Heat-Related Skin-Colored Papules with Associated Hypohidrosis: Miliaria Profunda

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ABSTRACT:

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A healthy young Thai man presented with easily overheating and multiple confluent flesh-colored papules on the trunk, chest and upper arms during exercise. The symptoms started in peak of summer without history of previous skin lesion. He was diagnosed with miliaria profunda with associated localized hypohidrosis. Keratolytic ointment, antiseptic soap and topical retinoid alleviated the condition.

Key words: Hypohidrosis, heat-related illness, miliaria

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Introduction

Miliaria, one of the most common sweat gland disorders, is classified by the level of the ductal obstruction in stratum corneum, stratum malpighii and below the dermoepidermal junction, into miliaria crystallina, miliaria rubra and miliaria profunda, respectively[1]. They are more common in hot and humid areas. Miliaria profunda typically presents after episodes of miliaria rubra, with multiple asymptomatic flesh-colored papules on the trunk and proximal extremities with variable degrees of associated hypohidrosis and heat-related illness[1,2]. Overhydration from excessive sweating, bacterial colonization and irritation from clothing are contributing factors[1,3-5]. Apart from the typical presentations, there are also some other presentations of the condition. This case report aims to alert the dermatologists, especially those based in tropical countries, to be aware of this condition.

Case report

A 26-year-old otherwise healthy Thai male presented with a 2-month history of easily overheating during exercise. He usually runs as an exercise, but this skin lesion never occurred before. In early April, peak of summer in Thailand, he started noticing numerous tiny nonpruritic flesh-colored bumps associated with less sweating on the trunk and upper extremities contrasting to more sweating on the face, (Figure 1,2). He did not change either personal body-care products or fabric material types of workout clothes. The lesions appeared when running more than 20-30 minutes and spontaneously disappeared 30-60 minutes after the physical activity has been stopped. The symptoms sometimes presented during his routine activities on daily basis in hot environment. He occasionally felt slightly dizzy but most of the time he was troubled by excessive overheat which limited his running.

At rest, the physical examination was normal. After running on a treadmill for 15 minutes, multiple tiny non-follicular skin-colored papules appeared on his back, shoulders and upper extremities. The affected areas were observed to be hypohidrotic, while facial hyperhidrosis was noted. Starch-iodine test was done and showed nearly absence of sweating in the lesional areas. Neurological examination, to rule out central or neuropathic hypohidrosis, and hair and nails examination, to rule out ectodermal developmental disorders, were within normal limit. After he stopped the aforementioned physical activity and moved to cool environment, the lesion disappeared. The diagnosis of miliaria profunda with associated hypohidrosis was made due to the transient nature of the lesions, precipitated by exercise and hot climate, and spontaneously resolution. Facial hyperhidrosis, as

seen in this case, has been reported in previous reports of miliaria profunda[1,2]. His clinical presentation was obvious so that the diagnosis could be made without a skin biopsy.

During June to November, the patient was initially prescribed 3% salicylic ointment on the affected area twice daily and 4% chlorhexidine gluconate soap solution. He noticed improvement of sweating and had more exercise tolerability. Starch-iodine test also showed turning of yellow into purplish color on previously affected areas. Since some lesions on the trunk and forearms were persistent, 0.05% tretinoin cream was additionally prescribed in order to reduce sweat ductal obstruction caused by abnormal keratinization. After the new treatment, he experienced transient improvement which followed by worsening of the symptoms. He then stopped using 0.05% tretinoin cream and continued applying 3% salicylic acid ointment. The improvement of skin lesions and exercise tolerability were noted again. We suggest the patient to use chlorhexidine soap as prophylactic measure, once or twice weekly for another 2 months, then his clinical sign and symptom will be evaluated again.

