

Review Article

Allergic contact dermatitis from ophthalmic products: can pre-treatment with sodium lauryl sulfate increase patch test sensitivity?

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In patients suspected of allergic contact dermatitis because of topical ophthalmic medicaments, patch tests performed with patients' own products are often negative. The irritant anionic surfactant sodium lauryl sulfate (SLS) may alter the stratum corneum and increase antigen penetration. Pre-treatment of the skin with SLS 0.5% for 24 h was performed in the sites of patch tests with patients' own products in 15 selected patients. In patients previously negative to their own products tested with conventional patch tests, SLS pre-treatment showed 6 new relevant positive reactions and induced a stronger positive reaction in 1 patient. SLS pre-treatment could be proposed as an alternative promising method, which may increase sensitivity of patch tests with patients' own products.

Key words: eyedrops; ophthalmic medicaments; patch tests; SLS. © Blackwell Munksgaard, 2005.

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Topical ophthalmic medicaments play a relevant role in inducing eyelid allergic contact dermatitis (1–4). However, the demonstration of the aetiological responsibility of these agents can be difficult when patch tests with patients' own products are performed (5, 6). The potential antigens in the eyedrops are often at low concentration or may be scarcely bioavailable. Furthermore, the thick healthy skin of the back, on which patch tests are usually performed, has quite different anatomical and physiological properties from the thin, maybe damaged, skin of the eyelids. These factors may explain the frequent negativity of patch tests even when history, together with a positive stop-restart test, strongly leads to the suspicion of contact sensitization because of ophthalmic medicaments.

Sodium lauryl sulfate (SLS) is an anionic surface-active agent. Its capacity for altering the stratum corneum can enhance the penetration of other substances in animal assays and in patch tests. In fact, some experimental studies have showed that the pre-treatment of the skin with this substance may increase allergen penetration through a damage of the cutaneous barrier (7, 8).

The aim of the present study is to evaluate the usefulness of pre-treating the skin of the back with sodium SLS before performing patch tests

with patients' own eyedrops, trying to identify possible false-negative responses.

Patients and Methods

A group of 15 consecutive non-atopic patients, affected by periorbital dermatitis while using topical ophthalmic drugs, was enrolled in the present study. A positive stop-restart test or a highly indicative history of allergy to topical products was observed in all the patients.

The patients, 9 men and 6 women, mean age 64.9 years (range: 40–83), complained of eyelid eczema (10 patients) or persistent erythematous–oedematous reaction of the eyelid (5 patients). Ophthalmic products had been prescribed for glaucoma in all patients.

Patch tests were performed with the Italian SIDAPA standard series and the preservatives–antimicrobials series.

All the patients were also tested with their own ophthalmic products by using both normal Finn Chambers and large Finn Chambers on Scampor tape. Patch tests were left in occlusion for 72 h and read 1 h after having removed the test. Clinical scoring was in accordance with the International Contact Dermatitis Research Group recommendations.

In all the patients, after obtaining informed consent, patch tests were also performed with the same eyedrops used by them after pre-treatment of the skin with SLS. The pre-treatment consisted in applying 40 µg of SLS 0.5% aqueous solution on a filter paper disk fitted in a large Finn Chamber (12 mm in diameter) left in occlusion for 24 h. The paper disk was then removed and replaced with a new disk soaked with the eyedrops, left in occlusion for 72 h and read 1 h after removal. Patch tests with simple occlusion (without any substance) and occlusion after pre-treatment with SLS (without eyedrop application) were performed as negative patch test control in each patient.

Results

Testing with the SIDAPA series evidenced only 3 non-relevant positive reactions, respectively, to nickel (1 patient) and thimerosal (2 patients). In the preservative series, a positive non-relevant reaction was detected to butylhydroxyanisol. We considered clinically relevant the positive reactions to allergens present in products previously used by the patients.

