Margin Status in Shave Biopsies of Nonmelanoma Skin Cancers

Is It Worth Reporting?

Alicia M. Schnebelen, MD; Jerad M. Gardner, MD; Sara C. Shalin, MD, PhD

Context.—The practice of reporting margin status in biopsies is relatively unique to biopsies of the skin and highly variable among pathologists.

Objective.—To address the accuracy of margin evaluation in shave biopsies of nonmelanoma skin cancers.

Design.—We collected shave biopsies of squamous and basal cell carcinomas that appeared to have uninvolved margins on routine sign out. We obtained deeper levels on corresponding tissue blocks until blocks were exhausted and examined them for tumor at biopsy margins.

Results.—Forty-seven consecutive cases were collected, including 20 squamous cell (43%) and 27 basal cell (57%) carcinomas. Eleven of 47 cases (23%) with negative margins at initial diagnosis demonstrated positive margins upon deeper-level examination. Margins of 8 of 27 basal cell carcinomas (30%) and 3 of 20 squamous cell carcinomas (15%) were erroneously classified as “negative” on routine examination.

Conclusions.—No guidelines exist regarding the reporting of margins in nonmelanoma skin cancer biopsies, and reporting practices vary extensively among pathologists. We found that nearly one-quarter of positive margins in shave biopsies for cutaneous carcinomas are missed on standard histologic examination. Moreover, reporting of a positive margin may also be misleading if the clinician has definitively treated the skin cancer at the time of biopsy. For these reasons, and as routine exhaustion of all tissue blocks is impractical, the decision to include or exclude a comment regarding the margin status should be given conscious consideration, accounting for the clinical intent of the biopsy and any known information regarding postbiopsy treatment.

Cancer biopsies of the skin are used primarily in the evaluation of epithelial neoplasms and benign and malignant melanocytic lesions and, less frequently, for inflammatory dermatoses. Interestingly, the inclusion of a margin status in final diagnostic reports for biopsy specimens seems to be relatively unique to biopsies of the skin. Most nondermatologic surgical reports omit margin status altogether, because in most cases, the primary intent of a biopsy is to sample the lesion to obtain a diagnosis and not to definitively treat the lesion being sampled. Depending on the practice environment and patient characteristics, lesions that are clinically suspicious for squamous cell carcinoma (SCC) or basal cell carcinoma (BCC) at the time of biopsy may be followed by an immediate electrodessication and curettage or other definitive intervention in clinic. Most biopsies, however, are obtained because of a degree of clinical uncertainty, and the definitive treatment plan awaits the biopsy diagnosis. The surgical pathology biopsy report, therefore, becomes an important document for treatment planning.

Historically, at our institution, a comment on margin status has been included in standard diagnostic reports for shave biopsies of all malignancies and melanocytic nevi, unless a clinician has specifically requested otherwise. Although this practice varies widely among institutions, it remains in use in many laboratories across the nation, and the terminology employed by each pathologist is highly variable. Given that a standard shave biopsy is evaluated along one plane only, leaving the edges of the specimen that are deeply embedded and parallel to the plane of sectioning entirely unexamined, unless deeper levels are inspected within the paraffin block, we hypothesized that routine margin evaluation of nonmelanoma skin cancer (NMSC) biopsies had a relatively high potential for error, thereby being misleading to treating clinicians. As such, we performed an evaluation of all “negative-appearing margin” biopsies to assess the accuracy of routine margin assessment in shave biopsies of cutaneous carcinomas.

MATERIALS AND METHODS

This study was designed as a prospective analysis of all consecutively received shave biopsies of SCC and BCC that appeared to have uninvolved (“negative”) margins on routine
Abbreviation: NMSC, nonmelanoma skin cancer.

histologic examination during a 2-month period. The study was approved by the institutional review board at our institution. Melanocytic lesions and other neoplasms were excluded from the project, as were biopsies of SCC and BCC with positive margin results. Specimens submitted as “excisions” (including specimens submitted as “shave excision” or “shave removal”) or those grossly identified as elliptical excisions or cylindrical punch biopsies were also excluded. All biopsy specimens were handled according to our laboratory’s standard operating procedure for shave biopsies. At the time of gross examination, the surgical edges of the specimens were inked, and the specimens were sectioned transversely at approximately 3-mm intervals. Following processing, the paraffin blocks were minimally effaced (30–50 μm depending on the size of the tissue), then leveled by microtome at approximately 40-μm intervals. For each case, 2 or 3 step levels were prepared for initial microscopic examination. For all SCCs and BCCs that appeared to have negative surgical margins on routine histologic exam, microscopic examination. For each case, 2 or 3 step levels were prepared for initial microscopic examination. For all SCCs and BCCs that appeared to have negative surgical margins on routine histologic exam, corresponding step levels were obtained by sectioning the tissue at approximately 40-μm intervals until the entire tissue block was exhausted. All sections were then examined simultaneously by 2 dermatopathologists; initial sections were examined to confirm the original margin status, and the corresponding deeper levels were examined to evaluate whether the margin became positive after exhaustion of the paraffin block. Appropriate statistical calculations were performed.

