INTRODUCTION

In 1948, Sophie Spitz first described nests of large epithelioid or spindled melanocytes observed in children as benign juvenile melanomas. Since that time, the classifications of these spitzoid proliferations have diversified, and now include a spectrum of diagnoses such as classical or benign Spitz nevi, atypical Spitz tumors, and spitzoid melanomas. The increasingly complex nomenclature and similarity to melanomas have made the diagnosis and management of spitzoid lesions in the pediatric population historically challenging and controversial. In addition to the reported fatalities among patients with spitzoid melanomas and atypical Spitz tumors, there is at least 1 reported death due to metastasis in a child diagnosed with a conventional Spitz nevus, which was originally classified as benign by 6 different pathologists.

However, there is now growing evidence for conservative management, namely the “wait and see” approach, for children aged under 12 years who have been diagnosed with a benign Spitz nevus. Despite this evidence, clinical uncertainty and a lack of consensus remain among dermatologists and surgeons regarding the management and surgical intervention for these pediatric benign Spitz lesions. One major concern among physicians is the potential for malignancy of partially excised Spitz lesions, prompting surgical re-intervention after an initial biopsy or excision.

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would advise re-excision if the sample extends to the lateral histological margin despite no clinical evidence of residual lesion.16

While some advances have been made toward a formal recommendation against surgical intervention,10 there exists a paucity of data and no definitive protocol for the management of involved margins following initial biopsy or excision. To address this gap in the literature, we aimed to characterize the management, clinical course, and outcomes of pediatric patients who underwent surgical intervention for benign, histologically-confirmed Spitz nevi at our institution—with a specific focus on the management of residual lesion after secondary excision.

METHODS

Approval from Boston Children’s Hospital Committee on Clinical Investigation was obtained (Protocol number: P00025597), with a waiver of informed consent. We retrospectively identified and reviewed the medical records of 123 patients seen at our institution, a large tertiary pediatric facility, for the management of Spitz nevi from January 2007 through June 2017 using the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10) codes D22 and D23. To meet inclusion criteria, all patients were <18 years of age during consultation, underwent surgical intervention for a Spitz nevus (initially) diagnosed by observation and (subsequently) confirmed by histopathology, and were managed by a pediatric plastic surgeon, a general surgeon, or a dermatologist. Patients with atypical or malignant lesions were excluded.

Medical records were reviewed for patient demographics, Fitzpatrick skin type, age at the time of diagnosis, age at the time of biopsy and excision, biopsy and/or excision method, and patient’s family history of melanoma. Lesion characteristics that were collected included: anatomical location, lesion size (longest dimension), clinical presentation, and recurrence status. Due to the retrospective nature of this study, follow-up time was defined as the length of time from initial biopsy or excision to the patient’s last clinical visit. The primary outcome was the presence of histological residual Spitz lesion after secondary excision. Secondary excision was defined as a formal excision procedure performed after the specimen of the initial biopsy or excision procedure demonstrated involved margins. Figure 1 outlines the typical clinical pathway and our definition of a “secondary excision.” Histopathological records inclusive of fluorescence in situ hybridization and immunoreactivity results were also reviewed.

Statistical analyses were conducted using SPSS (IBM SPSS Statistics for Windows, version 21.0; IBM Corp., Armonk, N.Y.), and SAS 9.2 (SAS Institute Inc., Cary, N.C.). Median age at the time of diagnosis, biopsy, and excision, and median lesion sizes were calculated, with differences compared using the independent-samples median test. Frequency distributions for patient, lesion, biopsy, and excision characteristics were calculated. Fisher’s exact testing was used to compare differences in the proportion of patients with residual lesions and clear margins by varying management types, as well as initial method of management and treating specialty. $P < 0.05$ was considered statistically significant.

RESULTS

Demographics and Clinical Features

A total of 123 patients meeting inclusion criteria were identified and included in analyses. Patient and treatment characteristics are presented in Table 1. Roughly half of all patients in our sample were women (51.2%, $N = 63$). Most patients for which a Fitzpatrick skin type was documented in the chart were types I–II (80.8%, $N = 63$). No patient had a prior history of melanoma, and 4% ($N = 5$) of patients reported a family history of melanoma. The most commonly affected anatomical sites were the head/neck area (45.5%, $N = 56$), followed by the lower (24.4%, $N = 30$) and upper limbs (21.1%, $N = 26$), and trunk (8.9%, $N = 11$). Lesion size was skewed right with a median (interquartile range) diameter of 8 (5) mm at the widest point (Table 2).

