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CASE STUDY

Skin Hypersensitivity to Sun Light Due to Doxycycline Ingestion Causing Hand Partial-Thickness Burn

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Abstract Drugs hypersensitivity should be remembered when placing patients on any form of medications. In this case we present skin hypersensitivity to sun light due to doxycycline ingestion causing hand partial-thickness burn.

Case Report

A 75 year-old female presented to the wound center with right leg ulceration and cellulitis due to untreated venous insufficiency. The patient was seen in the emergency room earlier in the day and blood test showed a white blood count of 12,000 and Doppler ultrasound was negative for deep venous thrombosis. Upon being seen in the wound care clinic, the patient was started on doxycycline 100 mg PO BID to treat her cellulitis and was given local wound care of absorptive dressing with compression therapy to treat her leg wound. She was also told to avoid sun exposure while on doxycycline. On her next visit 1 week later, it was noted that her right hand had first and second degree burns on the dorsum of the hand (Figure 1). The patient denied any contact with heat source and said that she was traveling in the car as a passenger and wasn't aware that her right hand was exposed to the sun for 1 h. The patient stated she developed the injury that night. As the patient was on doxycycline for 1 week, the diagnosis of a hypersensitivity injury due to sun exposure was made. She was started on local burn care including daily dressing change to the hand using silver sulfadiazine cream and dressing. The patient's hand injuries healed in 1 week later (Figure 2) along with the cellulitis. The patient's leg ulcer healed 2 weeks later and she now wears compression stockings.

Discussion

Doxycycline is a broad spectrum antibiotic effective against both gram positive and negative bacteria. This is performed by allosteric binding of the amino acyl T-RNA site at the receptor site halting the creation of the protein on the 30S ribosome.[1] Doxycycline is indicated in multiple

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Figure 1 Shows right hand with erythema and blisters due to partial thickness (second degree) burn.

Figure 2 Shows healed right hand burn.

infections including, pneumonia, Lyme disease, syphilis, plague, and periodontal infections. A study of 342 rheumatoid patients showed that 11.8% of doxycycline users had some sort of side effect.[2] Major side effects were nausea (15.5%), other skin abnormalities (10%), photosensitivity (8.2%), and dizziness (8.2%). The major side effect was Poly-Morph Nuclear Leukocytes (PMNL) suspensions, which were exposed to ultraviolet (UV) light showed an increase in oxygen consumption. The PMNL were then damaged when the light was suddenly shut off. It is not known if PMNLs are involved in skin damage in a photosensitive reaction[3] although this is not completely understood, it is thought to be due to the change during irradiation of molecular oxygen to excited oxygen species. One theory is that UVA radiation penetrates deeper into the skin in a spectrum of 320–400 nm (tetracycline is at 289–342 nm).[4] After UV irradiation the drug molecule is in an excited energy state and causes chemical reactions as they relax to their energetic base level, which results in a synthesis of photoproducts that act as antigens, which cause an allergic reaction.[5] Photo onycholysis has been reported multiple times before. The mechanism is unknown but is thought to be caused by the unprotecting from sun light of the nail bed that has less melanin and therefore less UV protection.[6] This case study shows a possible complication and its resolution of symptoms. Patients on doxycycline should be made aware of the effect of the sun light on the skin and should avoid sun exposure while receiving the medication.

References

1. Griffin MO, Fricovsky E, Ceballos G, Villarreal F: Tetracyclines: a pleiotropic family of compounds with promising therapeutic properties. Review of the literature. Am J Physiol Cell Physiol. 2010;299(3): C539–C548.
2. Smith CJ, Sayles H, Mikuls TR, Michaud K: Minocycline and doxycycline therapy in community patients with rheumatoid arthritis: prescribing patterns, patient-level determinants of use, and patient-reported side effects. Arthritis Res Ther. 2011;13(5):R168.
3. Glette J, Sandberg S, Haneberg B, Solberg C: Effect of tetracyclines and UV light on oxygen consumption by human leukocytes. Antimicrob Agents Chemother. 1984;26(4):489–492.
4. Ping-Kai H, Wai-Kwong F: Identification of tetracyclines by second-derivative ultraviolet spectrophotometry. Analyst. 1991;116: 751–752.
5. Palmer RY, White IR: Phototoxic and Photoallergic Reactions. Contact Dermatitis, 4th ed.Berlin: Springer Verlag; 2006. p. 309–317.
6. Passier A, Smits-van Herwaarden A, van Puijenbroek E: Photo-onycholysis associated with the use of doxycycline. BMJ. 2004;329:265.1.