of malignant melanoma with dermoscopy or naked-eye evaluation, sensitivities of 90% and 71%, respectively, were reported.[42] As expressed by the relative diagnostic odds ratio, the diagnostic accuracy of dermoscopy was fourfold higher than that of naked-eye evaluation.

Complete excisional biopsy with a margin of 2 mm is the standard of-care for diagnosis of CM, allowing determination of depth without altering the detection of lateral migration and melanocytic maturation. Partial biopsy techniques, including punch biopsy, may be used for larger lesions that are not amenable to excisional biopsy.[43] The differential diagnosis includes many benign and malignant tumors (Table 2). Staging of CM is based on the AJCC system. Major primary tumor prognostic factors are depth and ulceration, with mitotic activity now added to the evaluation of thin melanoma (<1.0 mm depth). The complete staging system is outlined in Table 3.[16]

Breslow thickness has been consistently shown to have the most important prognostic impact, unlike the Clark level in which the correlation between the level and prognosis has been less reliable.[6,37,43] In a review of 89 patients with malignant CM in acral locations, Rex et al[6] found that subungual tumors had a median

thickness of 4.4 mm, whereas dorsal and palmoplantar tumors had a median thickness of 1.65 mm and 1.5 mm, respectively. At the time of presentation, 83.1% of patients had local disease, 12.3% of patients had regional metastases, and 1.1% had distant metastases.

For patients with palpable nodal disease, full regional lymph node dissection is the standard of care. SLNB is an important prognostic indicator for patients with clinically node-negative disease and should be performed with lymphoscintigraphy for CMs with a depth ≥1 mm.[43,44] The incidence of positive sentinel lymph nodes (SLNs) is 15% in tumors with a Breslow depth of 1 to 2 mm.[44] In patients with primary CM, no difference in overall survival benefit was found between WLE with SLNB or WLE with nodal basin observation. Subset analysis of SLN status in patients who underwent SLNB showed that the biopsy had a significant impact on 5-year melanoma-specific survival (72.3% ± 4.6% for positive node status versus 90.2% ± 1.3% for negative node status).[45] Immediate lymphadenectomy for patients with positive lymph nodes significantly improves survival compared with delayed lymphadenectomy for patients who did not undergo SLNB and developed clinical evidence of nodal disease. The use of SLNB may be indicated for patients with thinner CM tumors. In a study of 432 patients with thin, primary CM tumors (0.51 to 1.0 mm Breslow depth), 29 patients (6.7%) had SLNB results that were positive for metastatic melanoma.[46]

The standard treatment for CM is WLE. For in situ lesions, a margin of 2 to 5 mm is recommended. Surgical margins for invasive tumors are based on survival data, and for lesions <1.0 mm, a 1-cm margin is adequate (95% to 100% 5-year survival).[40] For tumors ≥2.0 mm, a 2-cm margin is recommended (60% to 75% 5-year survival). For melanomas 1- to 2- mm thick, the data are less clear, with guidelines suggesting that a 1- to 2-cm margin is sufficient (80% to 96% 5-year survival). The deep margin for proximal lesions should include the deep muscle fascia; excisions deeper than this level have not been shown to provide additional survival benefit.[40] In general, CM of the dorsal hand can be safely excised while preserving the paratenon, providing a simpler means of reconstruction.

Surgical management of subungual melanoma is more controversial, and there are no randomized controlled trials comparing amputation with conservative resection. In retrospective studies, less radical treatment has been shown to have survival equivalent to that of proximal amputation. In a series of 116 patients with subungual melanoma treated with amputation, Nguyen et al[38] found that, as long as histologically negative margins were achieved, there was no difference between distal and proximal amputations in terms of progression-free, disease-free, or overall survival. Overall disease-free survival at 5 years was 57.1% in patients with a mean tumor thickness of 3.1 mm. The authors recommended amputation through the interphalangeal joint for subungual melanoma of the thumb and amputation through the distal interphalangeal joint for the remaining digits.

Nonamputative wide excision of the nail unit with local reconstruction was first reported in 2002.[47] The goal of the procedure is to maximize functional preservation without compromising oncologic outcomes. Sureda et al[41] reviewed nine studies published from 2002 to 2011 with a total of 67 patients diagnosed with melanoma in situ. The surgical technique was not standardized across these studies, and excision of the periosteum varied. Nevertheless, out of 29 total in situ lesions there was only one recurrence, although four patients ultimately required amputation for positive margins. Moehrle et al[48] compared the outcomes of 31 patients who underwent distal amputation with those of 31 patients who underwent wide excision for stage I and II invasive melanoma. A mean 10-mm margin was used in the wide excision group, including excision of the distal aspect of the distal phalanx in 28 patients. The only significant variable that influenced recurrence-free survival was tumor thickness, with no significant difference between treatment groups.

Brodland[49] examined the use of MMS for management of subungual melanoma. The author reviewed 14 patients with a total of 10 invasive melanomas and primary tumors with an average thickness of 1.38 mm. Four patients had in situ disease. Negative margins were achieved in 8 patients (57%) after a single stage of MMS, with 14% requiring three or more stages. Disease-free survival at 6.7 years was 42.8%, and three local recurrences (21%) were reported at a mean of 64 months (range, 30 to 120 months).

The prognosis for hand and acral melanoma is worse than that for CM overall.[5,6,37,38,43] A population-based study that used data from the National Cancer Institute registry found that the 5- and 10-year survival rates for ALM were 80.3% and 67.5%, respectively.[36] The largest single-institution series by Bello et al[5] reviewed the outcomes of 281 patients with ALM. Independent factors associated with worse disease-specific survival were increased Breslow thickness, increased tumor stage, the presence of ulceration, a Clark level of IV or V, positive margin status, and SLN positivity. Patients with ALM had a lower 5-year survival rate (70%) than did stage-matched nonacral CM controls (83%).

Summary

Skin cancers of the hand and upper extremity are common, and management strategies continue to evolve as more outcomes data becomes available. Early recognition and accurate diagnosis are essential to proper management, and hand surgeons must be aware of the oncologic principles that guide proper treatment.

References

Evidence-based Medicine: Levels of evidence are described in the table of contents. In this article, references 13 and 22 are level III studies. References 1, 2, 4-12, 14, 15, 17-21, 23, 24, and 26-49 are level IV studies. References 3 and 25 are level V expert opinion.

References printed in **bold type** are those published within the past 5 years.

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