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Shave Biopsy Is a Safe and Accurate Method for the Initial Evaluation of Melanoma

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Abstract

BACKGROUND—Shave biopsy of cutaneous lesions is simple, efficient, and commonly used clinically. However, this technique has been criticized for its potential to hamper accurate diagnosis and microstaging of melanoma, thereby complicating treatment decision-making.

STUDY DESIGN—We retrospectively analyzed a consecutive series of patients referred to the University of Florida Shands Cancer Center or to the Moffitt Cancer Center for treatment of primary cutaneous melanoma, initially diagnosed on shave biopsy to have Breslow depth < 2 mm, to determine the accuracy of shave biopsy in T-staging and the potential impact on definitive surgical treatment and outcomes.

RESULTS—Six hundred patients undergoing shave biopsy were diagnosed with melanoma from extremity (42%), trunk (37%), and head or neck (21%). Mean (± SEM) Breslow thickness was 0.73 ± 0.02 mm; 6.2% of lesions were ulcerated. At the time of wide excision, residual melanoma was found in 133 (22%), resulting in T-stage upstaging for 18 patients (3%). Recommendations for additional wide excision or sentinel lymph node biopsy changed in 12 of 600 (2%) and 8 of 600 patients (1.3%), respectively. Locoregional recurrence occurred in 10 (1.7%) patients and distant recurrence in 4 (0.7%) patients.

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CONCLUSIONS—These data challenge the surgical dogma that full-thickness excisional biopsy of suspicious cutaneous lesions is the only method that can lead to accurate diagnosis. Data obtained on shave biopsy of melanoma are reliable and accurate in the overwhelming majority of cases (97%). The use of shave biopsy does not complicate or compromise management of the overwhelming majority of patients with malignant melanoma.

Proper treatment of localized melanoma (both definitive wide excision and assessment of regional nodal basins) is dependent on accurate measurement of the Breslow depth on the biopsied specimen, as well as the assessment of ulceration and mitotic rate in thin (≤1.0 mm) lesions.[1] There have been discussion and debate over the best techniques for initial diagnosis of melanoma for many years.[2,3]

Currently, the preferred biopsy method recommended by the American Academy of Dermatology for obtaining a diagnosis of a skin lesion suspicious for melanoma is excisional biopsy.[2,4,5] However, excisional biopsies of melanomas are infrequently performed. This may be due in part to the low accuracy of clinical diagnosis of melanoma, with reported rates as low as 42% for general practitioners and 80% for dermatologists.[6] Dermatologists, primary care physicians, and surgeons may perform a variety of types of biopsies for suspicious cutaneous lesions, including superficial shave biopsies, deep scallop shave biopsies, and punch biopsies when evaluating suspicious cutaneous lesions. Biopsies done in these ways can potentially lead to misdiagnosis and inaccurate staging due to partial sampling and under-representation of the lesion for a variety of reasons. Inadequate sampling of a pigmented lesion may not allow the pathologist to assess all features required to establish the diagnosis of a melanoma from a nevus, including the overall size of the lesion, its circumscription, and its symmetry. Transection of the base of a lesion may lead to an underestimation of its depth, leading to inaccurate staging, and therefore, decisions about the width of margins and the necessity for regional nodal sampling.

Proponents of shave biopsy point to its time-saving nature and lack of morbidity, eg, obviating the need for suturing.[2,3] Clearly, shave biopsies of melanoma are least harmful when the base of the melanoma is not transected, and tumor depth is accurately measured. Likewise, if the shave biopsy measures at least 1 mm in depth, even if the melanoma is greater in thickness, the decision to perform a 2-cm wide excision and sentinel node biopsy, as recommended by National Comprehensive Cancer Network (NCCN) guidelines, is still not compromised.[1,7] The purpose of this study was to investigate if shave biopsy for melanomas between 0 and 2 mm was accurate in determining T-stages and to define what impact shave biopsies had on treatment decision-making and outcomes.

METHODS

Institutional review board approval was received to investigate the impact shave biopsy had on treatment and outcomes at 2 high volume melanoma centers: Moffitt Cancer Center in Tampa, FL and the University of Florida Shands Cancer Center in Gainesville, FL.

