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Pilomatricoma on the Sole Following Wart Treatment

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Pilomatricoma is a benign skin tumor that arises from hair follicle stem cells. It typically presents in the facial region and rarely involves the palms and soles. A 15-year-old boy presented with a solitary tender nodule on the left sole. He had a history of plantar warts on the same site and had received multiple treatments including cryotherapy and intralesional bleomycin injection for nine months. Excisional biopsy was performed, and the specimen showed a well-demarcated mass in the deep dermis with basaloid cells undergoing abrupt keratinization. Ghost cells were seen with calcification. Based on these findings, he was diagnosed with pilomatricoma on the sole. We report a case of pilomatricoma, which developed on a site without hair follicles.

Keywords: Pilomatricoma, Trauma, Warts

INTRODUCTION

Pilomatricoma, which is recognized as calcifying epithelioma, originates from the hair follicle stem cells and typically occurs before 20 years of age[1,2]. It presents as a solitary skin-colored or bluish deep dermal to subcutaneous nodule and exhibits slow growth[1,3]. Histologically, pilomatricoma shows a well-circumscribed tumor composed of solid nests with basaloid cells[4]. The overlying epidermis shows abrupt trichilemmal keratinization leading to the formation of ghost cells[1]. Focal areas of calcification can occur[5].

Pilomatricoma can be located anywhere on the body but typically presents near the head and neck, which accounts for 70% of all cases, followed by 20% of cases that have been identified in the upper extremities[5]. However, no cases have reported a diagnosis in which pilomatricoma occurs on the palms or soles. Herein, we report a case of pilomatricoma on the sole.

CASE REPORT

A 15-year-old boy with no previous medical history presented with an 8-mm-sized solitary deep-seated nodule on the left forefoot (Fig. 1). The nodule was firm and the patient complained of pain and tenderness. He had a history of a plantar wart at the same site. He had no specific family history. He had undergone various treatments including carbon dioxide laser therapy (2 times), cryotherapy (8 times at 2 weeks interval), and intralesional bleomycin injection (2 times). The wart had totally cleared after the treatments. However, he visited our clinic again with a newly developed tender nodule on the same site one month after the last visit. There were no clinical features that definitively suggested if the nodule was a viral wart. An excisional biopsy was performed for the nodule to determine the type of benign skin tumor. Histological examination revealed a well-demarcated tumor in the deep dermis, with solid nests of basaloid cells undergoing abrupt trichilemmal type keratinization (Fig. 2A~C). Ghost cells were found with calcification (Fig. 2D). Based on these findings, the patient was diagnosed with pilomatricoma on the sole. After removing the nodule, the patient experienced no recurrence for about three years (Fig. 3).

DISCUSSION

Pilomatricoma presents as a solitary nodule and often occurs in the head and neck or the upper extremities[6]. Lower limbs are uncommon sites for pilomatricoma and the incidence of pilomatricoma on lower extremities was reported as 2%, 5%, and 9%[2,7,8]. Our case showed unique features in that pilomatricoma occurred on the sole, non-hair bearing area. Also, the patient had preceding treatment history of viral wart on the same site.

Although the etiologic factors of pilomatricoma are not fully understood, several factors have been suggested as possible causes for pilomatricoma. First, some genetic mutations have been identified such as BCL-2 and beta-catenin gene (CTNNB1) mutations[1]. BCL-2 is a proto-oncogene that regulates the process of cell death and is suppressed in pilomatricoma[1]. CTNNB1 expresses the beta-catenin protein that is required for skin differentiation and determines whether stem cells form follicular keratinocytes[9,10]. Some reports have suggested that cells that comprise pilomatricoma strongly expressed beta-catenin, which could play an important role in development of pilomatricoma[9,11]. Although the exact role of beta-catenin is unknown, genetic mutations have been observed in 75% of human pilomatricomas[9]. Unfortunately, we did not

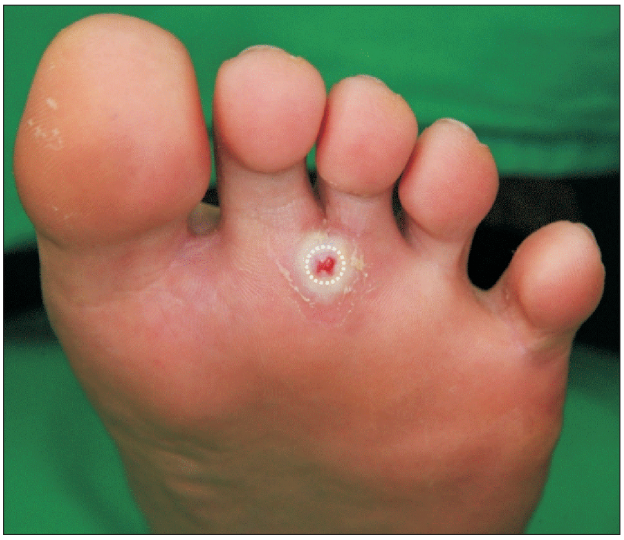

Fig. 1. An 8-mm-sized solitary tender nodule was located on the left forefoot.

