

STOMATITIS FROM ALLERGY TO ACRYLIC DENTURE

REPORT OF A CASE

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IRRITATION or inflammation of the oral mucosa resulting from the use of plastic dentures has occurred with increasing frequency since the introduction of the acrylic plastic materials as a substitute for vulcan or rubber in the preparation of artificial dentures. The irritation sometimes is due to improper fitting of the denture, which usually can be corrected by the dentist. When it persists, the irritation may be due to the presence in the denture of a small amount of the liquid monomer of acrylic resin, which is irritating and sensitizing.

Artificial plastic dentures usually are prepared by mixing the liquid monomer of acrylic resin, called methyl methacrylate, with the powdered polymer, designated polymethyl methacrylate. The mixture then is heated until further polymerization occurs. After subsequent hardening, the familiar pink-colored denture is formed. If the denture is properly heated, or "cured" as the dentist terms it, complete polymerization takes place and none of the irritating monomer is left behind. If it is improperly "cured," however, the presence of the monomer, even in small amounts, may cause irritation and/or sensitization.

Allergists seldom see patients who have irritation or sensitization of the oral mucosa. When they do, the diagnosis of specific allergy is not easy and may be suspected only because the stomatitis disappears when the patient does not wear the denture for awhile and recurs shortly after the reinsertion of the plate. Recently we saw a patient with stomatitis in whom we were able to obtain definite proof of a specific allergy. Because this condition is so uncommon, we thought it might be worth reporting.

CASE REPORT

Mrs. H. F., aged 63 years, first came to the Medical Outpatient Clinic of Temple University Hospital on April 22, 1955, complaining of swollen gums and burning and tingling sensations of the tongue following the use of an upper artificial denture. She was in excellent health until September, 1954. At that time, and shortly after her upper teeth had been extracted, she began to wear an artificial denture made of plastic material. Symptoms were noted within a short time after inserting the denture and disappeared twenty-four to forty-eight hours after removing it. She returned to her dentist, who attributed the difficulty to mechanical difficulty with the denture. Repeated adjustments and attempts to alter the denture failed to improve the symptoms. In November, 1955, she

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went to another dentist in Allentown, who gave her a second denture made of similar plastic material which supposedly was properly "cured." Repeated attempts to use the new denture were followed by exactly the same symptoms, which came on within a half-hour after inserting it. The patient stated that if she wore the denture for a longer period of time, she developed the usual oral symptoms but, in addition, noted nausea and itching of the skin with a few visible hives.

Aside from these manifestations, her general health had been good. She had occasional attacks of dizziness when constipated, but not if her bowels were kept regular. Prior to the removal of her teeth, she had slight pains in the proximal phalanges and in the wrist joints, which were diagnosed as rheumatoid arthritis. These symptoms disappeared following the removal of her teeth in August, 1954. She had pneumonia at the age of 18, with no sequelae, and several operations, including the removal of both tubes and ovaries, appendix, uterus, and tonsils. She is intolerant of certain drugs, particularly those in the



Fig. 1.

opium group. The ingestion of morphine on one occasion produced immediate marked constriction of the chest and throat and an inspiratory croup. The ingestion of clams caused nausea and vomiting. A grandson is allergic to milk. Three sisters and one brother are allergic to various drugs. On one occasion, her mother had marked acute anaphylactic shock after morphine. The patient worked in an office, smoked occasionally, and used feather and foam rubber pillows. The use of plastic pillowcases seemed to induce sneezing and dryness in the nose so that she had to discontinue their use.

Physical Examination.—Blood pressure was 140 systolic and 86 diastolic. There was mild obesity and evidence of bilateral corneal scars. The membranes of the nose were pale but not boggy. Tongue and pharynx were negative. The mucous membranes of the upper alveoli were slightly erythematous and showed several pin-point vesicles. Examination of the lungs revealed no abnormalities. The heart seemed slightly enlarged to the left with an audible soft systolic nontransmissible mitral murmur. The abdomen was soft, and showed scars of previous operations. There were no abnormalities of the skin, and the

reflexes were normal. Routine laboratory examinations were negative. A diagnosis of probable allergic stomatitis from an acrylic denture was made, and the patient was referred to the allergy clinic for further study.

The patient reported to the allergy clinic on May 2, 1955. At that time she had no oral symptoms, since she had not worn the denture for several days. However, application of the edentulous portion of the plate to her arm for a period of eight hours produced a red line outlining the outer rim of the denture that had been in contact with the skin (Fig. 1).

Since the denture was made of processed acrylic resin, we obtained some of the liquid monomer (methyl methacrylate) from the Temple School of Dentistry for patch tests. In addition, we tried to scrape some material directly from the denture to use in the test, but little actually was obtained because we were afraid of altering its contour and fit. Patch tests were done on the arm with both these materials, and the patches were allowed to remain for forty-eight hours. A positive patch test was obtained only with the methyl

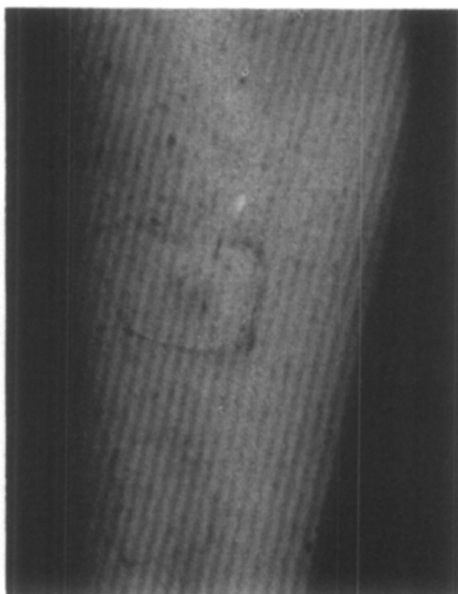


Fig. 2.