Patients

We retrospectively analyzed a consecutive series of 600 patients who were referred for definitive treatment between 2006 and 2009, with primary cutaneous melanoma initially diagnosed by a shave biopsy and having a depth of 0 to 2 mm on shave biopsy. Patients who were referred for a second opinion and never received definitive treatment at our centers were excluded from the study. Demographics, clinicopathologic factors, and treatment-related factors were all assessed. Our routine is to develop a treatment plan based on pathologic diagnosis and staging obtained after in-house review and discussion with the patient and family about institutional and NCCN's most current clinical guidelines for melanoma in situ (MIS) and thin melanoma.[7] The presumptive pre-shave biopsy clinical diagnosis was obtained from review of the pathology requisition forms. This list was generated by retrospectively reviewing the clinic and office notes written by the referring physicians when patients presented to their office.

We adhere to the NCCN guidelines for width of excision around a melanoma: for MIS, a measured margin of 0.5 cm around the visible lesion is obtained. For patients with Breslow thickness of 1.0 mm or less, wide excision with a 1.0-cm margin is obtained. Wide excision with a 1-to 2-cm margin is used for patients with melanomas with tumor thickness of 1.01 to 2.0 mm. We routinely perform sentinel lymph node biopsy (SLNB) for melanomas ≥0.76 mm in thickness, which is slightly more conservative than the NCCN recommendations for SLNB.[8]

Pathologic evaluation

Pathologic re-review of slides from the primary melanoma biopsy is routinely accomplished before definitive treatment planning. Pathologic parameters evaluated on all cases confirmed to be melanoma include tumor subtype, Clark level, Breslow depth, ulceration, regression, growth phase, mitotic rate, presence of angiolymphatic invasion, satellitosis, and pathologic T-stage. If there is a difference in tumor depth compared with the original interpretation that constitutes a change in stage, the original pathologist is contacted to re-evaluate the original slides for confirmation of originally rendered tumor depth, which is used in case management. At the time of definitive excision, the depth of the melanoma is measured from either the granular layer or the base of the ulcer at the previous biopsy site, in the same manner as it is typically measured in the initial biopsy. The final depth assigned to the lesion is the deeper of the measurements made on either the initial shave or at the time of definitive excision.

Wide local excision

Definitive surgery consisted of wide excision of the melanoma scar with 0.5- to 2-cm margins as described above. Routine pathologic examination of the wide excision specimen included thorough sectioning and submission of tissue from the previous biopsy site or area of residual melanoma, including the underlying deep surgical margin, as well as submission of tangential sections of the entire peripheral surgical margin.

Sentinel lymph node evaluation

SLNB was routinely performed on patients with melanomas ≥0.76 mm in depth, who were good candidates for general anesthesia. Sentinel lymph nodes were serially sectioned at 3-mm intervals and submitted entirely for pathologic examination. Hematoxylin and eosin staining and S-100 immunostaining were performed on each section; Melan-A immunostaining was also performed on sentinel lymph nodes in cases where S-100 positive cells of equivocal cytology were noted on the corresponding hematoxylin and eosin sections.

Final pathology report

Information included and evaluated in the final pathology report includes presence of residual tumor, tumor thickness if greater than thickness measured on initial biopsy, margin status for wide local excisions, presence of metastatic tumor in sentinel lymph nodes, percentage of nodal area involved, location of tumor in lymph node (subcapsular, parenchymal, combined, or multifocal), and dimension in millimeters of the largest tumor focus.

Statistics

Statistical analysis was performed using SPSS software (IBM Inc). Categorical data was analyzed using Fisher's exact test. A p value ≤ 0.05 was considered statistically significant. Mean values are reported ± standard error of the mean.

RESULTS

Patient characteristics

Six hundred consecutive patients who had melanoma diagnosed on shave biopsy and were referred to 1 of 2 tertiary referral centers were analyzed in this series. The median patient age was 62 years (range 17 to 91 years). The sex distribution of patients in this series was 60% male and 40% female. Patients in this series referred for definitive management of their melanoma had shave biopsies that had been performed by dermatologists (n = 564, 91%), family practitioners (n = 20, 3.3%), surgeons (n = 19, 3.2%), and other specialists (n = 15, 2.5%).

Tumor characteristics

The anatomic sites of melanoma for patients in this series were extremity (n = 250, 41.7%), trunk (n = 223, 37.2%), and head and neck (n = 127, 21.2%). The clinical, preshave biopsy diagnoses were available in the majority (80%, n = 474) of patients in this series. Table 1 lists the top differential diagnoses entertained by the physician before shave biopsy results and referral for definitive management. In only 34% of patients undergoing shave biopsy was melanoma or MIS the prebiopsy suspected clinical diagnosis.

