

Occupational contact dermatitis caused by sodium tetradecyl sulfate in a healthcare worker: A case report

SAGE Open Medical Case Reports
Volume 12: 1–3
© The Author(s) 2024
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/2050313X241237604
journals.sagepub.com/home/sco



Ji Eun Yu, Young-II Koh and Da Woon Sim 

Abstract

Healthcare workers are known to be at a higher risk of experiencing occupational contact dermatitis and attention should be paid to new materials that cause contact dermatitis. Sodium tetradecyl sulfate is widely used in the treatment of small varicose veins of the legs and venous malformations. We report the case of a 42-year-old woman, a healthcare worker, who presented with contact dermatitis caused by sodium tetradecyl sulfate. The contact dermatitis induced by sodium tetradecyl sulfate resolved completely after sodium tetradecyl sulfate avoidance at the last follow-up. Thus, we recommend increased protective measures when handling this substance.

Keywords

Case report, contact dermatitis, occupational, patch test, sodium tetradecyl sulfate

Date received: 16 August 2023; accepted: 20 February 2024

Introduction

Sodium tetradecyl sulfate (STS), also referred to as 7-ethyl-2-methyl-4-undecanol hydrogen sulfate sodium salt, is a detergent-like sclerosant (CAS no 1191-50-0).¹ It was approved by the United States Food and Drug Administration in 1946.² STS is generally used in the treatment of small varicose veins of the legs and venous malformations.² The mechanism of action of STS is to produce endothelial damage with minimal thrombus formation. This damage further promotes fibrosis of the lesion, which leads to shrinkage of the vein.³ In addition, STS has been reported to be used in various off-label dermatological applications.^{4,5} The expansion of STS use may inevitably increase the occurrence of side effects, including hypersensitivity reactions.

Thus far, allergic contact dermatitis (ACD) caused by STS has never been reported in the literature. In particular, STS-induced allergic reactions in healthcare workers have never been reported. Here, we present a case of ACD caused by STS in a healthcare worker handling STS.

Case report

A 42-year-old woman working as a nurse at a hospital visited an allergy clinic because of erythema and swelling on her

skin (Figure 1). She had no previous history of dermatitis, including atopic and contact dermatitis. As a result of taking a detailed history, it was possible to suspect that there was a relationship between the work of mixing 3% STS (Fibrovein[®], KC-PHARM, Gyeonggi-do, Korea) in physiological saline and the patient's repeated symptoms. In the process of mixing STS and saline, she did not use protective equipment such as gloves because she felt uncomfortable while working. Therefore, in the course of work, a small amount of STS spattered on her finger and hand. Subsequent hand contact also seems to have spread the substance to the arms and legs, and this was repeated several times throughout the day. A few hours after the activity, skin symptoms appeared, and in the evening, skin lesions spread across the body and severe itching occurred. The patient started taking injections for sclerotherapy using STS 2 weeks before the initial appearance of

Department of Allergy and Clinical Immunology, Chonnam National University Medical School, Chonnam National University Hospital, Gwangju, South Korea

Corresponding Author:

Da Woon Sim, Department of Internal Medicine, Chonnam National University Hospital, 42 Jebong-ro, Dong-gu, Gwangju 61469, South Korea.
Email: mdsdw@jnu.ac.kr





Figure 1. Lesions that occurred after the drug splashes on the patient's body during the mixing process.



Figure 2. The result of the patch test using 3% sodium tetradecyl sulfate diluted at 10% in petrolatum.

the above symptoms, and these symptoms remained for 2 weeks before diagnosis.

STS patch tests were performed using Finn chambers according to the European Society of Contact Dermatitis guidelines.⁶ An STS patch test was prepared with commercial STS (3%) and diluted at 10% in petrolatum. Readings were performed on day (D) 2 and D4 and positive reactions to STS++ on D2 and D4 (Figure 2). By contrast, a control group of 20 healthy volunteers showed no reaction to STS (3%) diluted at 10% in petrolatum. Patch tests with benzyl alcohol gave negative results on D2 and D4. Patch tests were performed with the Korean Baseline series (ECODERM, Kwangju, Korea) and the tests showed negative results.

Based on the patient's history and patch test results, no other cause could be suspected for the patient's dermatitis. Therefore, the patient was diagnosed with occupational ACD

caused by STS. As a result of the test, the patient was recommended to discontinue the use of STS, the causative agent of ACD, and a medical certificate with the contents was issued to the patient. Based on these medical findings, she was moved to another department in the hospital that does not use STS. At the last follow-up, 1 year after changing the department of work, the pruritic dermatitis had completely disappeared, and there was no recurrence.

Discussion

Occupational contact dermatitis is the most commonly reported occupational skin disease, and its burden on individuals and society is increasing.⁷ There are several known risk factors for the occurrence of occupational contact dermatitis, especially among healthcare workers who are known to be at a higher risk for occupational contact dermatitis compared to people from other occupations.^{8,9} Occupational contact dermatitis can be categorized as ACD and irritant contact dermatitis (ICD).⁷ ACD is a type IV hypersensitivity reaction that results from repeated contact with an allergen by an already sensitized individual.¹⁰ By contrast, ICD requires no prior sensitization and results from skin contact with a harmful stimulus.¹⁰ However, it is often difficult to distinguish between occupational ACD and ICD based on symptoms alone.⁷ For ACD, patch testing with suspected substances is the gold standard method for diagnosis.⁷

However, in the case of ACD caused by a previously unknown allergen, as in this patient's case, it can be difficult to even suspect. Clinicians should support individuals affected by occupational ACD to continue with their occupation by helping them identify the causative allergen, improve the protective measures, and change work tasks. Therefore, as in this case, it is necessary to actively conduct tests, such as patch tests, to determine the cause of ACD.

