

Case report

Anaphylaxis after dental treatment with a formaldehyde-containing tooth-filling material

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A 67-year-old patient developed systemic reactions after application of a formaldehyde-containing tooth filling. She had a clearly positive RAST result for formaldehyde, whereas skin prick testing and patch tests were negative. Sensitization to formaldehyde appears to have occurred 1 year previously. Induction of formaldehyde allergy may represent a major complication during dental treatment, and assessment of specific IgE should be considered in patients at risk.

Key words: anaphylaxis; dental treatment; formaldehyde.

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Toxavit® is used in dental treatment for devitalization of the tooth pulp. It is a paste containing paraformaldehyde, lidocaine, *m*-cresol, eugenol, glycerol, and carbon fibers. Toxavit has to remain in the tooth for 10–15 days.

Case report

A 67-year-old woman developed generalized urticarial exanthema approximately 10 h after dental treatment with Toxavit. Two hours later, she collapsed and was unconscious for some seconds. An emergency doctor injected her with 80 mg triamcinolon acetonoid and 2 mg clemastine intravenously, and she was taken to hospital. At the emergency room, her blood pressure was 170/85 mmHg and her pulse rate was 70 ppm. The blood pressure dropped to 150/80 mmHg and 130/85 mmHg, and the pulse rate climbed to 80 ppm. After another intravenous injection of 250 mg prednisolone 21 sodium hydrogen succinate and 50 mg ranitidine, she was admitted to hospital (Table 1). The next morning, the exanthema was gone and she was discharged. Her cheek was slightly swollen, but she had no angioedema. The tooth filling was removed immediately by her dentist.

Table 1. Anaphylactic reaction after application of formaldehyde-containing tooth-filling material Toxavit

Toxavit	Symptoms	Onset after application
Woman 67 years old		
Symptoms	Generalized urticarial exanthema	8 h
	Unconsciousness	10 h
	Swelling of cheek	20 h
Treatment	Immediate medical help and hospitalization	
	Triamcinolon acetonoid 80 mg	
	Clemastine 2 mg	
	Prednisolone 21 sodium hydrogen succinate 250 mg	
	Ranitidine 50 mg	
Recovery	24 h	

Material and methods

The patient was prick tested with formaldehyde 1.0%, 0.1%, 0.01%, and 0.001% (10). Specific IgE against formaldehyde and specific IgE against latex were assessed by RAST (Biodiagnostics, Freiburg, Germany). Total IgE level was assessed by PRIST (Pharmacia, Uppsala, Sweden). Patch testing with a European standard series including formaldehyde 1.0%, a disinfectant series, a dental series (Epi-pharm, Linz, Austria), and a mercury series was

done. In addition, the substances used in the tooth filling (paraformaldehyde 460 mg/g, lidocaine 370 mg/g, *m*-cresol 45 mg/g, and eugenol 45 mg/g) were patch tested in the concentration used in the filling. The substances were applied with Finn chambers on Scanpor[®] tape and fixed in the scapular region. Patches were removed after 72 h and the reading was taken. Results were scored as recommended by the International Contact Dermatitis Research Group (ICDRG).

Results

The patient showed a highly positive RAST to formaldehyde (RAST class 2.7). Prick testing with formaldehyde 1.0%, 0.1%, 0.01%, and 0.001% revealed negative reactions (formaldehyde wheals: diameter 2 mm; histamine wheal: diameter 9 mm). Total IgE was in the normal range (70 kU/l); specific IgE against latex was negative. Patch testing revealed negative reactions to the tooth-filling materials and to formaldehyde 1.0% in the standard series. The patient showed a 2+ positive reaction to phenylmercuric borate 0.05%.

Discussion

One year previously, the formaldehyde-containing tooth filling Toxavit was applied to four teeth of our patient and was tolerated well. The filling causing anaphylaxis was done about 4 weeks after the last Toxavit treatment.

The patient's case history revealed that 6 years before she had consulted an allergy clinic for chronic dermatitis of both eyebrows. Skin prick testing showed a positive reaction to formaldehyde. The patient had been helping to build a house for several years. She regularly used paint and glue (12) which could have caused initial sensitization to formaldehyde (1). As the first Toxavit treatments did not cause symptoms, a loss of specific IgE against formaldehyde over the years had probably occurred. As Toxavit slowly releases formaldehyde from paraformaldehyde, sensitization may have been reinduced by a constant formaldehyde level.

IgE-mediated sensitization to formaldehyde is rare. Sources for sensitization have been occupational exposure (1, 5, 8, 12), repeated use of dialysis equipment (2), and probably even exposure to very low amounts of indoor formaldehyde (4). Anaphylaxis from tooth fillings (7) caused by formaldehyde has been described by Candura (3) and Ebner & Kraft (6), who reported four patients treated with Toxavit (Table 2). One woman experienced life-threatening symptoms.

It took our patient 10 h to develop anaphylaxis. This late onset of symptoms is typical of anaphylaxis

Table 2. Anaphylactic reactions after formaldehyde-containing tooth-filling materials described by Ebner & Kraft (6)

Toxavit	Symptoms	Onset after application
Woman 33 years old (Ebner & Kraft (6))		
Symptoms	Generalized urticaria Swelling of face Cardiovascular problems Unconsciousness	5–6 h
Treatment	Immediate medical help	
Recovery	24 h	
Woman 45 years old (Ebner & Kraft (6))		
Symptoms	Generalized itchy exanthema Swelling of face Swelling of tongue	≈ 10 h 10–12 h
Treatment	Hospitalization	
Trio Paste [®]	Symptoms	Onset after treatment
Man 57 years old (Ebner & Kraft (6))		
Symptoms	Generalized urticaria Angioedema Cardiovascular symptoms Asthma	1 h
Treatment	Intensive care unit	
Recovery	48 h	

from Toxavit, although it is a Type I reaction. However, a positive skin prick test result for formaldehyde was obtained neither in our patient nor in Ebner & Kraft's (6) patients.

Patients already sensitized to formaldehyde are likely to be at high risk of anaphylaxis during dental treatment with formaldehyde-containing filling materials. Because specific IgE against formaldehyde is seldom associated with particular symptoms (4), sensitization is hard to detect from case history. The fact that even low indoor exposure to formaldehyde may induce sensitization indicates that specific IgE against formaldehyde may not be rare (4).

Anaphylaxis in dental treatment may be induced by local anesthetics (9), latex gloves (11), or formaldehyde. In our patient, sensitization to formaldehyde was probably reinduced by repeated use of Toxavit. Because our patient had a high level of specific IgE against formaldehyde, anaphylaxis seemed to be caused by formaldehyde.

Therefore, induction of formaldehyde allergy could represent a major complication during dental treatment. A prophylactic assessment of specific IgE against formaldehyde should be considered in patients exposed to either gaseous or topical formaldehyde.

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