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CLEAR CELL HIDRADENOMA OF THE DORSUM PEDIS IN A FEMALE PATIENT: A RARE ADNEXAL TUMOR WITH A DIAGNOSTIC CHALLENGE

Fadillah
Bhayangkara's Hospital In Palembang, Medicine of Muhammadiyah University In Palembang
Email: fadillahsayuti@gmail.com

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Abstract

Background: Clear cell hidradenoma (CCH) is a rare benign adnexal neoplasm with eccrine and/or apocrine differentiation. Although it may occur at various anatomical sites, involvement of the foot is uncommon. Its variable clinical and histopathological features may create a diagnostic challenge, particularly when it presents as an isolated mass on the dorsum pedis. Case presentation: A 20-year-old woman presented with a one year history of a slowly enlarging mass on the dorsum of the left pedis The lesion measured 2x1,5x1 cm and was described clinically as Ganglion like, grayish-brown in color. On sectioning, two cystic spaces measuring 0.4 cm and 0.5 cm in diameter are identified, each containing a jelly-like material. The specimen has a rubbery consistency.The patient underwent wide local excision. Histopathological examination revealed the tumor is located in the dermis and is unencapsulated. It is partly cystic, with cystic spaces containing amorphous eosinophilic material. The solid component is composed of polygonal cells with basophilic cytoplasm, some of which have clear cytoplasm containing glycogen. Mitotic activity is low, with fewer than 4 mitoses per 10 high-power fields. Based on the clinicopathological findings, a diagnosis of clear cell hidradenoma was established. Conclusion: CCH should be considered in the differential diagnosis of an isolated soft-tissue mass on the dorsum pedis. Histopathological examination is essential for distinguishing this rare benign adnexal tumor from other cutaneous neoplasms and malignant hidradenocarcinoma. Complete excision and clinical follow-up are important because incomplete removal may lead to local recurrence.

Keyword: *clear cell hidradenoma; dorsum pedis*

A. INTRODUCTION

Clear cell hidradenoma (CCH), also known as nodular hidradenoma, solid-cystic hidradenoma, or eccrine acrospiroma, is a rare, benign, adnexal neoplasm originating from the distal excretory ducts of sweat glands, exhibiting both eccrine and apocrine differentiation.[1,2]. Clear cell hidradenoma most commonly occurs in middle-aged adults and usually presents as a solitary, slowly growing, well-circumscribed dermal or subcutaneous nodule. The head, neck, and trunk are frequently involved, whereas lesions arising on the foot are uncommon.[2,3]. Epidemiologically, clear cell hidradenoma is a relatively uncommon skin tumor, accounting for less than 1% of all primary cutaneous neoplasms. It predominantly affects adults in their fourth

to eighth decades of life, with a distinct female-to-male predilection of approximately 2:1. Anatomically, these tumors occur most frequently in the head and neck region, anterior trunk, and proximal extremities. Occurrence on distal extremities, particularly the foot, is exceptionally rare. Presentation on the dorsum pedis represents an atypical clinical site; due to its scarcity and non-specific presentation in this location, it often mimics other soft-tissue lesions such as ganglion cysts, epidermal inclusion cysts, foreign body granulomas, or vascular malformations, frequently leading to pre-operative misdiagnosis.[4]At the cellular level, CCH is composed predominantly of two major cell populations: polygonal cells with eosinophilic or basophilic cytoplasm and clear cells containing abundant glycogen. The clear-cell phenotype is attributed to the accumulation of intracellular glycogen, which is dissolved during routine tissue processing and produces the characteristic optically clear cytoplasm on hematoxylin and eosin staining. The proportion of clear cells may vary considerably between tumors. Ductal differentiation, squamous metaplasia, and cystic degeneration may occur as part of the tumor's divergent adnexal differentiation [5] A recurrent molecular abnormality reported in CCH is the t(11;19)(q21;p13) translocation, resulting in a CRTC1–MAML2 gene fusion. This fusion is thought to contribute to tumor development through dysregulation of transcriptional pathways, particularly those associated with cyclic adenosine monophosphate and CREB-mediated signaling. The same molecular alteration has also been described in selected salivary gland tumors, suggesting a possible shared molecular pathway among certain adnexal and salivary gland neoplasms. However, the presence of this fusion is not sufficient by itself to establish the diagnosis, and its exact role in the progression from benign hidradenoma to hidradenocarcinoma remains incompletely defined, [6]Clear cell hidradenoma (CCH), is a rare benign cutaneous adnexal tumor that usually presents as a solitary, slowly enlarging skin nodule. It predominantly affects adults, with a mean age of approximately 54.7 years in a recent systematic review of 241 reported cases. A slight female predominance has been reported, with females accounting for approximately 54% of cases. However, because most available evidence consists of case reports, the demographic distribution should be interpreted cautiously.[6] Clinically, CCH is generally described as a solitary, well-defined cutaneous or subcutaneous nodule. The lesion is often asymptomatic, although pain, tenderness, or other local symptoms may occur. The clinical appearance is nonspecific and may resemble other benign skin lesions, which can make preoperative diagnosis difficult. Consequently, histopathological examination following biopsy or surgical excision is usually required to establish the diagnosis. The clinical course is usually indolent, with lesions persisting for months or years before diagnosis.