**RESULTS**

Fifty (n = 50) consecutive cases were collected. Three cases were excluded from the study, 2 of which had positive initial margins upon reevaluation, and 1 in which the exhausted tissue levels were lost. Forty-seven cases were included in the analysis, comprising 20 SCCs (43%) and 27 BCCs (57%). The BCCs were subclassified based on predominant architectural pattern as follows: 22 nodular type (81%), 4 superficial type (15%), and 1 infiltrative type (4%). Upon the initial grossing of the specimens, 25 of the 47 biopsies (53%) were bisected, 15 (32%) were trisected, 6 (13%) were quadrisected, and 1 case (2%) was sectioned into 6 pieces. Eleven of the 47 cases (23%) that had negative margin results at initial diagnosis demonstrated positive margins in at least one deeper level upon exhaustion of the tissue block (Table). Eight of 27 BCCs (30%; 7 nodular type and 1 superficial type) and 3 of 20 SCCs (15%) were erroneously categorized as having negative margins based on only initial examination (Figure 1, A through D). The likelihood of erroneous margin status in SCC versus BCC was not statistically significant (χ² test, P = .24). Of our 11 cases that became positive on deeper levels, 6 (55%) had tumor present at the deep margin only, 2 (18%) had involvement of the peripheral margin only, and 3 (27%) were positive at both the peripheral and deep margins. There was also no statistically significant difference in the frequency of erroneous margin status between specimens that were bisected and those that were sectioned into 3 or more pieces (χ² test, P = .92). The number of additional levels examined after exhaustion of the blocks ranged from 4 to 18, with a mean of 6.5 levels in the specimens with erroneous margin status and 7.2 levels in specimens with correct margin status. Using the Wilcoxon rank-sum test, the correctly diagnosed specimens were found to have had a significantly greater number of additional levels required to exhaust the block (P < .05).

**COMMENT**

The College of American Pathologists and the Association of Directors of Anatomic and Surgical Pathology recommend the reporting of margins in cases of cutaneous melanoma. Inclusion of margin status has also been suggested for formal resections and excisional biopsies of cutaneous carcinomas. No such guidelines exist, however, regarding the reporting of margins in melanocytic nevi or in biopsies of cutaneous carcinomas. Therefore, reporting practices are not uniform among pathologists. They may be influenced by the diagnostician’s own training background or career experience, as well as by the preferences of the treating physicians, among other variables. In a survey of 152 dermatopathologists by Sellheyer et al,1 regarding the evaluation of margins in melanocytic lesions in particular, it was recognized that not only does the inclusion or exclusion of margin status in diagnostic reports vary greatly but also that the terminology varies broadly and is often ambiguous. Responding dermatopathologists reported employing the use of phrases such as “appears” or “on limited margin evaluation” or “margins free in examined sections.” This vague wording likely reflects the dermatopathologist’s inherent understanding that the margin assessment in skin biopsy specimens is limited. Although not, to our knowledge, formally studied in the literature to date, we would expect that similar phrases could be found in diagnostic reports for epithelial neoplasms.

This inherent limitation of margin assessment is related to standard gross examination practices. Based on the relatively small size of shave biopsies, most are bisected or trisected during gross examination, resulting in a finite number of cross-sectional planes examined. Tissue more deeply seated in the paraffin block is not sampled unless deeper sections are inspected (Figure 2). In fact, it is estimated that less than 1% of a skin specimen is examined. This inherent limitation of margin assessment is related to standard gross examination practices. Based on the relatively small size of shave biopsies, most are bisected or trisected during gross examination, resulting in a finite number of cross-sectional planes examined. Tissue more deeply seated in the paraffin block is not sampled unless deeper sections are inspected (Figure 2). In fact, it is estimated that less than 1% of a skin specimen is examined.
“bread-loafing” of an excision will allow a relatively thorough assessment of the entire circumferential peripheral and deep margins, and as excisions are performed with a clinical intent to cure, they include more tissue for evaluation. *En face* margin assessment, as may be performed during Mohs microsurgery or during some intraoperative frozen sections, offers a still more-comprehensive assessment of margin status and may be particularly useful in cases in which tissue-sparing options are requisite.7

The results of this study suggest that, indeed, concern regarding the accuracy of margin evaluation in skin biopsies is warranted. We found that nearly one-quarter of shave biopsies for SCCs and BCCs that appeared to have negative margins on routine examination had tumor involving the surgical margins if the entire tissue block was examined. There was no statistically significant difference in the frequency of erroneous margin assessment for BCCs versus SCCs, or between specimens that were bisected and those that were trisected or greater. The latter finding reflects that the discrepancy in margin evaluation is independent of the method or extent of sectioning during gross examination. In addition, although we recognize that some of our biopsies were perhaps not adequately sampled upon initial sectioning (as is reflected in the rare cases requiring greater than 10 levels for complete tissue exhaustion), the number of additional levels obtained after block exhaustion was actually greater for correctly diagnosed specimens that retained their negative margins, meaning our findings cannot be attributed to superficial block sectioning alone.

