Generalized keratosis pilaris induced by testosterone injections in a patient with CHARGE syndrome

Fares Abdulmajed Alkhayal,1 Rima Bin Fadliah,[2] Sarah Alasgah,[2] Raed Almutiri,[1] Yasser alqubaisy[1]

[1]Dermatology and Dermatologic Surgery Department, Prince Sultan Military Medical City, Riyadh; [2]Princess Nourah Bint Abdulrahman University, Riyadh, Saudi Arabia

Abstract

Keratosis pilaris (KP) is a common disorder of follicular keratinization characterized by keratotic follicular papules with varying degrees of perifollicular erythema. Keratosis pilaris affects up to half of normal children and up to three-quarters of children with atopic dermatitis. KP is prominent during adolescence and less common in older people, but it may occur in children and adults of all ages. In this report, we describe the case of a 13-year-old boy known to have CHARGE syndrome who developed generalized keratosis pilaris after testosterone injections. To the best of our knowledge, this is the first reported case of generalized keratosis pilaris induced by testosterone injection.

Correspondence: Fares Abdulmajed Alkhayal, Prince Sultan Military Medical City Makkah Al Mukarramah Rd, As Sulimaniyah, Riyadh 53037, Saudi Arabia.
Tel.: +96614777714.
E-mail: faalkhayyal@psmmc.med.sa

Key words: keratosis pilaris, testosterone injection.

Contributions: the authors contributed equally.

Conflict of interest: the authors declare no potential conflict of interest.

Patient consent for publication: signed consent was obtained from the patient's parents.

Availability of data and materials: data and materials are available from the corresponding author upon request.

Received for publication: 6 January 2023.
Accepted for publication: 10 January 2023.
Early view: 21 April 2023.

Licensee PAGEPress, Italy
Dermatology Reports 2023; 15:9661
doi:10.4081/dr.2023.9661

Introduction

Keratosis pilaris (KP) is a common, benign skin condition of follicular hyperkeratosis.[1] The condition is multifactorial and innocuous and predominantly affects the extensor aspects of the proximal arms, thighs, cheeks, arms, thighs, and buttocks.[2] KP is often seen in association with atopic dermatitis and ichthyosis vulgaris.[2] KP is among the most common dermatologic conditions and can be considered a normal variant. It is the most common follicular keratosis. Keratosis pilaris first appears in early childhood and progresses, becoming most extensive during the second decade of life.[3]

CHARGE syndrome is a complex genetic syndrome, owing to the wide range of tissues/systems affected by mutations in the *CHD7* gene. The term *CHARGE* is an acronym that describes a constellation of clinical features including coloboma, heart defects, choanal atresia, retardation (of growth and/or development), hypogonadism, genitourinary malformations, and ear abnormalities. There is no well-known skin manifestation associated with CHARGE syndrome.[4]

Case Report

A 13-year-old boy with a known case of CHARGE syndrome presented to our clinic complaining of skin rash over his face, arm, chest, thigh, and back, after receiving two testosterone injections 1 week apart to enhance his stature and puberty because patients with CHARGE syndrome do not achieve puberty spontaneously. The patient developed the rash 5 days after the second injection. The dose of testosterone was 250 mg/mL per injection. There is no history of KP in the patient's family, which clearly indicates that KP was induced by the testosterone injections.

On examination, there were numerous small, rough folliculocentric keratotic papules with variable perifollicular erythema over the back and arms (Figure 1**)** in addition to the thigh (Figure 2) and face (Figure 3). There were numerous hair follicles plugged by red scaly spots over the chest as shown in Figure 4 (keratosis pilaris rubra).

Discussion

Keratosis pilaris is a common skin disorder comprising fewer common variants and rare subtypes, including keratosis pilaris rubra, erythromelanosis follicularis *faciei et colli,* and the spectrum of keratosis pilaris atrophicans.[4] The cause of KP is relatively unknown. It is considered to be a genetic disorder of keratinization that results in the formation of horny plugs in the hair follicle orifices; it was also reported that people diagnosed with KP have other family members who are affected by this disease.[5,6] The nat-

ural history of KP was described as it mainly develops in children and reaches its peak in adolescents, Moreover, it presumably involutes spontaneously during adulthood; therefore, it was suggested that there might be hormonal involvement in the development of KP given the frequency at which it occurs during puberty and that may explain the testosterone-induced KP in our patient.[7] However, KP has no clear trigger factors and is not commonly induced by medication. KP showed to be induced by Nilotinib, which is a second-generation *BCR-Abl* tyrosine kinase inhibitor that is approved for the treatment of imatinib-resistant chronic myeloid leukemia expressing the *BCR-Abl* mutation.[8] Vemurafenib, a selective *BRAF* kinase inhibitor, is a new anticancer drug recently proven to improve survival in patients with metastatic melanoma harboring the *BRAF V600E* mutation.[9] KP is typically asymptomatic and may be an incidental finding during a physical exam. Some patients reported a rough texture and an unpleasant appearance of their skin. As well as other skin conditions that are associated with KP, such as atopic dermatitis and ichthyosis vulgaris.[10]