A total of 50 patch tests were performed with patients' own products. Using normal Finn Chambers, only patients n°8 and n°12 did react to their own products (respectively to Trusopt® and Betaclar® eyedrops and to Betaclar® eyedrops). Results of patch tests with large Finn Chambers and patch tests performed after pre-treatment with SLS have been showed in Table 1.

All controls in each patient were negative.

Discussion

As we have already demonstrated (5, 6) and as emerging from current literature, difficulties are encountered when testing topical ophthalmic

products, especially eyedrops containing beta blocking agents (9, 10).

Numerous procedures to increase sensitivity have been proposed. Scratch tests and stripping of the skin have repeatedly been performed with some success (11–13). Enlargement of the patch test area or an increased concentration of allergen has been suggested by other authors (10, 14, 15). Villarreal observed allergy to phenylephrine eyedrops in 24% of his patients only by means of the technique of conjunctival challenge (15). However, no method appears superior to the others.

SLS is a primary irritant capable of damaging the skin without systemic toxicity. It is largely used in experimental studies in order to induce irritant contact dermatitis (16). Seidenari et al. clinically and echographically demonstrated that pre-treatment of the patch test areas with SLS was able to elicit positive reactions to nickel in patients previously negative to routinely performed patch tests (17). The study confirmed that pre-treatment of the patch test area with this irritant could be used in clinical activity in order to increase the sensitivity of patch tests when conventional patch testing to nickel was negative even though history strongly showed a nickel sensitization. Other studies (18) demonstrated that the elicitation threshold and concentration limits may be influenced by combined exposure to allergens and irritants. On the basis of these studies, we decided to apply the method in clinical practice in patients found negative to their own ophthalmic products even when their history strongly suggested an allergy. We, therefore, used SLS in order to induce subclinical skin damage and to allow an increased allergen penetration.

Performing this technique, we could detect 6 new relevant positive reactions to eyedrops in 4 patients in comparison with the patch tests performed with normal Finn Chambers. Therefore 6 false-negative responses to conventional patch tests were demonstrated. However, comparing these results with those obtained testing eyedrops in large Finn Chambers (increasing the total quantity of eyedrops), only 4 new positive reactions were elicited. SLS pre-treatment induced a stronger positive reaction to Betaclar® in patient n°12; the increased penetration of allergen favoured by SLS may, thus, facilitate the evaluation and scoring of weak positivities (19, 20).

Paradoxically, 2 weak positive responses to eyedrops were missed in patient n°8 with SLS pre-treated patch test. A false-negative result in SLS pre-treated patch tests is, therefore, possible.

The concentration of 0.5% SLS we used did not give rise to clinically visible irritant reactions (verified in each patient checking the negative

Table 1. Patch test results

Patient number	Positivity with normal Finn Chambers	Positivity with large Finn Chambers	Positivity after pre-treatment with SLS
6	Trusopt®–	Trusopt®–	Trusopt®+
8	Trusopt®+ Betaclar®+	Trusopt®+ Betaclar®+	Trusopt®– Betaclar®–
10	Lumigan®– Xalatan®–	Lumigan®+ Xalatan®–	Lumigan®+ Xalatan®+
12	Timoptol®– Betaclar®+ Droptimol®–	Timoptol®– Betaclar®+ Droptimol®–	Timoptol®+ Betaclar®++ Droptimol®+
13	Carteol®–	Carteol®+	Carteol®+

SLS, sodium lauryl sulfate.

control) capable of confusing scoring evaluations. We did not perform patch test with SLS plus drugs in 'normal volunteers'; this will be performed in future studies.

Considering the limited number of patients, a statistical evaluation cannot be attempted; however, SLS pre-treatment could be a promising technique in testing with patients' own products. It is easy to perform, inexpensive and can be used in clinical activity.

The present preliminary study exclusively based on clinical evaluation from experienced dermatoallergologists without echographic evaluation or other instrumental assessments may be open to criticism, particularly as we are evidencing weak positive reactions.

However, the real advantages of this method in comparison with other suggested procedures (stripping, increased concentration and scratching) could be showed by comparatively studying the techniques in a larger series of patients or, better still, in multicentric studies.

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