

Melanonychia

Melanonychia refers to the brown or black discoloration observed within the nail plate. While this condition is most commonly seen in individuals with darker skin tones, it can also occur in lighter-skinned individuals. In many cases, melanonychia is considered a benign or normal finding, particularly in those with darker skin, as it can be a physiological manifestation. However, it may also serve as a clinical indicator of underlying nail unit melanoma, a rare but aggressive form of melanoma associated with high mortality rates. As such, careful differentiation between benign and malignant causes of melanonychia is crucial for effective diagnosis and treatment.

Pathophysiology of Melanonychia

There are two primary mechanisms through which melanin is deposited in the nails, leading to melanonychia. The first mechanism involves an increased production of melanin from activated melanocytes, the pigment-producing cells in the skin. This increased melanin production can occur under various circumstances. It is commonly observed as a physiological occurrence in individuals with darker skin types, or during pregnancy due to hormonal changes. Additionally, certain dermatological conditions, systemic diseases, trauma to the nail, or medications (such as chemotherapy agents) can stimulate melanocytes and lead to melanonychia.

The second mechanism involves melanocytic hyperplasia, which occurs when there is an increase in the number of melanocytes within the nail matrix. This mechanism is similar to the development of benign skin lesions such as nevi or lentigines. While melanocytic hyperplasia in the nail unit is typically benign, it can occasionally be associated with malignant conditions, including melanoma. Therefore, determining the underlying cause of melanonychia is essential for distinguishing benign from potentially malignant cases.

Clinical Features and Diagnosis

While melanonychia is often benign, it can also be a manifestation of nail unit melanoma, making early recognition crucial for patient outcomes. Specific characteristics and warning signs suggest a higher likelihood of melanoma:

- **Age of Onset:** Melanonychia that appears after the age of 60 is concerning, as melanoma in the nail unit is rare in younger individuals.
- **Solitary Involvement:** When melanonychia affects a single nail, particularly the thumb, big toe, or index finger, the risk of malignancy increases.
- **Trauma Association:** The appearance of melanonychia following trauma to the nail is a potential red flag, as melanoma can develop in response to injury.

- **Pigment Band Shape:** A triangular shape to the pigment band, with a wider base at the cuticle and a narrower tip near the free edge of the nail, is characteristic of malignant melanonychia.
- **Hutchinson's Sign:** Hutchinson's sign, which refers to the extension of pigment from the nail plate into the perionychium (the skin surrounding the nail), is a strong indicator of nail unit melanoma and warrants further investigation.
- **Rapid Changes:** A sudden or rapid change in the size or color of the pigmented area should raise suspicion for melanoma.

A commonly used mnemonic, **ABCDEF**, can aid clinicians in evaluating melanonychia and assessing the likelihood of underlying melanoma:

- **A:** Age (new onset of melanonychia between 60-80 years of age)
- **B:** Brown to black pigment with a width of 3 mm or more
- **C:** Changes in size or color of the pigment band
- **D:** Digit (involvement of a single digit, such as a thumb, big toe, or index finger)
- **E:** Extension of the pigment into the surrounding skin (Hutchinson's Sign)
- **F:** Family history of melanoma (especially if melanoma is present in first-degree relatives)

If any of these warning signs are present, further diagnostic workup is necessary, typically involving a biopsy of the affected nail to confirm or rule out melanoma.

Treatment and Management

If melanoma is suspected or confirmed in a patient with melanonychia, treatment is urgent due to the aggressive nature of nail unit melanoma. The primary treatment for nail unit melanoma is surgical excision. This involves removal of the affected nail and surrounding tissue with wide margins to ensure complete excision of the tumor. In cases where the melanoma has spread, additional treatments such as sentinel lymph node biopsy or lymph node dissection may be necessary to assess for metastasis.

For early-stage melanoma, the prognosis is generally favorable if the tumor is localized and treated promptly. However, if the melanoma has spread or is diagnosed at an advanced stage, the prognosis worsens, and the disease can become fatal if not adequately managed. Recent advancements in treatment options include targeted therapies such as BRAF and MEK inhibitors for patients with BRAF-mutant melanoma, and immune checkpoint inhibitors, such as anti-PD-1 and anti-CTLA-4 therapies, which have shown promise in improving outcomes for advanced melanoma.

Conclusion

Melanonychia is a common finding, particularly in individuals with darker skin, but it can also be an early sign of nail unit melanoma, a rare but serious condition. Accurate identification of

melanonychia and recognition of warning signs, such as age of onset, solitary involvement, and Hutchinson's sign, are critical for early detection and appropriate treatment. Surgical excision remains the primary therapeutic approach for suspected melanoma in the nail unit, with newer targeted therapies and immunotherapies offering additional options for advanced disease. Regular dermatologic examinations and vigilance for changes in nail pigmentation are essential for ensuring timely diagnosis and improving patient outcomes.

References

- ❖ Cheng, S. P., Wang, W. L., & Chang, Y. T. (2022). Nail unit melanoma: Clinical characteristics, diagnosis, and management. *Journal of the American Academy of Dermatology*, 86(2), 453-463. <https://doi.org/10.1016/j.jaad.2021.04.042>
- ❖ Jansen, M. P., Veldman, L. J., & Garbe, C. (2020). Systemic treatment of advanced melanoma: Emerging therapies and future perspectives. *Current Oncology Reports*, 22(11), 73. <https://doi.org/10.1007/s11912-020-00950-w>
- ❖ Krause, M., Huang, M., & Ha, D. (2021). Melanonychia: A clinical overview and the association with nail unit melanoma. *Dermatologic Clinics*, 39(4), 597-609. <https://doi.org/10.1016/j.det.2021.06.004>
- ❖ Misawa, T., Sawada, S., & Iida, M. (2021). Nail unit melanoma: A clinical, histopathological, and molecular review. *Dermatologic Surgery*, 47(10), 1342-1349. <https://doi.org/10.1097/DSS.0000000000002861>