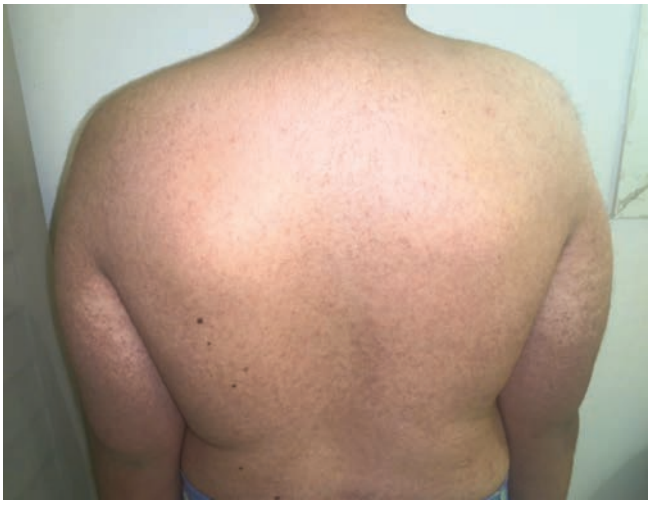

Figure 1. Multiple erythema atous follicularly based papules over the back.

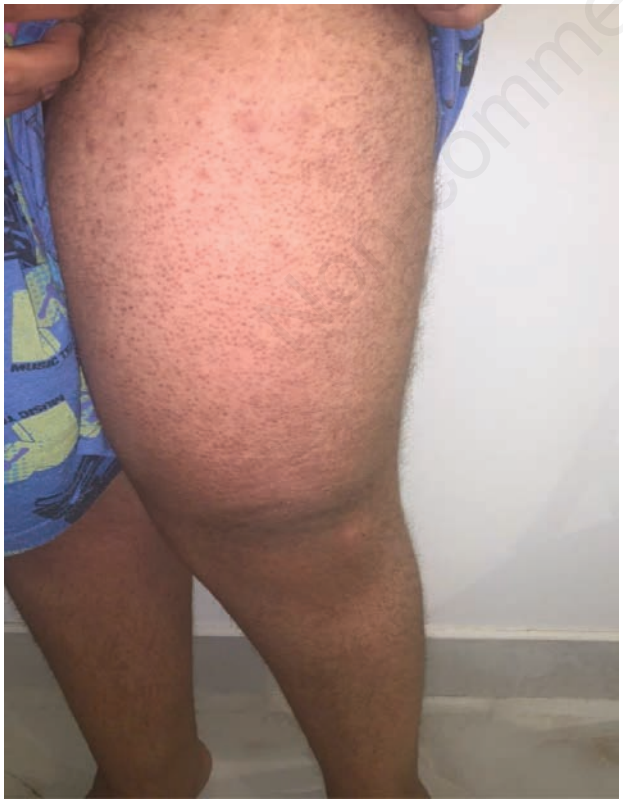

Figure 2. Multiple erythematous folliculary based papules over the left thigh.

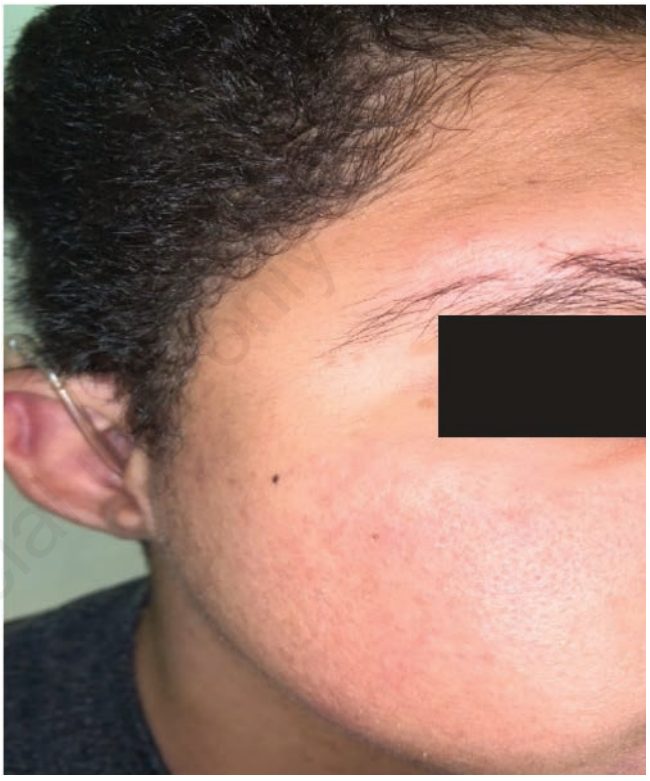

Figure 3. Multiple erythematous follicular based papules on the patient's face.