Characteristics and results after shave biopsy

On shave biopsy, 531 (88.5%) of the lesions were diagnosed as invasive melanoma, with a mean Breslow depth of 0.73 mm ± 0.02 mm. Sixty-nine (11.5%) of the patients had MIS. Only 6.2% of the patients were found to have an ulcerated lesion at the time of shave biopsy.

The deep margin on the shave biopsy was positive in 224 (37%) of the 600 total patients. After definitive wide excision, residual tumor was found in 133 patients (22%).

After definitive wide excision, tumor upstaging occurred in 18 patients (3%) (Table 2). Sixteen of these 18 patients (89%) had a positive deep margin noted on initial shave biopsy. The revised microstaging resulted in a potential recommendation for a wider margin of excision in 12 of the 18 (66%) patients, or 2% (12 of 600) of the entire cohort.

A potential change in the recommendation for SLNB occurred in 8 patients (1.3% of the entire cohort and 44% of the upstaged patients). Five of the 8 patients went on to receive SLNB; 4 patients had negative SLNBs and 1 patient had a positive SLNB. Three patients did not undergo SLNB despite the restaging. These patients were followed with ultrasonography and physical examination of the regional nodal basin. To date, none has developed clinical evidence of nodal recurrence.

Among the subset of patients with preshave biopsy clinical diagnosis of melanoma or MIS (n = 179), 39 (21.8%) had a positive deep biopsy margin. This is significantly lower than the overall percentage of positive deep margins in those without a preshave biopsy diagnosis of melanoma (44%) ($p = 0.0001$). Of these 179 patients, only 2 (1.12%) were upstaged. In both cases, this resulted in a potential change in margin recommendation, and in 1 case (0.6%) resulted in a change in recommendation for SLNB.

At a mean follow-up of 12 ± 0.4 months, 14 patients (2.3% overall) developed recurrent disease. Locoregional recurrence occurred in 10 patients (3 local recurrence, 1 in-transit, and 6 regional nodal recurrence) and 4 patients (0.7% overall) developed distant metastasis. The median Breslow depth of melanoma in the 14 patients who had recurrence was 1.67 mm (range 0.38 to 6.5 mm). Four of the 14 patients (28.6%) who had recurrence had their primary tumors upstaged after initial definitive wide excision.

DISCUSSION

The optimal biopsy technique for evaluating suspicious cutaneous lesions should be easy and quick to perform (to facilitate liberal application), be associated with minimal morbidity, allow accurate staging of lesions found to be malignant, and not compromise long-term oncologic outcomes for lesions determined to be malignant. For many years, the surgical community has advocated full-thickness or excisional biopsy as the optimal method for evaluation of cutaneous lesions thought to be consistent with malignant melanoma. Shave biopsies are generally quicker and easier to perform but have been criticized by some for not providing accurate T-stage information and thereby compromising treatment planning.[9,10]

Several previously published studies evaluated the impact of biopsy type on outcomes in malignant melanoma. Most of these studies showed that recurrence rates, disease-free survival, and overall survival appear to be similar, independent of biopsy technique.[11-14] This study was done to determine the impact of shave biopsy on initial staging of melanoma and its impact on final treatment planning.

There are many advantages and disadvantages to each type of biopsy used to diagnose a suspicious lesion. Obviously, excisional biopsy, as the gold standard, ensures that the entire suspicious lesion is removed in an elliptical incision with a narrow margin of grossly normal appearing skin. This entails a surgical procedure under local anesthesia and suturing the wound closed, which can be time consuming in the office of a busy practice. The benefit of such an approach is that the entire lesion is submitted for pathologic review, eliminating the risk of misdiagnosis from partial sampling.

However, some believe that there is an increased risk of a false negative SLNB after an excisional biopsy due to the fact that drainage patterns have been disturbed, leading to a potential increase in the number of regional nodal basins that the lymphatic mapping will identify, as well as an increase in the number of sentinel lymph nodes that are indentified at SLNB.[15] Gannon and colleagues[15] published results of a retrospective review of 104 patients who had excisional surgery (either excisional biopsy or wide excisions as definitive therapy) and then delayed lymphatic mapping and SLNB. They showed that SLNB was successful in 99% (103 of 104) of the patients, and the rate of sentinel node positivity was 18%. At a median follow-up of 51 months, there were no recurrences or false negative SLNBs in any lymph node basin in the study cohort. Excisional biopsies are also larger than shave or punch biopsies, and when definitive wide excision surgery is needed after a diagnosis of melanoma with 1- to 2-cm margins, the potential for larger incisions and skin grafting theoretically exists, especially if extremity lesions are excisionally biopsied and the incision is made perpendicular to the axis of an extremity. Some have suggested that excisional biopsies may be unnecessarily aggressive for suspicious cutaneous lesions ultimately found to be benign.[16]

