Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies ***NLM ID:*** *101716117*

Journal home page: www.jamdsr.com doi: 10.21276/jamdsr Index Copernicus value = 85.10

(e) ISSN Online: 2321-9599; (p) ISSN Print: 2348-6805

Case Report

Hypersensitivity Reaction to Nickel Based Metal Ceramic Prosthesis: A Case Report

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ABSTRACT:
Metal alloys are being used in dentistry for several decades now.They are used in various prosthetic and restorative procedures in dentistry. Among the present alloys,nickel based alloys have gained popularity as they provide necessary strength,flexure and are cost effective. However, in few patients hypersensitivity reaction to nickel has been reported. Hypersenstivity reaction to metal manifests as contact dermatitis orally and periorally with symptoms like burning, gingival inflammation, erythema, ulceration and swelling.This delayed hypersenstivity reaction can be attributed to previous sensitization from nickel contained in food and jewellery.
Keywords- hypersenstivity, dental alloys, metal allergy, nickel prosthesis.

Received: 14, January 2021 Accepted: 25 February, 2021

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This article may be cited as: Verma N, Srivastava A, Dubey PK. Hypersensitivity Reaction To Nickel Based Metal Ceramic Prosthesis: A Case Report. J Adv Med Dent Scie Res 2021;9(4):17-19.

INTRODUCTION

A significant population worldwide uses fixed metallic restorations and prosthesis for oral rehabilitation.[1] Pure metals and various alloys have been used for in dentistry for restorations and prosthetics. An alloy is a fusion of two or more metals or metals and non-metals.Dental alloys have superior physical properties than pure metals.[2] They have better strength, elasticity, microstructure, grain size, resistance to wear and corrosion and biocompatibility in oral environment as compared to the elemental metals. [3] Earlier gold based alloys were used in the fabrication of dental prosthesis later with advent of newer metals the shift was towards non precious metal alloys like nickel-chromium and cobalt based alloys.[4]

Ni-Cr alloys are extensively used for fixed metallic and metal ceramic or porcelain prosthesis. Due to their hardness and high modulus of elasticity thinner cross-section of the material can be done. The thinner the cross-section more space it provides for veneering of porcelain providing with superior resistance.Also their coefficient of linear thermal expansion is analogous to that of porcelain which decreases the risk of cracks and fractures during the process.[5] Alongwith superior mechanical properties they are also more affordable than precious metal based dental prosthesis. Hence are a preferred choice for metal and metal ceramic fixed partial dentures.[4]

Nickel a major constituent of Ni-Cr alloy, is a known allergen, though nickel allergy is infrequent in dentistry,

few cases of delayed hypersenstivity reactions have been reported.[6] Hypersenstivity reactions related to nickel poses a significant diagnostic complexity and challenge in treatment planning.
Here we present a case of hypersenstivity reaction to Ni-Cr alloy fused ceramic fixed prosthesis in maxillary anterior region.

CASE REPORT

A 16 year old female patient came to the department with the complaint of swelling in upper and lower lips since one month. She was asymptomatic 1 month back. She visited a local dental practitioner for esthetic concern of missing maxillary anterior teeth. A fixed partial prosthesis was fabricated in the anterior maxillary region,after four days of fabrication patient noticed swelling of her upper and lower lips. [fig.1]

Fig. 1 Extraoral picture showing swelling in upper and lower lips.

There was no history of previous dental restorations,drug use or drug allergy.No significant medical history was present, neither was such an episode reported previously. On examination diffuse swelling which was non-tender ,nonpruritic, nonpitting, with no erosion or ulceration was noted on her upper and lower lips. On intraoral examination fixed metal ceramic prosthesis was present with respect to 11, 12, 21 with associated gingival inflammation. [fig.2]

Fig. 2 Intraoral picture showing fixed prosthesis in relation to 11, 12, 21 associated gingival inflammation

On radiographic examination no periapical pathology was present. Based on clinical and radiographic findings a hypersenstivity reaction was suspected. Patient was prescribed 10 mg anti- histamines and 10mg corticosteroid, orally once daily for 3 days and recalled afterward. She reported mild decrease in swelling initially, which did not regress further after 3 days of treatment. Patient was referred to the department of dermatology for the patch test on the suspection of metal allergy from prosthesis. Patient was tested for possible allergy to metals used in prosthesis (mainly nickel,chromium and cobalt). Nickel sulfate hexahydrate 5% in petroleum jelly was used for the test, it was applied on the volar region of the forearm and observed after 24 h and 48 h for any positive skin reaction. The test was positive for nickel. Thereafter patient was advised for removal of prosthesis,after removal of prosthesis there was an evident decrease in swelling of lips and gingival inflammation. [fig.3,4].

Fig. 3 Extraoral picture showing reduced swelling of lips after prosthesis removal.

Fig. 4 Intraoral picture showing reduction in gingival inflammation after removal of prosthesis.

DISCUSSION

Dental materials interact continuously with oral tissues and fluids.They are subject to high temperature and pH variations in the oral cavity, which leads to corrosion and leaching of byproducts inciting an immunological response.[1] Metal allergy is categorized as a delayed

hypersensitivity reaction. Various alloys leach metal ions in oral environment as a result of salivation, improper hygiene and corrosion from fluoride dentifrices. These released ions act as allergens and trigger inflammatory process. It occurs in two steps after entering the skin,first the allergen activates epithelial cells which release cytokines and a complex immune response is intiated involving antigen-presenting cells (APCs) and T cells. Activated APCs are presented as allergen to CD4 cells. In the second step, on successive re-exposure to the same allergen,there is activation of allergen-specific T-cells, which results in visible hypersensitivity reaction after 48 to 72 hrs of exposure.Nickel allergies are more common in females of the age group of 16-35 years as compared to males, probably due to frequent use of jewellery containing high amounts of nickel. [7] Oral symptoms of nickel allergy include burning sensation, gingival inflammation and hyperplasia, desquamation, chelitis, erythema multiforme, periodontitis, ulcers with mucosal erythema, perioral rashes, altered taste sensation, lack of sensation, tenderness at side of the tongue. [6]

Allergies to nickel based oral appliances are rare occurrence, however Noble et al(2008), De Silva et al (2004) reported cases of nickel hypersenstivity in patients undergoing orthodontic treatment from use of the orthodontic wires.These wires contain high amount of nickel.[6,8] Majority of the reported cases had delayed hypersenstivity reaction to allergen, however Itsara et al(2018) reported a case of immediate hypersenstivity reaction in a patient using dental appliance containing nickel and methyl methacrylate.[9]

Dental surgeons should consider allergy-producing potential of dental alloys before planning of treatment and take apt measures for reducing the risk of hypersenstivity reactions. Suspected patients should be confirmed with patch tests, and treatment plan should be modified accordingly in case of any positive allergy. Concurrent use of diverse alloys in the treatment should be avoided.[10]In cases of extensive reactions removal of prosthesis, treatment with antihistamines and corticosteroids should be considered.[11]

CONCLUSION

Hypersenstivity reactions remain the unprecedented complication of metal alloys used in dentistry and are a diagnostic challenge for the clinicians. Meticulous history taking,examination and investigations of the patient is required before proceeding with dental treatment requiring use of metal alloys. Incorporation of metal free dental materials is beneficial in such cases.

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