Clinical Course

Approximately three-fourths (76.4%, $N = 94$) of all patients were managed by a plastic surgeon, with the remaining patients treated by either a dermatologist (17.9%, $N = 22$) or a general surgeon (5.7%, $N = 7$). Lesions initially managed with excision were significantly larger than those undergoing punch biopsy ($P = 0.02$; Table 3). However, the size of lesions undergoing punch and shave biopsy was comparable ($P = 0.78$). The method

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**Fig. 1.** The clinical course of a typical patient who presented with a suspected Spitz nevus. If margins were involved (“Positive margin”), most (but not all) underwent a secondary excision procedure. The outcome of interest was the presence of histopathologically-confirmed residual lesion on this secondary specimen.
Table 1. Patient and Treatment Characteristics

| Characteristics          | Patients (N = 123) |
|--------------------------|--------------------|
| Gender                   |                    |
| Men                      | 63 (51.2%)         |
| Women                    | 60 (48.8%)         |
| History of melanoma, N (%) | 0 (0%)            |
| Family history of melanoma, N (%) | 5 (4.1%) |
| Median (IQR) age at biopsy, y | 7.3 (4.9) |
| Median (IQR) age at initial excision, y | 6.6 (6.0) |
| Median (IQR) time from biopsy to excision, mo | 2.5 (3.1) |
| Median (IQR) time from excision to re-excision, mo | 3.5 (3.3) |

Table 2. Lesion Characteristics

| Characteristics | Lesions (N = 123) |
|-----------------|-------------------|
| Median (IQR) diameter at widest point, mm | 8.0 (5.0) |
| Anatomic location, N (%) |                    |
| Head/neck       | 56 (45.5%)        |
| Lower extremities | 30 (24.4%)      |
| Upper extremities | 26 (21.1%)      |
| Trunk           | 11 (8.9%)         |

Table 3. Incidence of Histopathological Residual Lesion on Surgical Specimens after Secondary Excision

| Initial Management | Punch Biopsy (N = 14) | Shave Biopsy (N = 51) | Formal Excision (N = 58) | Total (N = 123) |
|--------------------|-----------------------|-----------------------|--------------------------|-----------------|
| Median (IQR) diameter at widest point, mm | 8.0 (5.0) | 6.0 (5.0) | 9.5 (5.0) | – |
| Margin involvement | 11/14 (78.6%) | 50/51 (98.0%) | 14/58 (24.1%) | 75/123 (61.0%) |
| Residual lesion in secondary procedure specimen | 10/11 (90.9%) | 23/47 (48.9%) | 5/8 (62.5%) | 38/66 (57.0%) |
the incidence and management of residual lesion in secondary excision specimens when the initial biopsy/excision specimen demonstrated involved margins.

Shave and punch biopsies are two of the most commonly recognized biopsy techniques for Spitz nevi, with complete excision representing the most aggressive initial treatment. In the present study, about half of all lesions underwent an initial shave or punch biopsy (53%) and almost all had margin involvement (94%). All other lesions underwent an initial excision and roughly one-quarter had margin involvement (24%). These findings confirm those of previous pediatric and young adult studies. Often times residual lesions are re-excised due to concern for initial misdiagnosis, potential metastasis, or recurrence, particularly when recurrent lesions are irregular in form or confined within a subsequent scar. To date, there exists no evidence that re-excision can reliably achieve clear margins, but the belief that re-excision can reduce the possibility, albeit small, of malignant or fatal outcomes by achieving clear margins remains pervasive among physicians.

In this present study, we observed that roughly half of all re-excised shave biopsies had residual, histologically-confirmed lesions, while the great majority of initial punch biopsies (91%) had confirmed residual Spitz lesions. It is possible that inflammatory healing responses eliminated viable remaining cells from the wound beds that had involved margins on the initial specimens, but regardless, these findings suggest that shave biopsy is superior to punch biopsy with respect to total removal of the initial lesion. Nevertheless, we would be remiss not to note the important diagnostic advantage of punch biopsies over shave biopsies; punch biopsies can more reliably excise a full-thickness specimen with preserved architecture of the lesion in question, providing the most clarity on the malignant potential of a lesion, or the presence of atypical Spitz tumor in these cases.

Finally, the prognostic value of residual lesion or involved margins following the initial surgical management of a benign spitzoid lesion in the pediatric population has not been verified. Although it is likely that the a priori presence of residual lesion portends a higher likelihood of recurrence, it is not clear whether this predisposes to pre-malignancy. It must be noted that malignancy and lesion reoccurrence were not observed in any subject during the present study’s follow-up period. Given the observed 42% incidence of no residual lesion in wound beds which initially had margin involvement, and the low incidence of malignant or atypical Spitz nevi in children under 12 years and low recurrence rates of classical Spitz lesions, clinicians may observe biopsied or primarily excised lesions with involved margins when appropriate—especially if there is no clinically visible lesion remaining. Additionally, physicians should consider the benefits and
risks of a secondary procedure because many of these lesions occur in the aesthetically-sensitive head and neck areas, often pose the additional risks of general anesthesia, and are not guaranteed to achieve clear margins.