The outcomes of our project are concordant with previous studies identifying inaccuracies in margin assessment of skin specimens. In a similarly designed study by Chang et al,8 greater than one-third of all punch excisions of melanocytic nevi with apparently negative margins on initial examination were found to have positive margin involvement upon through-block sectioning. Conservative elliptical excisions, which have slightly wider margins than shave biopsies but narrower margins than formal excisions, are also vulnerable to margin assessment error. When compared with Mohs microsurgery technique—the gold standard in skin margin evaluation when tissue sparing is required—bread-loafing of conservative elliptical excisions of facial BCCs was found to be only 44% sensitive in identifying positive margins.7 A separate investigation by Koslosky et al9 compared the margins of initial-stage Mohs specimens with the preceding biopsy margin status and up to one-third of cases with negative margins on biopsy were positive on the first stage of Mohs surgery. Interestingly, these numbers, although

---

**Figure 1.** Example of basal cell carcinoma, nodular type, and squamous cell carcinoma that had negative margins on initial examination (A and B) but had positive margins after inspection of deeper levels (C and D) (hematoxylin-eosin, original magnification ×40 [A through D]).

**Figure 2.** Standard transverse sectioning in a shave biopsy specimen may lead to underassessment of the outermost margins parallel to the plane of sectioning.
assessed by a different method, are similar to the percentages of missed margins detected in our study.

Another project evaluating NMSC biopsies and their subsequent excisions determined that, although negative margins on biopsies of BCCs do not reliably predict complete tumor removal, negative margin biopsies of SCCs were generally reliable. The discrepancy between the results of that study and our own might be explained by the observation that residual SCC is more likely than BCC to regress following partial biopsy and is, therefore, less likely to be identified on subsequent excision. 

Although a subset of the biopsies we encounter in our practice have been immediately followed by electrodessication and curettage, most neoplasms are biopsied without definitive treatment immediately following the biopsy; in many cases, we are not provided with information regarding the clinical procedure performed. Some clinicians establish further treatment decisions based on whether the neoplasm was eradicated via biopsy. As Chang et al reason, reporting margins in skin biopsy specimens provides clinicians with the misconception that margins can be accurately assessed by routine histologic examination. Moreover, as diagnostic results become increasingly available to patients, one must also consider patient interpretations of their biopsy reports and their potential refusal for subsequent intervention upon receiving a report with language suggesting that their neoplasm has been “eradicated” by biopsy alone. The converse situation can also be problematic. For biopsies that are followed by immediate definitive treatment, receipt of a biopsy report that indicates tumor is present at the tissue edge is similarly misleading. Future treating physicians or the patients themselves may not recognize that the biopsy result did not take into account the definitive intervention performed at the time of biopsy and may thus press for additional, unwarranted therapy.

Our study is not without limitations. First, we recognize that there are regional and interinstitutional variations in how NMSC is biopsied. Biopsy size may be minute or generous. At our institution, biopsy size tends to be judicious, and therefore, we may have a higher proportion of biopsies with apparently negative margins (whether truly negative or not) than a practice setting that routinely sees very small tissue fragments. There are also some significant differences in the standard handling of shave biopsies within the laboratory. For example, the standard number of levels routinely evaluated differs among practices, and those that examine 4 or 5 levels on every biopsy might be less likely to erroneously categorize a margin as negative. Similarly, some laboratories have found that by prospectively including multiple deeper levels in all cases, there is a resulting increase in their diagnostic accuracy and a reduction in their overall costs. For these laboratories, the percentage of erroneous margins would likely be lower than that identified in our study. Lastly, because of the nature of sampling, it was impossible to inspect the tissue that was discarded during effacement of the tissue blocks upon initial- and deeper-level sectioning, and consequently, it is possible that our results may have actually underestimated the percentage of cases whose margins were actually positive.

We do not advocate for the exhaustion of all paraffin tissue blocks on shave biopsies of cutaneous carcinomas because that exercise would be impractical. Extraneous sectioning of specimens results in a delay in turnaround times, is costly, and is accompanied by a higher work burden for both histotechnologists and pathologists involved in the case, particularly when deeper levels are ordered retrospectively. Instead, we suggest that the decision about whether to provide a margin status in a biopsy of NMSC be made on a case-by-case basis, balancing any known intent of the biopsy and postbiopsy treatment procedures with the potential risk for misunderstanding by the clinician and/or patient population for each institution. Because of this study, in agreement with our dermatology department, we revised our reporting practices for NMSCs. Margin status is no longer mentioned routinely; for small tumors on which shave procedures are performed with an intention to be curative, a more-complete margin assessment can be requested by the clinician and performed through the use of deeper-level sectioning, if necessary. Although this change is still recent, we anticipate that it will lead to improved clinician satisfaction with reporting, less ambiguity for clinicians and patients, and ultimately better patient care outcomes.

We acknowledge the substantive technical work required on this project and the dedication of our outreach laboratory histotechnologists: Kimberly Hall, HT, QIHC; Amanda James Osborne, BS, HT; and Sarah Vestal, BS, MPH.

References