Fig. 3.

methacrylate, but not with the scrapings (Fig. 2). On May 9 another direct pressure test with the plate was done, the patient being instructed to leave it on more firmly and for a longer period of time. After being in contact with the skin for about twelve hours, the denture was removed. A positive reaction, consisting of red lines duplicating the points of contact, was noted (Fig. 3). In addition to the local reaction, both after the patch test with the methacrylate and the direct pressure test with the denture, the patient reported the development of soreness of the roof of the mouth and tongue which lasted for a short time. Following the demonstration of the unsuitability of plastic dentures because of her allergy to the acrylic material, the patient was referred back to the dental school, where a vulcan denture was made for her. After a short period of readjustment, the patient has worn this new denture apparently without difficulty, at least until last heard from in mid-September, 1955.

COMMENT

The fact that the artificial plastic denture was responsible for the irritation of the oral mucosa was established in this patient by the clinical history

of symptoms of stomatitis after repeated attempts to wear it, followed by relief when the denture was removed. Repeated adjustments of the first denture and even the preparation of a second denture failed to prevent the irritation, suggesting that it was not due to either improper fitting or "curing" but perhaps to a true allergy. Suspicion of this was obtained by the initial positive reaction to the pressure test done with the denture, but more definite proof was furnished by the positive patch test to the liquid monomer.

In an excellent review published in September, 1954, Fisher¹ discussed the question of sensitization of the skin and oral mucus membranes to acrylic denture materials. He reported four patients with allergic contact dermatitis of the skin and hands, proved clinically and by patch tests to be due to allergy to the liquid monomer of acrylic acid. Included in this report was the study of twenty cases (all women) of sore mouth caused by acrylic dentures. Four of these patients were told that they were allergic to the dentures because of positive reactions obtained after strapping the plates on the forearm for forty-eight hours. But only one of the four had a specific sensitization as proved by a positive patch test to the liquid monomer and even she could wear a properly heat-cured denture without difficulty. Seventy control patients, including twenty men and fifty women, had plastic dentures strapped to their forearms for forty-eight hours; all reacted with various degrees of redness and papulation. In two men and fifteen women, numerous bullae formed at the points of maximum pressure. The histologic examination of these bullae showed no eczematous responses. By contrast, of 100 control patients who were patch tested with the liquid monomer (methyl methacrylate), only one showed a slight redness after forty-eight hours, indicating that the monomer itself was not irritating. Fisher concludes, from these studies, that true allergic sensitization to the acrylic denture material is extremely uncommon; also that it is not advisable to depend upon tests done with the entire denture for determining such sensitization, since many persons react to it in a nonspecific way. The best method for testing is by patch test with the methyl methacrylate liquid monomer. When the latter is completely polymerized, it is no longer a sensitizer or elicitor of allergic reactions. No instance of allergic sensitization to the heat-cured acrylic denture material was found in twenty patients with sore mouths caused by dentures. Self-cured acrylic denture material, however, sometimes contains sufficient unpolymerized monomer to give reactions in patients sensitized to the monomer.

The patient which we are reporting had a positive pressure test with the denture. This, according to Fisher, is not in itself diagnostic and may be nonspecific. But she also had a positive patch test to the monomer, which is indicative of the existence of true allergic sensitization rather than of nonspecific irritation. This was substantiated clinically by the fact that the patient could wear a vulcan denture without further difficulty.

One question which suggests itself concerns the manner in which the sensitization occurred in this patient. Allergic sensitization to chemical agents like acrylic resin usually is acquired by contact. While the history is uncertain, evidence of the sensitization in our patient followed shortly after she began

wearing the denture so that the period of contact must have been quite short. The presence of other manifestations of allergy in this patient perhaps might have enhanced her tendency to sensitization; thus, she had a severe allergic reaction to morphine, as did her mother; furthermore, she could not tolerate a plastic pillowcase without sneezing. It is possible that she possessed a natural allergy to plastics, but that is difficult to prove, as is also the relationship between her allergy to drugs like morphine and the allergy to the acrylic resin.

SUMMARY

The present report is of a patient with allergic stomatitis resulting from sensitization to acrylic denture materials. The presence of specific allergy in this patient, suspected from the clinical history and from a positive direct pressure test with the denture on the arm, was definitely proved by means of a positive patch test to the liquid monomer of the acrylic resin (methyl methacrylate) used in the preparation of the plastic denture, and clinically by the relief afforded by wearing a vulcan denture. The necessity for reliance upon a positive patch test with the liquid monomer rather than upon clinical evidence or pressure tests with the denture in establishing the diagnosis of allergy is emphasized.

REFERENCE

1. Fisher, Alexander A.: Allergic Sensitization of the Skin and Oral Mucosa to Acrylic Denture Materials, *J. A. M. A.* **156**: 238, 1954.