The current study is retrospective and, as such, has several limitations. The results of this study may not be generalizable because subjects were recruited from a single large, tertiary-care facility. Additionally, the included patients were identified by their assigned ICD-10 codes, potentially limiting the selection of relevant cases. Although we did not discern any demographic differences in the subjects, confounding could not be controlled. Color could not be ascertained and stratified. There was also no indication of whether there was visible lesion after the initial excision or biopsy and before the secondary excision, and this information would have been very useful to correlate with histopathological residual lesion. It is possible that the absence of visible lesion decreases the test probability that histological residual lesion remains, and thus tilts the scale toward observation. Finally, the median follow-up time for the cohort was relatively short (approximately 1 year), and future studies are needed to explore long-term outcomes in this population.

CONCLUSIONS

Benign Spitz nevi in the pediatric population are commonly managed with observation alone. However, a subsection of these cases are treated with surgical intervention. Concern for recurrence and potential malignancy have driven clinicians to re-excite classical Spitz nevi in pediatric patients to achieve clear margins. Our findings suggest that observation post initial biopsy and excision may be a reasonable treatment course for pediatric patients with histologically-confirmed Spitz nevi. As such, we urge physicians to fully consider the risks and benefits of secondary excisions of classical Spitz nevi in children.

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REFERENCES

1. Spitz S. Melanomas of childhood. Am J Pathol. 1948;24:591–609.
2. Crotty KA, Scolyer RA, Li L, et al. Spitz naevus versus spitzoid melanoma: when and how can they be distinguished? Pathology. 2002;34:6–12.
3. Dika E, Ravaiolì GM, Fanti PA, et al. Spitz nevi and other spitzoid neoplasms in children: Overview of incidence data and diagnostic criteria. Pediatr Dermatol. 2017;34:25–32.
4. Peris K, Ferrari A, Argenziano G, et al. Dermoscopic classification of Spitz/Reed nevi. Clin Dermatol. 2002;20:259–262.
5. Abbond J, Stein M, Ramien M, et al. The diagnosis and management of the Spitz nevus in the pediatric population: A systematic review and meta-analysis protocol. Syst Rev. 2017;6:81.
6. Wood BA. Paediatric melanoma. Pathology. 2016;48:155–165.
7. Laflas A, Apalla Z, Ioannides D, et al; International Dermoscopy Society. Update on dermoscopy of Spitz/Reed naevi and management guidelines by the International Dermoscopy Society. Br J Dermatol. 2017;177:645–655.
8. Pol-Rodriguez M, Lee S, Silvers DN, et al. Influence of age on survival in childhood spitzoid melanomas. Cancer. 2007;109:1579–1583.
9. Barnhill RL, Flotte TJ, Fleischli M, et al. Cutaneous melanoma and atypical Spitz tumors in childhood. Cancer. 1995;76:1833–1845.
10. Bartenstein DW, Fisher JM, Stamoulis C, et al. Clinical features and outcomes of spitzoid proliferations in children and adolescents. Br J Dermatol. 2019;181:366–372.
11. Brunetti B, Nino M, Sammarco E, et al. Spitz naevus: A proposal for management. J Eur Acad Dermatol Venereol. 2005;19:391–393.
12. Luo S, Sepehr A, Tsao H. Spitz nevi and other Spitzoid lesions part II. Natural history and management. J Am Acad Dermatol. 2011;65:1087–1092.
13. Gelbard SN, Tripp JM, Marquoob AA, et al. Management of Spitz nevi: A survey of dermatologists in the United States. J Am Acad Dermatol. 2002;47:224–230.
14. Metzger AT, Kane AA, Bayliss SJ. Differences in treatment of Spitz nevi and atypical Spitz tumors in pediatric patients among dermatologists and plastic surgeons. JAMA Dermatol. 2013;149:1348–1350.
15. Kaye VN, Dehner LP. Spindle and epithelioid cell nevus (Spitz nevus). Natural history following biopsy. Arch Dermatol. 1990;126:1581–1583.
16. Thougan BE, Orlow SJ, Schaffer JV. Spitz nevi: Beliefs, behaviors, and experiences of pediatric dermatologists. JAMA Dermatol. 2013;149:283–291.
17. Barnhill RL, Argenyi ZB, From L, et al. Atypical Spitz nevi/tumors: Lack of consensus for diagnosis, discrimination from melanoma, and prediction of outcome. Hum Pathol. 1999;30:513–520.
18. Vollmer RT. Patient age in Spitz nevus and malignant melanoma: Implication of Bayes rule for differential diagnosis. Am J Clin Pathol. 2004;121:872–877.
19. Casso EM, Grin-Jorgensen CM, Grant-Kels JM. Spitz nevi. J Am Acad Dermatol. 1992;27(6 Pt 1):901–913.
20. Elston DM, Stratman EJ, Miller SJ. Skin biopsy: Biopsy issues in specific diseases. J Am Acad Dermatol. 2016;74:1–16; quiz 17.