

Painful Edema of the Cheek

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Case Report

A 56-year-old woman presented with a 6-month history of right cheek swelling and discomfort. The patient distinctly recalled that her symptoms began within 24 hours of a tooth extraction and subsequent temporary crown placement. Her condition had initially been presumed to be a cellulitis, and penicillin was empirically initiated, with only minor symptomatic improvement. Persistent facial pain and edema led the patient to seek evaluation by an oral surgeon, an endodontist, an otolaryngologist, and a neurologist. None of these specialists

found any anatomic or pathologic abnormality, and extensive imaging by computed tomography and magnetic resonance imaging was unremarkable except for soft tissue swelling.

The patient was consequently referred for patch testing. On physical examination there was mild tenderness, erythema, and edema of the right cheek (Fig 1). Patch testing was performed with a modified North American Contact Dermatitis Group standard series, acrylate and dental series, and shavings from a sample of her dental material. A +++ reaction to ethylene glycol dimethacrylate (EGDMA), a + reaction to 2-hydroxyethyl acrylate (HEMA), and a +++ reaction to thimerosal were noted at 48 and 72 hours. No reaction was noted to the shavings from the patient's cured dental material. The Material Safety Data Sheet of the dental material identified the presence of "multifunctional methacrylates."

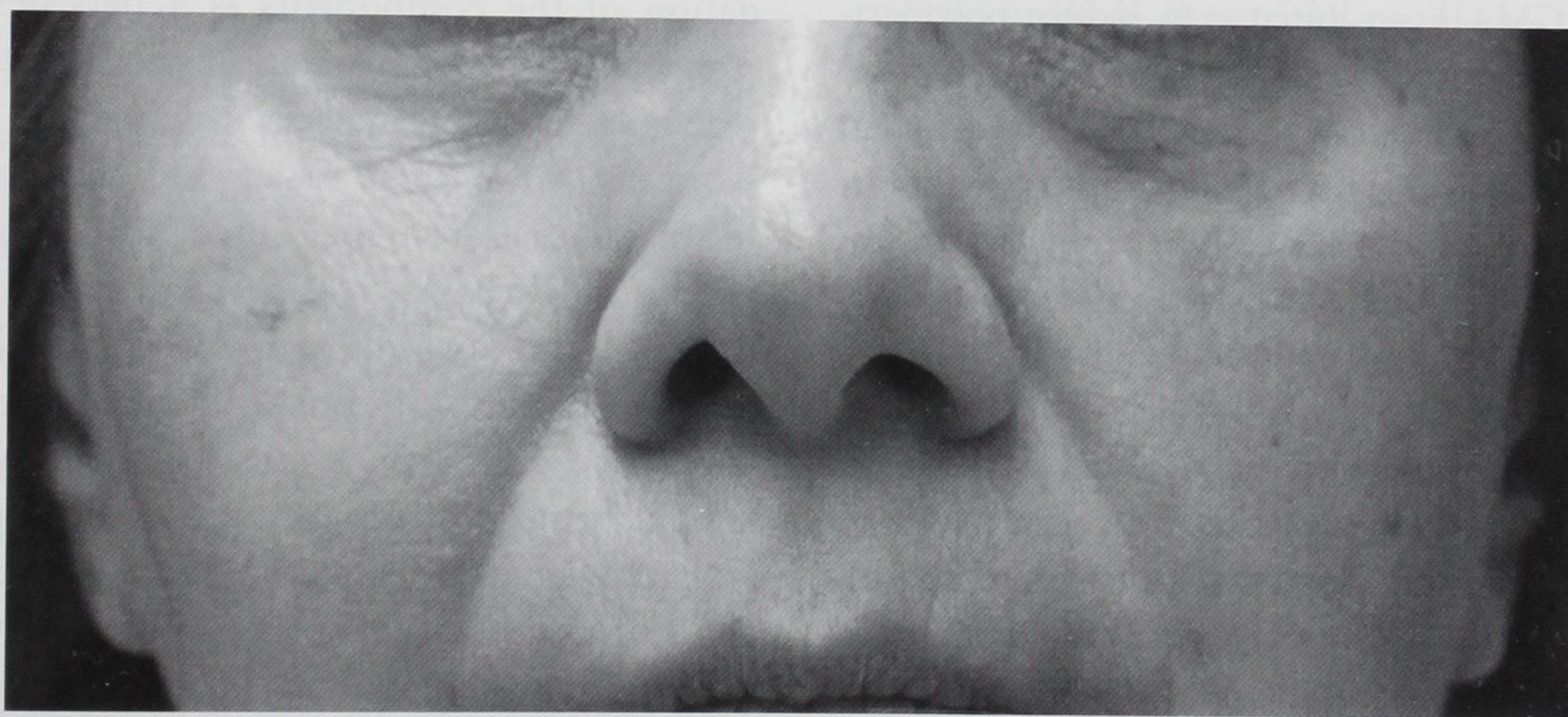


Figure 1. Erythema and edema of the right cheek of the patient.

What is your diagnosis?

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Diagnosis

Allergic contact dermatitis from EGDMA and HEMA leached from temporary crown material.

Discussion

Polymer-based dental filling (PBDF) materials are extensively used in dental prostheses and composites in place of mercury-based amalgams. Although PBDF materials are widely used for the restoration of anterior teeth, these agents are known to have variable durability under the stressors of mastication, and leakage of components into the mouth after placement has been reported.¹

PBDF materials are composed of three key components: the resin matrix, the inorganic filler (often glass, quartz, or silica), and the coupling agent (used to cement the filler and matrix). The combined properties of these three key agents are responsible for the strength and durability of PBDF.

The resin matrix itself is made of a liquid monomer system based on 2,2 bis(4-(2-hydroxy-3-methacryloyloxypropoxy) phenyl)-propane (also known as bisphenol A glycidyl methacrylate [Bis-GMA]), an initiator to induce polymerization, and a stabilizer to ensure the integrity of the matrical unit. When the matrical components are polymerized, a solid compound is formed. Bis-GMA, the predominant monomer system used currently, has superior properties of less volatility and polymerization shrinkage, faster hardening, and greater durability as compared to previous products.¹

