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Case Report

Allergic Contact Dermatitis by Beryllium Chloride as Unique Sensitivity: A Case Report

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ABSTRACT

Beryllium can be found in silver alloy, in costume jewelry and in dental prosthesis. It is also used in aerospace industry and might be also found in precision instruments. Pure contact dermatitis to Beryllium has never been described as in this case associated with allergic contact dermatitis to jewelry. Most reports of Beryllium contact dermatitis are related to dental prosthesis and most of the cases we have seen Beryllium allergic contact dermatitis is associated with other positive allergens. We believe that this metal should be added to the dental screening as according to our findings.

Keywords
Beryllium; Jewelry; Allergy; Skin allergy; Allergic contact dermatitis.

INTRODUCTION

Beryllium is used in the aerospace industry, is present in electronic components, ceramic industry, tools, golf clubs, precision instruments, and even in missiles. Beryllium is often associated in copper or aluminum alloys, usually at 2%.

It can be found in silver alloy, in costume jewelry, and in dental prosthesis. Beryllium has the ability to absorb heat thus it is also used in molds for casting. The insert alloy containing beryllium allows better cooling of the molds.

In structural applications, the combination of high flexural rigidity, thermal stability, thermal conductivity and low density (1.85 times that of water) makes beryllium metal a desirable aerospace material for aircraft components, missiles, space craft, and satellites. Because of its low density and atomic mass, beryllium is relatively transparent to X-rays and other forms of ionizing radiation; therefore, it is the most common window material for X-ray equipment and components of particle detectors.

Many dental prosthetic restorations placed in the Europe and United States are made of a variety of base metal alloys; as gold, silver, platinum, palladium, ruthenium, iridium, rhodium, and osmium and beryllium is added to some base metal alloys for use in crowns, bridges and in partial denture frameworks. Incorporation of beryllium into the base metal alloy formulation facilitates castability (lowering the melting temperature and surface tension) and increases the porcelain metal bond strength. Beryllium also allows the alloys to be electrolytically detachable for bonding veneers in conjunction with resin-bonded restorations.

Contact dermatitis to beryllium has been reported in recent years,[1,2] we have found 39 positivities in 1200 patients studied with the batteries of dental screening (chemotechnique) and special metal series, which we use to detect sensitivity to dental metals, where the beryllium chloride is at 1% in petrolatum.

However, this is the first time we have seen sensitivity to beryllium with some premises that makes it unique:

1. Beryllium sensitivity in this patient is not associated with any other sensitivity.
2. The patient reported intolerance to jewelry for 11-years.
3. The patient is not carrying any kind of dental nor surgical prostheses and in her adolescence did not carry orthodontic brackets.[3]
4. In her job as a journalist, there is no known contact with

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beryllium past or present.

5. For clinical history, there are only etiological relationship with jewelry and in this section are the possible causes of sensitization to beryllium.

CASE REPORT

A 33-year-old female reported to our department for the study of intolerance to earrings. In the family history, there is one brother with bronchitis, rhinitis, and asthma episodes. The patient complains about intolerance to certain earrings from the age of 22. She attends our department with a picture of an erythematous, edematous plaque affecting both ear lobes.

The clinical picture varies with different posts used, and it starts itching a few days of use of certain outstanding, appearing later erythema, papules, edema in the area of contact with the earrings. On avoiding the suspected earrings the clinical findings disappeared (Figure 1). She had no relevant history of dental work and she works as a journalist in television (TV).

Figure 1. *Contact Dermatitis to Beryllium Chloride on the Ear Lobe on Response to the Use of a Certain Earing*

In our Cutaneous Allergy Unit, we studied the patient with the following allergens: European Standard, dental screening (chemotechnique diagnostics, Vellinge, Sweden) and special metal series (Martí-Tor, Barcelona, Spain). Patch tested were applied on the back with Finn Chambers® (Epitest Ltd Oy, Tuusula, Finland) suspended on Scanpor® tape (Norgesplaster A/S, Vennsela, Norway). Reading were carried out on D2 and D4 according to the criteria of the International Contact Dermatitis Research Group (ICDRG), with the following results: See Figure 2.

Figure 2. *Response to Patch Test: +++ to Beryllium Chloride on Day 15*

Table 1. *Readings of the Allergic Contact Dermatitis Different Series at D2 and D4 According to the Criteria of the International Contact Dermatitis Research Group*

ALLERGENS	D2	D4	D15
European Standard	-	-	-
Dental Screening (Chemotecnique)	-	-	-
Special Series of Metals	Beryllium +	Beryllium++	Beryllium +++

Since the patch test reaction to beryllium might be delayed,[3] we performed an additional reading at D15.

The manufacturer of two types of slopes has given us the composition: Be 2%; Co+Ni 0.2%; Pb 0.02% Max and Cu balance.

CONCLUSION

Beryllium is a health and safety issue for workers. Exposure to beryllium in the workplace can lead to a sensitization immune response and can over time develop chronic beryllium disease (CBD). The National Institute for Occupational Safety and Health (NIOSH) in the United States researches these effects in collaboration with a major manufacturer of beryllium products. The goal of this research is to prevent sensitization and CBD by developing a better understanding of the work processes and exposures that may present a potential risk for workers and to develop effective interventions that will reduce the risk for adverse health effects. NIOSH also conducts genetic research on sensitization and CBD, independently of this collaboration. The NIOSH Manual of Analytical Methods contains methods for measuring occupational exposures to beryllium.

We believe that this metal must be contained in the dental screening as according to us in the last 20-years,[4] between 10% and 15% of dental prostheses placed in different countries contain beryllium, and this is the reason why we may continue watching sensitivities in the coming years.

The special series of allergens for study possible sensitization to metals in jewelry; electrical conductors, tools; must have beryllium; because this metal is broad used and have a substantial capacity to sensitize.[5]

We had not found its use in jewelry and we believe this case can be useful in some patients with symptoms of intolerance to costume jewelry without any positive result of metals tested regularly.[6,7] We strongly believe that beryllium should be included in a screening tray for jewelry induced contact dermatitis.

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