

Two cases of contact allergic reactions to Finn Chamber AQUA test chambers

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Multiple reactions on patch testing can be related to contact allergy to components of the patch test system used, for example, contact allergy to aluminium.^{1–11} We report on two cases with contact allergy to Finn Chamber AQUA (FCA) test chambers (SmartPractice, Phoenix, Arizona).

CASE REPORTS

Case 1: An 11-year-old girl with atopic dermatitis was referred because of a history of reactions to DuoDERM Extra Thin dressings (Convatec, Deeside, UK). Patch testing was performed with FCA test chambers with a prefixed filter paper. She reacted to all FCA test sites (Figure 1) and to DuoDERM Extra Thin (++) tested “as is.” She was retested with one test chamber each of FCA, ordinary 8-mm Finn Chambers (SmartPractice), and IQ Ultra chambers (Chemotechnique Diagnostics, Vellinge, Sweden). A positive reaction (++) to the FCA chamber was observed. By the use of ordinary Finn Chambers and fixation with Scanpor tape (Norgesplaster, Vennesla, Norway), the patient was then tested with the department’s paediatric baseline series (including aluminium chloride hexahydrate 10% pet., hydroabietyl alcohol 10% pet., abietic acid 10% pet., and ultrasonic bath extracts in acetone of 10 filter papers from the FCA chambers, the polyurethane film from one FCA patch, and DuoDERM Extra Thin. Patch test preparations were supplied by Chemotechnique Diagnostics. Patch tests were applied for 48 hours; readings were performed on day (D) 3 and D7.¹² There were positive patch test reactions to *Myroxylon pereirae* (+), oxidized limonene (++) , oxidized linalool (++) , colophonium (+), hydroabietyl alcohol (+++), abietic acid (++) , the FCA test chamber (++) , and the extracts of filter papers from FCA test chambers (++) and DuoDERM Extra Thin (++) .

Case 2: A 5-year-old girl with a history of diabetes mellitus and dry skin, but no previous dermatitis, was referred because of a reaction to a glucose sensor. She was patch tested with FCA test chambers. She reacted to all test sites, and also on the skin covered by the FCA test patches. She was retested with one test chamber each of FCA, ordinary Finn Chambers, and IQ Ultra chambers. By the use of ordinary Finn Chambers, she was then tested with aluminium chloride

hexahydrate 10% pet., colophonium 20% pet., hydroabietyl alcohol 10% pet., abietic acid 10% pet., and an ultrasonic bath extract of 10 FCA filter papers. She was also tested with an aimed series for glucose sensor-related substances; this testing is reported elsewhere.¹³ Patch tests were performed as in case 1. The patient had positive patch test reactions to hydroabietyl alcohol (+) and the extract of filter papers from FCA test chambers (++) , and a doubtful reaction to FCA tested “as is” (?+).

Ultrasonic bath extracts of the filter papers and the polyurethane film from FCA and DuoDERM Extra Thin were analysed with gas chromatography-mass spectrometry (GC-MS). The materials were extracted in ethanol; the extracts were then evaporated to dryness with a rotary evaporator, and thereafter dissolved in pyridine (Acros Organics, Geel, Belgium) and derivatized with *N*-methyl-*N*-(trimethylsilyl)-trifluoroacetamide (Acros Organics) before being injected into the GC-MS system. The analyses indicated the presence of colophonium-related substances such as methyl dehydroabietate and dehydroabietic acid (detected as a trimethylsilyl ester) in all three extracts.

In parallel with the chemical investigations, the manufacturer was contacted in order to obtain more information on the adhesives used in FCA. The manufacturer provided us with information on the acrylate-based adhesives used on the polyurethane film and between the filter paper discs and the aluminium chambers. According to this information, a modified colophonium was present as a tackifier in the adhesive used to fix the filter papers to the aluminium chambers. No information on colophonium in the adhesive on the polyurethane patch was obtained. The manufacturer has now implemented a replacement of the adhesive used in the FCA patch test chambers. Complementary testing with the new formula of FCA “as is” and with an extract of the filter papers of the new FCA was performed for case 2, causing no reaction.

