

Republic of Iraq  
Ministry of Higher Education  
and Scientific Research  
University of Baghdad  
College of Dentistry



# **ALLERGY IN ORTHODONTICS**

A Project Submitted to  
The College of Dentistry, University of Baghdad, Department of  
Orthodontics in Partial Fulfillment for the Bachelor of Dental  
Surgery

By: - **Heba Moeen Hussien**

Supervised by:

**Lecturer Zainab Mousa Kadhom**  
**B.D.S., M.Sc**

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## **Certification of the supervisor**

I certify that this project entitle "**Allergy in Orthodontics** " was prepared by the fifth-year student **Heba Moeen Hussien** under my supervision at the College of Dentistry/University of Baghdad in partial fulfilment of the graduation requirements for the Bachelor Degree in Dentistry.

Supervisor's name :- **Lecturer Zainab Mousa Kadhom**

Date :- April /2022

## Dedication

To my beloved **father and mother**, There are no words that can describe how much I'm thankful for believing in me and guiding me to my dreams, it would have been impossible without you both.

To my **husband** , Thank you for all your support , every hard time seemed easier with you, having you by my side through this journey was the best thing happened for me.

My friends specially( **mensha**), every moment with you is very precious to my heart, your help , your advices and your love to me all these things were very important to me

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## List of Abbreviations

<b>Ni</b>	<b>Nickel</b>
<b>PPm</b>	<b>Part Per million</b>
<b>NRL</b>	<b>Natural rubber Latex</b>
<b>TMA</b>	<b>Titanium Molybdenum Alloy</b>



## INTRODUCTION

An allergic response is one in which certain components of the immune system react excessively to a foreign substance (**pettersen and Jacobsen, 2003**). The reactions of hypersensitivity or allergies, are excessive immune system responses to a particular endogenous or exogenous antigen/allergen and which may, according to the intensity of the response, present systemic or local consequences (**Kumar, 2010**). This fact occurs through subsequent exposure to the antigen preceded by a primary contact. Thus, the allergen releases inflammatory mediators by binding to IgE on the surface of mast cells, in order to cause smooth muscle contraction, vasodilation, increased glandular activity and capillary permeability (**Gaujac et al., 2009**).

Epidemiologically, 10 % to 15 % of the world population has some type of allergic reaction (**Andrade et al., 2004**). Adverse reactions arising from fixed and removable orthodontic appliances use considered a concern for the orthodontists in the healthcare field (**Pazzini et al., 2009**) as most of these appliances comprise metallic alloys which regarded an integral part in the orthodontic treatment, like, stainless steel, titanium-molybdenum, cobalt chromium, and nickel titanium (**Sanjeev and Sushma Dhiman, 2015**) and the majority of these metallic alloys have nickel in their content (**Kolokitha and Chatzistavrou, 2009**). The percentage of this metal in the alloys varies from 8%, as in stainless steel, up to more than 50%, as in nickel-titanium alloys (**Chakravarthi et al., 2016**).



Safe and effective practice depends on identifying patients with allergy along with knowledge of materials that can potentially cause them **(Singh et al., 2019)**.

## **AIM OF THE STUDY**

This review is aimed to:

1. Recognize the materials that used in orthodontics and related to the appearance of oral and perioral allergic reactions.
2. Identify the allergic reactions of these materials and how to manage patients during orthodontic treatment.
3. Highlight alternative materials.

## CHAPTER ONE: REVIEW OF LITERATURE

### 1.1 Allergy in orthodontics

Allergy in the patients who undergo an orthodontic treatment may occur as a result of many reasons, such as latex products hypersensitivity, acrylic resin hypersensitivity, and metal hypersensitivity, etc. (**Chakravarthi *et al.*, 2012**). It is the response of the immune system against antigens which may result in tissue injury. It is a wide term utilized to explain an extreme and/or pathogenic immune response against either self-antigen or a foreign one expressed with a varying severity (**Abreo *et al.*, 2019; Dispenza, 2019**).

**Gell and Coombs (1963)** classified the hypersensitivity reaction into four types :-

- 1.1 Type I reactions (Immediate type hypersensitivity) include the liberation of histamine and other mediators from the mast cells and from the basophils. This reaction is mediated by immunoglobulin E. Like, anaphylaxis and allergic rhino conjunctivitis.
- 1.2 Type II reactions (Cytotoxic type hypersensitivity) include the binding of immunoglobulin M or immunoglobulin G antibodies to the cell surface

antigens, which followed by complement fixation, like, drug-induced hemolytic anemia.

