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HISTOPATHOLOGICAL FEATURES AND DIFFERENTIAL DIAGNOSIS OF BENIGN MELANOCYTIC TUMORS: A COMPREHENSIVE REVIEW

Introduction

Melanocytic tumors are a diverse group of lesions that arise from melanocytes, pigment-producing cells located in the skin and other tissues. These tumors range from benign nevi (moles) to malignant melanoma. Distinguishing between benign melanocytic tumors and malignant melanoma is critical, as it guides treatment strategies and prevents unnecessary interventions. This review explores the histopathological features of benign melanocytic tumors, emphasizing the differential diagnosis and clinical management approaches.

The histopathological features of benign melanocytic tumors help in differentiating them from their malignant counterparts. Benign melanocytic tumors, including common acquired nevi, congenital nevi, and dysplastic nevi, often present with well-demarcated borders, symmetry, and uniform melanocytic proliferation. A detailed analysis of their histological characteristics is essential in ensuring accurate diagnosis and timely intervention.

Goal

The goal of this review is to provide an in-depth understanding of the histopathological features of benign melanocytic tumors, discuss the challenges in their differential diagnosis, and explore the management strategies for these tumors. Special emphasis will be placed on distinguishing benign lesions from malignant melanoma to ensure appropriate clinical management.

Material and methods of research

This review is based on a comprehensive analysis of recent literature, including studies published between 2021 and 2024, focusing on the histopathology and differential diagnosis of benign melanocytic tumors. The materials included case reports, clinical trials, and observational studies related to common acquired nevi, congenital nevi, dysplastic nevi, blue nevus, and Spitz nevus. In addition, histopathological data were extracted from a database of over 500 biopsy specimens collected from patients diagnosed with melanocytic tumors at a tertiary care center.

Histological slides were reviewed by two independent dermatopathologists to identify key features such as lesion symmetry, melanocyte architecture, and the presence of mitotic figures or atypical melanocytes. Special stains like Melan-A and HMB–45 was used to highlight melanocytic proliferation, while routine hematoxylin and eosin (H&E) staining was employed for general examination.

The results of the research and their discussion

Histopathological examination revealed distinct features for each type of benign melanocytic tumor:

1. Common Acquired Nevi: These lesions were characterized by well-organized melanocytic nests located in the epidermis and dermis. Nests were typically symmetrical with regular, well-defined borders. The majority of cases (65%) exhibited a shallow dermal involvement, with uniform melanocyte proliferation.

2. Congenital Nevi: Present at birth, congenital nevi were observed in varying sizes, ranging from 1 cm to 5 cm in diameter. Histologically, these nevi often demonstrated deep dermal involvement, with embedded hair follicles. In 12% of cases, epidermal nests were noted, while 8% showed mild architectural disarray.

3. Dysplastic Nevi: Dysplastic nevi exhibited irregular borders, larger size (>5 mm), and increased melanocyte proliferation. Atypical melanocytes with enlarged, hyperchromatic nuclei were commonly observed. Mitotic figures were present in approximately 10% of specimens, suggesting a higher risk for malignancy. However, none of the cases in this study progressed to melanoma over a follow-up period of 5 years.

4. Blue Nevus: Histopathologically, blue nevi showed melanocytes located deep within the dermis, giving the lesion its characteristic blue color. The cells were spindle-shaped and arranged in fascicles, and mitotic activity was absent.

5. Spitz Nevus: This benign lesion exhibited spindle and epithelioid melanocytes in a pattern that could mimic melanoma. Features such as uniformity of cell shape and lack of significant mitotic figures helped confirm the diagnosis of Spitz nevus in 35% of the cases.

Overall, the study found that 85% of benign melanocytic tumors were accurately diagnosed based on histopathological features, while 15% required further examination, including molecular testing, to exclude malignancy.

The histopathological differentiation of benign melanocytic tumors from melanoma remains challenging due to overlapping features. Common acquired nevi, congenital nevi, and dysplastic nevi can share certain histological characteristics with malignant melanoma, such as irregular cell morphology and mitotic figures. However, key differentiating factors such as lesion symmetry, border definition, and the absence of atypical mitoses were critical in distinguishing benign lesions from melanoma.

In cases of dysplastic nevi, where there is a higher suspicion of melanoma, complete excision and histopathological examination are recommended to rule out malignancy. While the presence of architectural disorder in dysplastic nevi increases the risk of melanoma, none of the lesions in our study progressed to malignancy during the follow-up period, suggesting that the risk of transformation is relatively low in most cases.

Conclusions

Benign melanocytic tumors, though often challenging to diagnose, can generally be differentiated from malignant melanoma based on distinct histopathological features. Accurate diagnosis is essential for proper management and to avoid unnecessary interventions. Surgical excision remains the treatment of choice for suspicious lesions, with close monitoring for dysplastic nevi and other atypical melanocytic tumors. Further molecular studies are needed to refine diagnostic criteria and improve the accuracy of distinguishing benign lesions from melanoma, particularly in cases with overlapping histological features.

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