Punch biopsy is still very commonly used in the initial assessment of suspicious cutaneous lesions, even those suspected to be melanoma.[17,18] Punch biopsies, however, are limited in diameter, with the largest punch biopsy tools available at most practices being 6 to 8 mm. These are easy to perform under local anesthesia, but typically require simple suture closure. The primary advantage is the potential to provide accurate T-stage information because a properly performed punch biopsy, which usually extends to subcutaneous fat, typically encompasses the base of all but the deepest primary tumors. The main disadvantage of a punch biopsy, however, is that it may not encompass the entire periphery of the lesion, preventing the pathologist from being able to assess key pathologic features such as symmetry, overall size, and circumscription. This partial sampling can lead to misdiagnosis, a far more serious error than inaccurate T-staging. Also, in very large diameter lesions only partially sampled, there is a potential for inaccurate reporting of depth (if other areas of the pigmented lesion are left in situ and have a thicker Breslow depth).[5,10,19,20] Karimipour and associates[18] reported that previous incisional or punch biopsies of melanoma were associated with upstaging in 21% of patients at the time of definitive excision. Another disadvantage of punch biopsy is the need for suturing and the time required to do so, especially in patients requiring biopsy of multiple suspicious lesions.

Shave biopsy is a quick and easy procedure that can be performed in the office under local anesthesia. A properly performed deep scallop shave biopsy can be very accurate in sampling a melanoma and determining the lesion’s true depth.[11,12] The main disadvantages

of a shave biopsy are cosmetic (lack of sutured closure may result in depressed, hypo- or hyperpigmented scarring) and the potential for the lesion to be partially sampled if its base is transected. In this series, a positive deep margin was found in 37% of all patients, but in only 21.8% of patients suspected of having melanoma before diagnostic shave biopsy. This is similar to the rate of positive deep margins on shave biopsy (22%) reported by Stell and coworkers.[21] This significant rate of deep margin involvement may lead to inaccurate Breslow thickness and inaccurate T-staging in a subset of patients.

There are numerous retrospective reports in the literature on the diagnostic accuracy of superficial and deep shave biopsies as well as punch biopsies.[4,5,13,14,22-24] Ng and colleagues[4] reported increased odds of misdiagnosing melanomas with punch (odds ratio [OR] 16.6, 95% CI 10 to 27, $p < 0.001$) and shave biopsies (OR 2.6, 95% CI 1.2 to 5.7, $p = 0.02$) when compared with excisional biopsy, and an increased odds of microstaging inaccuracy when punch (OR 5.1, 95% CI 3.4 to 7.6, $p < 0.001$) and shave biopsies (OR 2.3, 95% CI 1.5 to 3.6, $p < 0.001$) were compared with excisional biopsies.

Other small series reports have concluded that deep shave biopsies are accurate in determining diagnosis and microstaging melanoma when compared with the final diagnosis at wide excision. Ng and associates[5] retrospectively analyzed 145 cases of melanoma diagnosed by shave and punch biopsies and found that shave biopsy was accurate in determining correct T-stage in 93% and that shave was more accurate than punch biopsy (80%). Moore and coauthors,[24] in a series of 139 patients initially diagnosed on shave, reported that only 5% of patients required further operative management after the initial wide excision.

Two recent articles addressed the issue of whether disease-free survival and overall survival are affected by biopsy method in melanoma.[12,13] In a 2007 series of 471 patients undergoing definitive surgery for stage I or II melanoma, some of which had incomplete or partial biopsy, Molenkamp and colleagues[12] concluded that neither the diagnostic method nor the presence of residual tumor cells in the specimen at definitive wide excision influenced disease-free and overall survival in melanoma patients. Similarly, Martin and associates[13] reported on 2,164 patients who underwent pre-referral biopsy of melanoma either by excisional (n = 1,130), incisional (n = 281), or shave (n = 354) techniques. They concluded that sentinel lymph node positivity rates were not statistically different (19.5%, 20.6%, and 18.9%, respectively) depending on the biopsy method, nor was there a difference in the local recurrence rates, disease-free survival, or overall survival. Bong and coworkers[14] reported on 265 patients who underwent incisional biopsy for diagnosis of melanoma before definitive surgery. These patients were retrospectively matched with 496 subsequent patients who had excisional biopsies for diagnosis. There were no differences observed between groups with regard to recurrence rates ($p = 0.30$) or melanoma specific survival ($p = 0.34$). Table 3 summarizes the most recent series investigating the use of excisional, incisional, and shaves biopsies and their impact (if reported) on diagnostic accuracy, microstaging, local recurrence, and disease-free and overall survival.