Figure 1,2 Multiple skin-colored papules on back and arm after 30-minute exercise

Discussion

Exhaustion, weakness, malaise and even tachycardia and hyperpyrexia could lead to the diagnosis of miliaria profunda, especially when present together with hypohidrosis and typical skin lesions of tiny 1-3 mm non-follicular pale or flesh-colored papules. It usually occurs in tropical climates. The lesions are transient and appear more common on the trunk and extremities when patients encounter heat stresses like heavy exercises and hot, humid environment. Miliaria profunda usually occurs after repeated episodes of miliaria rubra or prickly heat, which presents as erythematous non-follicular macules or papules and may contain central vesicles or pustules[1]. Atypical presentations of miliaria reported include dry erythematous sunburn-like rash[3], erythematous maculopapular rash with patchy areas of necrosis[4] and dry toasted-like rash[3]. It is believed that epidermal overhydration, high humidity and occlusion from sweating lead to sweat duct obstruction. Inflammation then occurs in response to sweat leaks and increase in *Staphylococcus epidermidis* colonization[1]. Abnormal epidermal keratinization from filaggrin mutation, as found in atopic dermatitis patients, can also be a cause of sweat duct obstruction as in a study found in mice[6]. Irritation from clothing, especially cotton, is another trigger for the condition[3,5]. Prolonged wearing of flame-resistant army combat uniforms with high pH, approximately 8.8, from inadequate detergent removal reported to cause irritancy with associated miliaria rubra[5]. A study in Iraq showed miliaria was more common in male, summertime, and areas undercover[3]. More severe presentations were seen in drivers, long-distance travelers, military personnel, and housewives[3]. When sweating is disturbed, elimination of excessive heat is reduced and causes hyperpyrexia, dizziness and even heat-related illness ranging from heat edema to heat stroke[7]. Other complications include secondary bacterial infection, commonly caused by staphylococci, impaired thermoregulation[8] and hyperhidrosis in non-affected areas[1,2].

The diagnosis of miliaria profunda can be made clinically, but in atypical cases, histological study should be obtained. Histologically, miliaria profunda shows sweat duct rupture at level below the dermo-epidermal junction with lymphocytic infiltration and epidermal spongiosis. The obstructing plug at duct opening can be demonstrated by PAS (periodic acid-Schiff)-positivity. It was believed to be either ductal in origin or extracellular polysaccharide substance produced by *Staphylococcus epidermidis*[1]. High-definition optical coherence tomography of lesional skin shows dilated spiraling acrosyringium with adjacent hyper-refractile (bright) substance and surrounded by hypo-refractile (dark) rim. The bright and dark area are likely to represent

macerated keratin that shows clinical of papule and free fluid from sweat outflow or spongiosis, respectively[9]. Sweat production tests for evaluation of the severity and treatment assessment include quantitative and qualitative tests. Minor test or starch-iodine test is simple and practical. By dusting cornstarch on areas applied with tincture iodine, sweat can be visualized when it facilitates the reaction of the ingredients and turns them from yellow color into purplish sediment[10].

Treatment includes avoidance of excessive heat and measures to improve sweat outflow. Topical anhydrous lanolin and oral retinoid were reported to be helpful. The former was believed to hydrate the obstructing plug and make it easier to be removed. Normalization of epidermal keratin was the aim of using the latter. Antibiotics and regular showering to remove salt and bacteria, and topical steroid, for anti-inflammatory property, are other considerations[2,11].

As April is considered peak of summer in Thailand, we assumed that this patient's condition was triggered by the higher temperature than usual. That explains why he had never experienced the symptoms before despite the same exercise clothing and body-care products. We thought avoidance of the exercise alone would not be adequate to relieve the patient's symptoms, so we prescribed a keratolytic ointment, 3% salicylic acid, to remove the obstructing plugs. In order to remove the salt from sweating, he was advised regular showering and using 4% chlorhexidine gluconate soap solution to decrease bacterial colonization. Addition of topical retinoid helped only transiently. However, inappropriate application of the agent could not be ruled out as a cause of the worsening of the symptoms. Salicylic acid (in this case; 3% ointment) is widely used in dermatological field and it is safe in healthy person. We recommend salicylic acid treatment in miliaria profunda as it improved the condition and shows no adverse reaction in this case so far. At present, he still uses chlorhexidine soap once to twice weekly as prophylaxis, hopefully the antiseptic soap will be stopped soon as his condition is well-controlled by salicylic acid.

Conclusion

Clinical presentations of miliaria profunda in this patient is atypical because there was no preceding episode of miliaria rubra. Other associated symptoms such as hypohidrosis and overheat should be sought in every patient suffering with this condition. As we are in tropical country, the condition might be underestimated, and it may limit sport or recreational activity to affected patients. We recommend starch-iodine test for detection of hypohidrosis improvement.

Twice weekly chlorhexidine soap use may prevent disease recurrence.

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