To allow mixing of the inorganic filler with Bis-GMA, EGDMA and triethylene glycol dimethacrylate diluents are incorporated.¹ Polymerization of the composite materials is induced by camphoroquinone, a commonly used initiator, and can be augmented by peroxides and elevated temperatures. As polymerization of resin components proceeds, a three-dimensional network is formed. However, up to 25 to 55% of methacrylate groups in PBDF materials remain unreacted after polymerization.^{1,2}

Concurrent contact allergy to camphoroquinone and EGDMA has been previously reported in a patient with dental composites.³ Allergic contact dermatitis from occupational exposure to EGDMA has also been described.⁴

Organic leaching of materials from PBDF by saliva has been demonstrated via gas chromatography by Lygre and colleagues.² Leached camphoroquinone was identified from all of the composite products examined. Additionally, leached EGDMA was identified from one product.² Our patient did not react when patch-tested against camphoroquinone.

Following the identification of allergy to EGDMA and HEMA, the presence of these compounds was confirmed with the manufacturer of the patient's dental composite,

and removal of the temporary crown was recommended. The patient reported that approximately 1 month following removal, more than 90% of the pain and erythema had resolved. The edema of the cheek slowly decreased, and at the 6-month follow-up, a decrease of approximately 50% in the edema was noted.

The growing incidence of contact allergy to PBDF materials, particularly among dental health professionals, has brought to light the need for accurate and precise identification of all components in PBDF materials on Material Safety Data Sheets.^{2,5} Often, incomplete or vague information is offered, as was the case for our patient's composite, whose hazardous component was listed as a "multifunctional methacrylate." The presence of EGDMA was confirmed only by contacting the manufacturer of the patient's dental composite, and the patient was advised to request the removal of the temporary crown and replacement with a porcelain permanent crown.

Despite technologic advances in PBDF materials and newer generations of dental resins that allow for more durable and cosmetically acceptable composites, degradation of the components is a persistent problem. Incomplete resin polymerization allows potential continued reactivity after the material's placement into the mouth. Exposure of the PBDF material to saliva can lead to leaching of materials from the "cured" PBDF, and common exogenous initiators (such as peroxide-containing toothpastes or oral rinses) can induce residual chemical reactivity. Thus, a negative result from isolated dental material curings is inconclusive, and patients must be patch-tested against each specific composite component. Increasing incidence of such contact allergies will require detailed patch testing, which can only be facilitated by complete identification of specific composite compounds by manufacturers.⁵

References

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