The patch test represents the standard procedure in diagnosing ACD.¹¹ In some countries, drug allergy patch test products containing about 80 types of systemic drugs are commercially

available, but there are countries including Korea that cannot conduct the test.¹² In addition, these tests cannot cover the full spectrum of allergens of ACD, and in cases where previously unknown substances are the cause, a patch test kit cannot help identify the causative allergen.¹² Therefore, as in this case, there are many cases where a patch test is performed with the substance used by the patient. The patch test is a relatively safe diagnostic method, and serious side effects induced by the patch testing procedure are unusual.⁷

Several cases of anaphylaxis have been reported for STS-related allergic reactions, but no contact dermatitis has been documented so far.^{13–16} In addition, hypersensitivity reactions related to STS reported so far have all been observed in patients treated with the drug.^{13–16} We report the first case of ACD caused by STS in a healthcare worker and recommend enhanced protective measures be taken by healthcare workers handling the substance.

Conclusion

We reported a case of occupational ACD induced by STS, which was confirmed via a positive patch test. This is the first ACD case associated with STS and the first occupational ACD induced by STS in a healthcare worker. Clinicians should help patients change work tasks through allergen avoidance by either protective measures or change in work tasks, as staying in the occupation should in most cases be the goal.

Acknowledgements

No additional acknowledgments are required.

Authors contribution statement

All the authors have equally contributed to the conception, drafting, writing, and critical reviewing of the article.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Ethics approval

Our institution does not require ethical approval for reporting individual cases or case series.

Informed consent

Written informed consent was obtained from the patient(s) for their anonymized information to be published in this article.

ORCID iD

Da Woon Sim  <https://orcid.org/0000-0002-9723-0720>

References

1. Rabe E, Schliephake D, Otto J, et al. Sclerotherapy of telangiectases and reticular veins: a double-blind, randomized, comparative clinical trial of polidocanol, sodium tetradecyl sulphate and isotonic saline (EASI study). *Phlebology* 2010; 25(3): 124–131.
2. Jenkinson HA, Wilmas KM and Silapunt S. Sodium tetradecyl sulfate: a review of clinical uses. *Dermatol Surg* 2017; 43(11): 1313–1320.
3. Parsi K. Interaction of detergent sclerosants with cell membranes. *Phlebology* 2015; 30(5): 306–315.
4. Caton MT, Duvvuri M, Baker A, et al. Percutaneous sclerotherapy for head and neck lymphatic malformations in neonates and infants ≤12 months of age. *J Neurointerv Surg* 2022; 15(12): 1242–1246.
5. Shivhare P, Haidry N, Sah N, et al. Comparative evaluation of efficacy and safety of the diode laser (980nm) and sclerotherapy for the treatment of oral pyogenic granuloma. *Int J Dent* 2022; 2022: 8269221.
6. Johansen JD, Aalto-Korte K, Agner T, et al. European Society of Contact Dermatitis guideline for diagnostic patch testing—recommendations on best practice. *Contact Dermatitis* 2015; 73(4): 195–221.
7. Sasseville D. Occupational contact dermatitis. *Allergy Asthma Clin Immunol* 2008; 4(2): 59–65.
8. Dietz JB, Menné T, Meyer HW, et al. Incidence rates of occupational contact dermatitis in Denmark between 2007 and 2018: a population-based study. *Contact Dermatitis* 2021; 85(4): 421–428.
9. Milam EC, Nassau S, Banta E, et al. Occupational contact dermatitis: an update. *J Allergy Clin Immunol Pract* 2020; 8(10): 3283–3293.
10. Li Y and Li L. Contact dermatitis: classifications and management. *Clin Rev Allergy Immunol* 2021; 61(3): 245–281.
11. Fonacier L, Frankel D and Mawhirt S. Contact allergens for the allergist. *Ann Allergy Asthma Immunol* 2022; 128(6): 629–644.
12. de Groot AC. Patch testing in drug reaction with eosinophilia and systemic symptoms (DRESS): a literature review. *Contact Dermatitis* 2022; 86(6): 443–479.
13. Chang YY, Lu PH and Yang CH. Anaphylactic shock after injection of foamed sodium tetradecyl sulfate. *Dermatol Surg* 2017; 43(6): 887–888.
14. Brzoza Z, Kasperska-Zajac A, Rogala E, et al. Anaphylactoid reaction after the use of sodium tetradecyl sulfate: a case report. *Angiology* 2007; 58(5): 644–666.
15. Avram J. [Allergic shock after injection of sodium tetradecyl sulfate]. *Phlebologie* 1966; 19(3): 171–173.
16. Nguyen CN, Nguyen QD and Silapunt S. Analysis of adverse events with sclerosants reported to the United States Food and Drug Administration. *Phlebology* 2022; 37(6): 452–459.