Nevertheless, malignant transformation has been reported. In the systematic review by Ladas et al. (2026), malignant lesions were generally larger and had been present for a longer duration than nonmalignant lesions. These findings suggest that progressive enlargement and prolonged duration may warrant careful evaluation; however, tumor size and duration alone cannot reliably distinguish benign CCH from hidradenocarcinoma. The definitive assessment of malignancy depends on the identification of histopathological features such as infiltrative growth, marked cytological atypia, increased mitotic activity, necrosis, and lymphovascular invasion. [6]

CASE PRESENTATION

A 20-year-old woman presented with a solitary mass on the dorsum of the foot that had been present for approximately one year. The lesion was tender and clinically resembled a ganglion cyst. No imaging examination was performed. A wide excisional biopsy was subsequently performed, and the specimen was submitted for histopathological examination.

Grossly, the specimen consisted of an irregular grayish-brown tissue fragment measuring 2.0 × 1.5 × 1.0 cm. On cut section, two cystic spaces measuring 0.4 cm and 0.5 cm in diameter were identified, containing jelly-like material. The specimen had a rubbery consistency.

Microscopically, the lesion was located within the dermis and was unencapsulated, with a partly cystic architecture. The cystic spaces contained amorphous eosinophilic material. The solid component was composed predominantly of polygonal cells with basophilic cytoplasm, admixed with clear cells containing glycogen. Focal squamous metaplasia and small ductal structures were identified within the cystic spaces. The tumor cells were generally monomorphic, with only mild cytological pleomorphism. Mitotic activity was low, with fewer than 4 mitoses per 10 high-power fields. No tumor necrosis was observed. Focal hemorrhage was present, with intervening hyalinized fibrocollagenous stroma and adipose tissue. There was no infiltration into the surrounding tissue or lymphovascular invasion.Based on the clinical and histopathological findings, the lesion was diagnosed as clear cell hidradenoma, a benign sweat gland adnexal tumor.