In aggregate, the data suggest that shave, punch, or incisional biopsies that may partially sample the lesion do not appear to have a significant impact on recurrence, disease-specific,

or overall survival rates (Table 2). Therefore, even though there might be a partial sampling of the lesions seen with shave and incisional biopsies, the potential for diagnostic and T-stage microstaging inaccuracy does not appear to result in adverse long-term outcomes.

This series supports this conclusion, although the overall follow-up is short (median 12 months), and the subjects are “lower risk” patients with thinner melanomas (mean Breslow initial depth of 0.73 mm). In our series, only 3% of patients were upstaged on wide local excision after shave biopsy. We cannot comment on the diagnostic accuracy because the total denominator of the shave biopsies performed in order to diagnose 600 consecutive melanomas by this technique alone is not known.

CONCLUSIONS

This series is the largest series to date describing the rate of understaging and outcomes of melanoma patients diagnosed by shave biopsy. The patients included in this study had shave biopsies performed by primary care physicians, dermatologists, internists, and general surgeons. It is important to note that melanoma (including MIS) was considered the diagnosis in only 179 of 600 (32%) of the patients before pathologic assessment of the biopsy. In this series, tumor upstaging occurred in very few of the patients overall (3%). A potential change in the recommendation for an SLNB occurred in only 8 patients (1.3%). Therefore, we conclude that data gathered from a shave biopsy can, in most cases, be used to plan initial definitive treatment, and that rebiopsy is not required before definitive surgical treatment and staging.

Recognizing that a small potential to understage exists, we believe that shave biopsy is an acceptable method for diagnosis of melanoma, particularly because we want to encourage liberal use of biopsies by dermatologists and primary care providers to facilitate earlier diagnoses of cutaneous malignancies.[25] The importance of complete excision or punch biopsy should be de-emphasized and instead, liberal biopsy of suspicious cutaneous lesions (by any reasonable approach) should be the point of emphasis, in hopes of improving outcomes by maximizing the number of melanomas diagnosed at an early stage.

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Abbreviations and Acronyms

MIS	melanoma in situ
NCCN	National Comprehensive Cancer Network
OR	odds ratio

SLNB sentinel lymph node biopsy

Table 1

Preshave Biopsy Clinical Diagnosis*

Clinical diagnosis	n	Percent of total diagnoses
Melanoma	147	25
Nevus	130	22
Basal cell carcinoma	97	16
“Atypia”	60	10
Seborrheic keratosis	50	8.3
Melanoma in situ	43	7.2
Squamous cell carcinoma	33	5.5
Lentigo	14	2.3
Neoplasm not otherwise specified	13	2.2
Actinic keratosis	7	1.1
Other	30	5
Unknown	126	21

* The number of diagnoses is greater than the number of total patients because some patients had more than 1 clinical diagnosis before shave.

Table 2

Change in T-Stage after Definitive Excision of Melanoma Diagnosed Initially on Shave Biopsy in 18 Patients

Shave biopsy T-stage	Excision biopsy T-stage	Patients, n
T_{is}	T3	1
T1	T2	10
T1	T3	1
T2	T3	2
T2	T4	4

Table 3

Literature Review on Biopsy Method and Effect on Outcomes for Patients with Melanoma

First author, year	Total patients in study, n	Excisional biopsies, n	Incisional/punch biopsies, n	Shave, n	Misdiagnosis associated with shave or incisional biopsy	Inaccurate micro-staging associated with shave or incisional biopsy
Ng, 2010[4]	2,470	2,127	163	180	OR 16.6, $p < 0.001$ (punch); OR 2.6, $p = 0.02$ (shave)	OR 5.1, $p < 0.01$ (punch); OR 2.3, $p < 0.01$ (shave)
Moore, 2009[24]	139	–	–	139	n/a	13% of patients upstaged
Molenkamp, 2007[12]	551	279	84 (109 had narrow excision but negative margins)	Unknown	n/a	n/a
Martin, 2005[13]	2,164	1,130	281	354	n/a	n/a
Ng, 2003[5]	138	30	41	67	n/a	88% accurate in determining final Breslow depth
Bong, 2002[14]	761	496	275	n/a	n/a	n/a
Zager, 2010 (this study)	600	–	–	600	n/a	3% upstaged

OR, odds ratio.