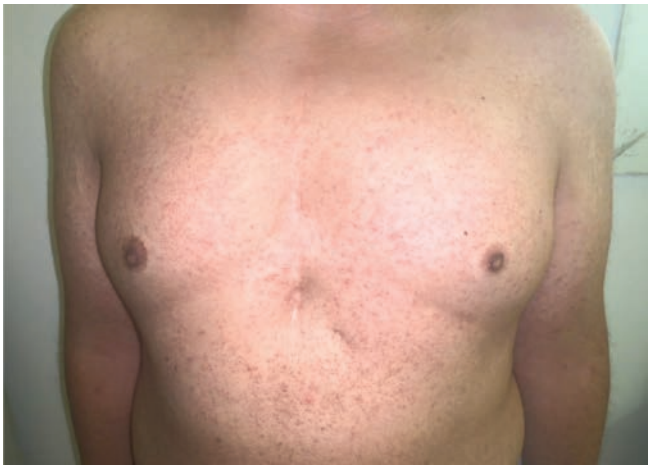

Figure 4. Multiple erythematous follicularly based papules over the chest.

KP typically improves with age without treatment. However, treatment has been requested by patients who have cosmetic concerns to reduce skin roughness and erythema. Treatment gives only symptomatic relief and improvement is usually temporary; therapy should be maintained to achieve continued remission.[10] However, KP still lacks a long-term effective treatment option that can provide complete recovery.[11] Various skin care measures applied to all patients with KP aimed at preventing excessive skin dryness, such as using a thick moisturizer generously over the skin, using soap-free cleansers, avoiding roughly scratching the skin, and hot baths and showers. First-line therapies for KP are emollients and exfoliants: topical exfoliants containing lactic acid, salicylic acid, or topical urea are used to relieve itchiness, and dryness and to improve skin texture. Our patient was started on urea 20% cream, and he showed good improvement.

Second-line therapy is a topical retinoid, which might be used for patients who failed to respond to keratolytic tretinoin 0.05% cream or tazarotene 0.05% cream, which is reported to effectively yet temporarily reduce the roughness and redness of the skin.[12] However, for those who fail to respond to topical retinoids, systemic retinoids may be a treatment option. Third-line therapy includes systemic retinoid, laser therapy, and other ablative therapies. Light and laser devices have been emerging as promising therapeutic options. Pulsed-dye laser, long-pulsed 755-nm alexandrite laser, 810-nm long-pulsed diode laser, and long-pulsed 1064-nm Nd:YAG laser have proved temporary reduction of perifollicular erythema and skin roughness when tried on patients with KP.[13] Nevertheless, all treatment measures are temporary and require long-term maintenance.

Conclusions

KP is a common disorder, multifactorial, affecting predominantly the extensor surfaces of the extremities. The cause is not fully understood. It occurs in children, and peaks in adolescence. KP is usually asymptomatic and associated with skin conditions, such as atopic dermatitis. KP tends to improve with age without treatment. The association between testosterone injections and KP can explain and ensure the hormonal role in KP development.

References

1. Hwang S, Schwartz RA. Keratosis pilaris: a common follicular hyperkeratosis. Cutis 2008;82:177-80.
2. Agharbi FZ. Keratosis pilaris. Pan Afr Med J 2019;33:274.
3. Pennycook KB, McCready TA. Keratosis pilaris. Treasure Island (FL), USA: StatPearls Publishing; 2021.
4 Hsu P, Ma A, Wilson M, et al. Charge syndrome: a review. J Paediatr Child Health 2014;50:504-11.
5. Del Pozzo-Magaña BR, Lazo-Langner A, Gutiérrez-Castrellón P, Ruiz-Maldonado R. Common dermatoses in children referred to a specialized pediatric dermatology service in mexico: a comparative study between two decades. ISRN Dermatol 2012;2012:351603.
6. Inanir I, Sahin MT, Gündüz K, et al. Prevalence of skin conditions in primary school children in Turkey: differences based on socioeconomic factors. Pediatr Dermatol 2002;19:307-11.
7. Barth JH, Wojnarowska F, Dawber RP. Is keratosis pilaris another androgen-dependent dermatosis? Clin Exp Dermatol 1988;13:240-1.
8. Leong WM, Aw CW. Nilotinib-induced keratosis pilaris. Case Rep Dermatol 2016;8:91-6.
9. Wang CM, Fleming KF, Hsu S. A case of vemurafenib-induced keratosis pilaris-like eruption. Dermatol Online J 2012;18:7.
10. Garwood JD. Keratosis pilaris. Am Fam Physician 1978;17:151-2.
11. Vipinsha RS, Prathibha CKB, Anandaraman PVS. Āyuṛveda management of keratosis pilaris - a case report. J Complement Integr Med 2020;18:223-30.
12. Bogle MA, Ali A, Bartel H. Tazarotene 0.05% cream for the treatment of keratosis pilaris. J Am Acad Dermatol 2004;50:P39.
13. Kechichian E, Jabbour S, El Hachem L, et al. Light and laser treatments for keratosis pilaris: a systematic review. Dermatol Surg 2020;46:1397-402.