DISCUSSION

FCA is a recently introduced moisture-resistant patch test system. According to the manufacturer, the tape used is a clear polyurethane

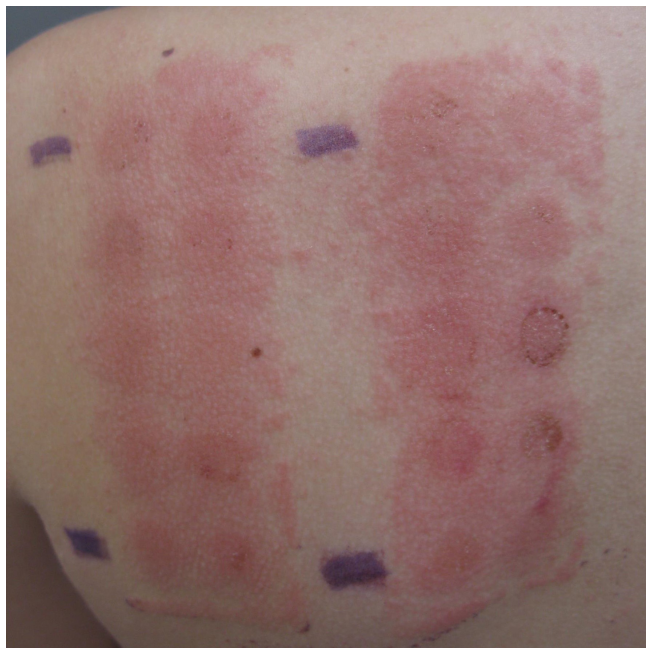


FIGURE 1 Case 1. Patch test reactions to Finn Chambers AQUA on day 3

film coated on one side with a medical-grade acrylic adhesive. Each chamber is covered with absorbent paper.¹⁴ This is in contrast to the traditional Finn Chamber, in which a filter paper is added when liquid haptens are tested. Allergic reactions to traditional Finn Chambers are mainly caused by contact allergy to aluminium, and, in most cases, are verified by positive patch test reactions to aluminium salts.^{1-4,6-9,11} Our two cases, however, had negative test results with aluminium chloride hexahydrate, making aluminium contact allergy unlikely. Instead, the investigation indicates contact allergy to modified colophonium in the adhesive used to fix the filter papers of FCA. At the initial patch testing, case 1 reacted not only under the test chambers, but also under the polyurethane patch. Although the safety data sheet of the acrylate-based adhesive used on the polyurethane patches did not list any colophonium-related substances, the chemical investigations indicated the presence of colophonium-related substances also in the extract of the polyurethane patch.

In two recent reports, cases of contact allergy to FCA have been described. In one report, a diagnosis of aluminium contact allergy was made; however, aluminium salts were not tested. Interestingly, the patient was also allergic to colophonium.¹⁵ In the other report, contact allergy to the adhesive was confirmed by patch testing with the adhesive used to fix the filter papers of FCA “as is.”¹⁶ Positive reactions to colophonium and abiestic acid were also observed in both patients. The patients were retested with the new formula of FCA, and no reaction was observed.

Case 1 reacted to DuoDERM Extra Thin, which has been reported to contain a colophonium derivative.¹⁷ Case 2 had a history of reactions to a glucose sensor. A recent publication reported contact allergy to colophonium in two diabetic patients, and the manufacturers of one glucose sensor and one insulin pump both confirmed

colophonium to be present in the adhesive used to fix these devices to the skin.¹⁸ As exemplified by our cases reacting to the adhesive used in the FCA system, colophonium derivatives may also be present in acrylate-based adhesives, which is not always obvious from the available information. Therefore, cooperation from the manufacturers and/or chemical investigation are important when patients with reactions to adhesives are diagnosed.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to report.

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