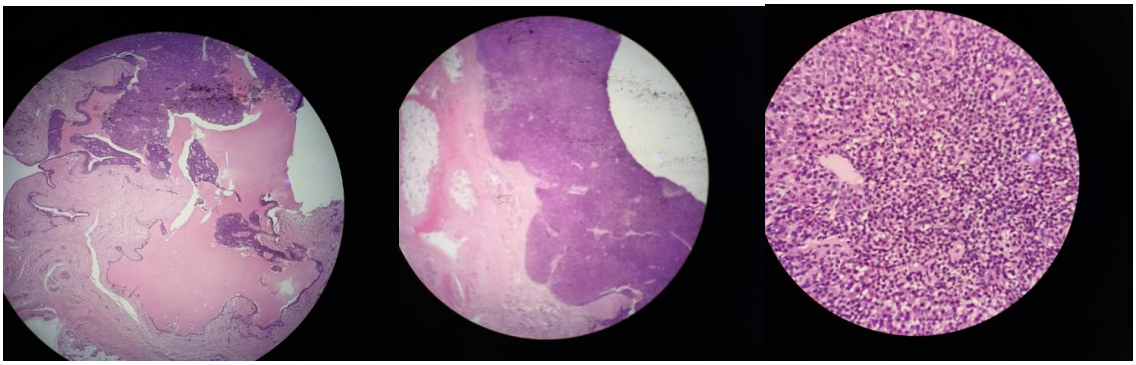

Figure 1 (a) microscopic show a well-circumscribed, partially encapsulated dermal neoplasm composed of solid and cystic areas. The solid component consists of lobules and nests of epithelial cells separated by delicate fibrovascular septa (H and E, 4x10). (B) The tumor cells display variable morphology, including polygonal cells with eosinophilic cytoplasm and clear cells with abundant glycogen-rich cytoplasm. (H and E, 4x10) (C) Focal ductal differentiation is identified, characterized by small lumina lined by cuboidal epithelial cells. The cystic spaces contain eosinophilic proteinaceous material and are lined by a double layer of epithelial cells.The nuclei are generally round to oval, with mild variation in size and occasional small nucleoli. Mitotic figures are inconspicuous. No significant nuclear pleomorphism, tumor necrosis, or infiltrative growth is identified. (H and E, 40x10)

B. RESULTS AND DISCUSSION

Clear cell hidradenoma (CCH), also referred to as nodular hidradenoma or solid-cystic hidradenoma, is an uncommon benign cutaneous adnexal neoplasm showing sweat gland differentiation. Contemporary classifications recognize hidradenomas as a heterogeneous group, with clear cell hidradenoma generally demonstrating apocrine-type differentiation, whereas poroid hidradenoma is associated with eccrine differentiation. [7,8] CCH usually presents as a solitary, well-circumscribed, slow-growing dermal or subcutaneous nodule. Although it can occur at various anatomical sites, the head and neck, trunk, and proximal extremities are more frequently involved [8,9]. The present case is noteworthy because of both the young age of the patient and the unusual location on the dorsum of the foot. Our patient was a 20-year-old woman, whereas a recent systematic review of reported CCH cases found a mean age at presentation of approximately 55 years, with a slight female predominance. [6]Therefore, presentation at the age of 20 years and at a distal extremity such as the dorsum of the pedis represents an uncommon clinicopathological setting. Recognition of this possibility is important because adnexal tumors are often not initially considered in the differential diagnosis of soft-tissue lesions of the pedis. Clinically, CCH is typically a slowly enlarging, firm,

circumscribed nodule that may remain asymptomatic for a prolonged period. Pain, tenderness, ulceration, or serous discharge may occasionally occur. In the present case, the lesion had been present for approximately one year and was associated with tenderness. The lesion was clinically considered to be a ganglion, which is understandable because ganglion cysts are among the common causes of nodular lesions around the foot and ankle. However, the clinical appearance of hidradenoma is nonspecific, and several reports have documented its preoperative misdiagnosis as more common benign lesions, including epidermal cysts and lipomas. [10]

