CASE REPORT

Management of occupational hazards in healthcare: exposure to diphencyprone

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SUMMARY

Diphencyprone is a chemical agent used most commonly in the treatment of alopecia areata. Its mechanism of action is through the sensitisation (type IV immune reaction) of affected areas to stimulate hair follicle growth. The consequences of accidental occupational exposure, however, have not been widely recognised. This report describes the clinical presentation and management of two pharmacy technicians that presented to Sheffield Occupational Health Service (SOHS) centre in 2012. Exposure sources were identified through a workplace visit arranged between the SOHS centre and the hospital's pharmacy; a chemical analysis revealed concentrations of the chemical sufficient to induce sensitisation at several points during the manufacturing process. The case highlights the role of close liaison between specialist services (dermatology and occupational medicine) in managing individual patient cases and mitigating risk within relevant occupational groups.

BACKGROUND

Diphencyprone (diphenylcyclopropenone) is a chemical agent used in some dermatology centres for the treatment of alopecia areata. The concentration of the chemical required to induce hair growth is determined by a patch test and the affected area is then treated, usually following a weekly or fortnightly regime. The duration of the treatment may range from 3 months up to 1 year depending upon the level of response. The potential for sensitisation following exposure to the chemical may not be widely recognised,¹ and this case therefore may be of relevance to institutions that currently, or intend to, use, produce or manufacture the chemical either in its powdered or liquid form.

CASE PRESENTATION

This report describes the clinical presentation and occupational management of two pharmacy technicians working at Sheffield Teaching Hospitals (STH) in the UK in 2012. The first employee was presented to the Sheffield Occupational Health Service (SOHS) centre as an urgent case with an erythematous rash around her neck and the dorsum of her left hand. She was referred to the dermatology department and treated with elocon cream and an antihistamine. She later presented with a second, more severe rash along with intermittent epistaxis and oral ulcers. The rash was treated as a fixed-drug eruption by the dermatology department at STH. The epistaxis and oral ulcers improved spontaneously after the employee was

Figure 1 Rash: dorsum of hand.

excluded from handling or working in the area where diphencyprone solution was manufactured.

The second patient was referred to occupational health by the manager of the pharmacy department with a suspected work-related rash. She was also reviewed by the dermatology department where it was diagnosed as a fixed-drug eruption, likely secondary to diphencyprone exposure.

Figures 1 and 2 show the rash present on the dorsum of the first patient's hands and their neck, respectively. Both workers confirmed they had been involved in the manufacture of diphencyprone. A workplace visit was arranged by the SOHS to the pharmacy department to determine potential exposure sources.

INVESTIGATIONS

The chemical (diphencyprone) was stored in the pharmacy department in a powdered form and converted into a solution for use in the treatment of alopecia areata in the dermatology department. A risk assessment highlighted the following potential exposure points to the chemical during the manufacturing process:

Figure 2 Rash: front of neck.

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- ▶ Handling the bottle containing the powder (exposure from handling it without gloves, glove permeation or during removal of gloves).
- ▶ During weighing the powdered chemical for dilution with acetone to prepare a solution.
- ▶ Through contamination of the sink during washing-up of used equipment.

Samples using clinical gauze swabs were taken from the bottle top, as well as the workbench on which the scales were placed for weighing out the diphencyprone powder. These were analysed in the Clinical Chemistry department at STH by dissolving the gauze samples in methanol and sampling the residue by mass spectrometry following combustion. Although some of the chemical was burnt off during the combustion process, the analysis revealed concentrations still sufficient to induce sensitisation (approximately 5 µg diphencyprone on the swab from the bottle, and 22 µg diphencyprone on the swab from the weighing area).

TREATMENT

Both patients were successfully treated with a combination of emollients, antihistamines and low-dose steroidal creams for allergic contact dermatitis affecting their hands, necks and in one patient, her right breast.

OUTCOME AND FOLLOW-UP

A report was provided to the managers of the department highlighting the presence of clinically significant concentrations of diphencyprone upon the bottle and workbench, as well as the suggestion that these were very likely to be the sources from which the pharmacy technicians had been sensitised to the chemical. The affected technicians were excluded from handling the chemical. The following recommendations were made:

- ▶ The bottles of diphencyprone powder should be wiped clean following each use and that latex-free rubber gloves should be worn as a mandatory component of the standard operating procedure for handling the chemical.
- ▶ A plastic, disposal bench cover (Benchkote) should be placed over the work surface on which the powder was weighed.
- ▶ A review of training procedures for those handling the chemical.
- ▶ Diphencyprone is a substance with properties that have the potential to cause skin disease among individuals who are exposed to it. To this end, the substance is recognised as a chemical hazard within the Control of Substances Hazardous to Health Regulations in the UK, which were updated in 2002. Part of the regulations mandate that individuals who are exposed to the substance should be under regular health surveillance to identify the presence

of disease at an early stage, as well as inform about the best practice in manufacturing and using the chemical.

- ▶ A fluorescent-labelling study was recommended to determine any further sources of exposure that may be present.

A later visit revealed that the pharmacy had chosen to outsource the manufacturing process to another centre. To this end, SB wrote directly to the occupational physicians practising at this new hospital informing them that our department had encountered two pharmacy workers who had developed allergic contact dermatitis following exposure to diphencyprone, and outlined the workplace adjustments we had wished to put in place.

DISCUSSION

Occupational exposure to diphencyprone can result in significant consequences for those working in such environments. Previous work has recognised that affected individuals may include dermatology clinicians, industrial chemists and pharmacy workers.^{1 2} This case highlights the importance and benefits of early assessment of individuals exposed to such chemicals in the workplace. This include developing a holistic approach to managing the clinical and occupational consequences of exposure in affected individuals; identifying and eliminating hazards, and communicating recommendations to relevant stakeholders.

Learning points

- ▶ Diphencyprone is a chemical most commonly used in treating alopecia areata.
- ▶ Occupational exposure, although rare, may cause allergic contact dermatitis which may involve prolonged periods of treatment.
- ▶ Early assessment by treating clinicians and occupational physicians should be a priority in managing the complex issues surrounding such cases.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Adishes A, Beck M, Cherry NM. Hazards in the use of diphencyprone. *Br J Dermatol* 1997;136:470.
- 2 Shah M, Lewis FM, Messenger AG. Hazards in the use of diphencyprone. *Br J Dermatol* 1996;134:1153.

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