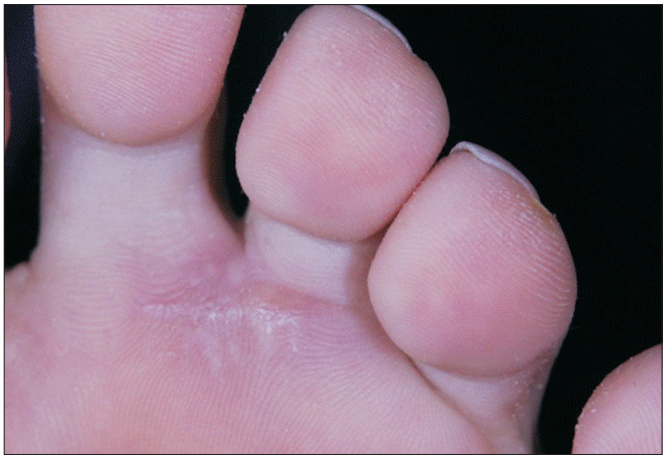

Fig. 3. The patient experienced no recurrence for about three years after the excision.

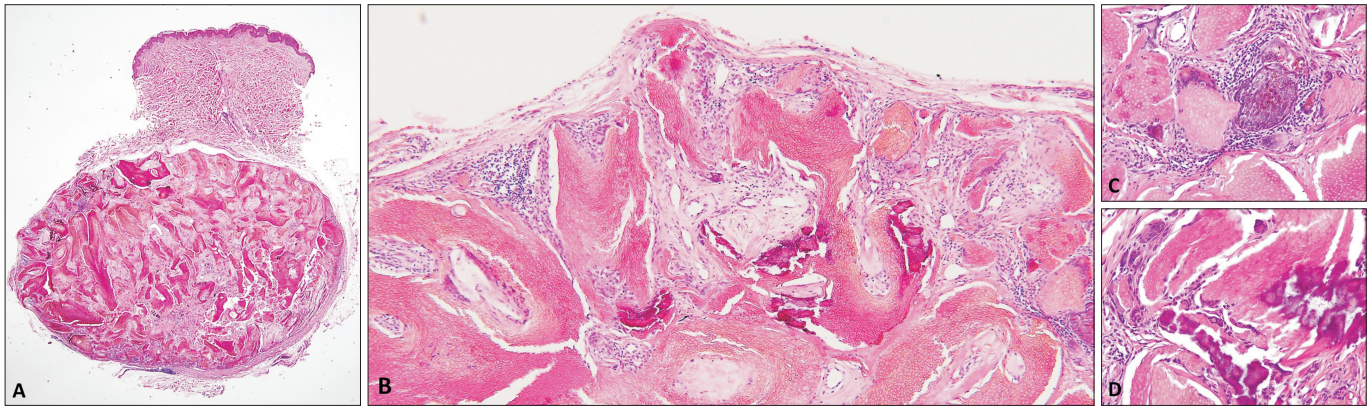

Fig. 2. (A) The biopsy specimen showed a well-circumscribed tumor from deep dermis to subcutaneous layer (H&E, scanning view). (B) It mainly showed eosinophilic keratinization with some inflammatory cells (H&E, ×100). (C) The abrupt trichilemmal keratinization from basaloid cells into shadow cells was observed. The basaloid nests resemble the matrix cells in hair follicle (H&E, ×200). (D) The ghost cells with calcifications were seen. The stroma contains multinucleated giant cells reacting to tumoral keratin (H&E, ×400).

perform genetic studies in the patient. Second, trauma and infection are suspected to contribute to pilomatricoma development[6]. Hemorrhage followed by trauma, such as injection, can promote the growth of pilomtricoma[5]. It has been reported that patients recalled previous trauma on the same site such as injury with a pencil tip, insect bite, and vaccination[8].

The soles receive continuous mechanical stress during standing, walking, and running[12]. In this case, the tumor site also had been exposed to repeated trauma due to previous plantar wart treatments. Some cases of epidermal cysts have been reported on the sole and have been attributed to traumatic epidermal implantation into the dermis[12,13]. Previous studies suggested trauma such as needle or crush injuries, or human papillomavirus (HPV) infection could cause an epidermal inclusion in the palms and soles[14,15]. Although there have been no reported cases of pilomatricoma on the sole, a similar pathophysiology could be involved considering both epidermal cyst and pilomatricoma originate from follicular structures[16]. Also, HPV infection can promote subsequent activation of cellular pathways, one of which is the HPV oncoprotein-regulating Wnt/beta-catenin pathway[17]. We suspect that HPV infection could promote the growth of pilomatricoma by modulating the Wnt/beta-catenin pathway in cellular proliferation and differentiation.

This case demonstrates that pilomatricoma can present on a non-hair bearing area. To the best of our knowledge, no cases have been reported on the palms or soles, which was consistent with a recent review article[7]. Although the occurrence of the two disorders might be coincidental, it cannot be overlooked that pilomatricoma on the sole is very rare, not reported before, and two diseases occurred in the exact same location with one month interval. Therefore, we regard that preceding HPV infection and repeated iatrogenic trauma could be contributory causes for pilomatricoma on the sole. Further case studies could reveal the relationship between two disorders.

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CONFLICTS OF INTEREST

The authors have nothing to disclose.

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