The absence of preoperative imaging in the present case did not preclude definitive diagnosis because histopathological examination remains the cornerstone for diagnosing hidradenoma. Nevertheless, ultrasonography may be useful when the clinical diagnosis is uncertain, particularly for lesions located on the extremities. Hidradenomas may demonstrate solid and cystic components and increased vascularity, but these findings are not sufficiently specific to establish the diagnosis without tissue examination. Consequently, excision followed by careful histopathological evaluation is required for definitive classification. [9] The diagnosis can generally be established on routine hematoxylin and eosin morphology when the characteristic architecture and cellular composition are present. Immunohistochemistry is most useful in morphologically unusual lesions or when malignant or metastatic clear-cell tumors are included in the differential diagnosis. Hidradenomas may express broad-spectrum cytokeratins, CK5/6, CK7, p63, p40, and other epithelial or adnexal markers, although the staining profile can vary and no single immunohistochemical marker is entirely specific.[11] Several entities should be considered in the histopathological differential diagnosis, particularly when clear cells predominate. These includ poroma/poroid hidradenoma, trichilemmoma, clear cell variants of squamous cell carcinoma, sebaceous neoplasms, metastatic renal cell carcinoma, and other metastatic clear-cell malignancies. The presence of a circumscribed dermal tumor with characteristic solid-cystic architecture, two populations of eosinophilic and clear cells, and ductal differentiation favors CCH. In challenging cases, appropriate clinical correlation and a targeted immunohistochemical panel may be necessary to exclude metastatic disease or another cutaneous adnexal neoplasm. [7,12] An important consideration is distinction from hidradenocarcinoma, the malignant counterpart of hidradenoma. Although malignant transformation is uncommon, careful assessment for malignant features is required in every case. Findings that should raise concern include an infiltrative growth pattern, marked cytological atypia or pleomorphism, increased mitotic

activity, atypical mitoses, tumor necrosis, and destructive extension into surrounding tissue. The absence of these findings supports a benign diagnosis. Recent analyses indicate that malignant CCH tends to be larger and to have a longer clinical duration than benign lesions, although tumor size or duration alone cannot establish malignancy. [6,13]The management of CCH is complete surgical excision. Excision provides both definitive diagnosis and treatment and is particularly appropriate for lesions that are persistent, symptomatic, or clinically uncertain. Incomplete excision may result in local recurrence, and recurrent lesions may be more difficult to evaluate because of scarring and architectural distortion. The present case was managed by wide excisional biopsy, which is consistent with the recommended approach for a localized lesion in an unusual anatomical site. The decision to perform wide excision is especially reasonable when the preoperative diagnosis is uncertain and the lesion cannot be confidently classified as a simple ganglion cyst. The unusual location of the lesion also has practical implications for surgical planning The dorsum of the pedis is a functionally important anatomical region containing tendons, neurovascular structures, and relatively limited soft-tissue coverage. Therefore, excision should aim to achieve complete removal while preserving function and minimizing unnecessary tissue loss. In a benign lesion, extensive surgery should generally be avoided unless required by the lesion's size, depth, recurrence, or histopathological findings. A well-circumscribed lesion that can be completely removed with an appropriate margin is usually adequately treated by local excision. [14] Postoperative follow-up is advisable because recurrence has been reported, particularly after incomplete excision. The 2026 systematic review emphasized that careful histopathological examination, biopsy, and surgical excision are important in the management of CCH. Although the risk of malignant transformation is low, recurrent lesions, rapidly enlarging lesions, or lesions demonstrating atypical histological features should be reassessed. Follow-up should therefore include clinical evaluation of the surgical site and attention to any new or recurrent nodular growth. The present case also demonstrates the importance of including cutaneous adnexal tumors in the differential diagnosis of persistent soft-tissue masses of the pedis.[15] A ganglion cyst is a common clinical diagnosis in this region, but a lesion that is tender, persistent, or atypical in consistency should not be assumed to be a ganglion without further evaluation. Although CCH is rare, its recognition is important because the diagnosis cannot be reliably established by clinical examination alone. Histopathological examination remains essential for distinguishing CCH from other benign adnexal neoplasms and from malignant clear-cell tumors.

C. CONCLUSION

In conclusion, this case represents an uncommon presentation of clear cell hidradenoma in a 20-year-old woman involving the dorsum of the pedis The lesion was clinically suspected to be a ganglion, illustrating the nonspecific clinical appearance of hidradenoma. Its unusual age and anatomical location expand the clinical spectrum of this rare adnexal tumor. Definitive diagnosis requires histopathological examination, and complete surgical excision remains the treatment of choice. Recognition of CCH is important not only for establishing the correct diagnosis but also for excluding hidradenocarcinoma and other clinically similar lesions.

CONFLICT OF INTEREST

There are no conflict of interest

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