1.3 Type III reactions (Immune-complex reactions) include the deposition of circulating antigen-antibody immune complexes in the postcapillary venules, which followed by complement fixation, like, serum sickness.

1.4 Type IV reactions (i.e., delayed type hypersensitivity or the cell-mediated immunity) are T cells mediated reactions. Like, contact dermatitis from nickel.

## **1.2 Importance of Examination for Allergy**

Given the different results of individual studies on the usefulness of performing allergy tests in diagnosing oral and perioral diseases with non-specific sensations, it is justified in the cases of unknown etiology to carry out allergy tests in order to establish possible allergies (mostly using patch tests and prick tests). Skin patch testing is a simpler procedure and preferred to mucosal testing. Other reasons for choosing skin test before mucosal are the higher specificity and sensitivity of the skin patch test and the requirement of a significantly higher concentration of allergens for mucosal testing, which often results in many adverse reactions (**McParland and Warnakulasuriya, 2012**).

It is also justified to examine the possible immediate allergic hypersensitivity, usually by prick testing (**Kelava et al., 2014**). The choice of the allergens to be tested is also important; it varies by studies, countries and number of allergens. Allergy unit prepares testing samples according to patient history and in consultation with dentists. There also are some other new methods for detecting type IV hypersensitivity to metals, which are promising but not yet

widely available, such as memory lymphocyte immunostimulation assay (**Lugović-Mihić et al., 2019**).

### **1.3 Orthodontic materials that causes allergy**

#### **1.1.1 Nickle**

Nickel alloys are widely used in the orthodontic in brackets, wires, bands and other orthodontic accessories. Nickel allergy occurs more frequently than allergy to all other metals combined (**Lowy, 1993**). It is estimated that 11% of all women and 20% of women between the ages of 16 and 35 years have a sensitivity to nickel (**Nielson and Menne, 1992**). Nickel-induced contact dermatitis is a Type IV delayed hypersensitivity immune response occurring at least 24 hours after exposure (**Al-Tawil et al. , 2019**).

**Van Loon and Van Elsas (1988)** reported that process has two interrelated, distinct phases :

- A) The sensitization phase: occurs from the moment the allergen enters the body, is recognized, and a response occurs.
- B) The elicitation phase** occurs after re-exposure to the allergen to appearance of the full clinical reaction. There may have been no symptoms at the initial exposure, but subsequent exposure leads to a more visible reaction (**Rahilly and Prince, 2003**).

It has been shown that the level of nickel in saliva and serum increases significantly after the insertion of fixed orthodontic appliances (**Agaoglu et al., 2001**). Nickel leaching from orthodontic bands, brackets, stainless steel or Ni–Ti

arch wires has been shown in vitro to occur within the first week and then decline thereafter (**Barrett et al., 1993**). It is suggested that a threshold concentration of approximately 30 ppm (Part per million of nickel may be sufficient to elicit a cytotoxic response (**Bour et al., 1994**). Scientific evidence suggests that orthodontic treatment is not associated with increase of Ni hypersensitivity, unless patients have a history of previous exposure to Ni. People with cutaneous piercing are considered a significant risk factor for Ni allergy (**Thyssen et al., 2007**). However, oral exposure to nickel through dental braces prior to ear piercing reduces the risk of developing nickel allergy (**Mortz et al., 2002**).

The percentage of nickel in the stainless steel is 8%, while in the nickel titanium the amount is more than 50%. Consequently, releasing of nickel ions from these metals can be the cause of inducing an allergic reaction (**Kolokitha and Chatzistavrou, 2009**). Elicitation of an allergic reaction to nickel depends on the conditions of nickel exposure—for example, happen concentration on the contact area, open or occluded exposure, presence of an irritant, and degree of contact allergy, the elicitation threshold varies between patients and also individually over time (**Fischer and Menne, 2005**).

#### **1.1.1.1 Clinical Features Associated with Nickel Allergy**

Clinical abnormalities, such as gingivitis, gingival hyperplasia, lip desquamation, multiform erythema, stomatitis, papula, tongue soreness, burning sensation in the mouth, metallic taste, angular cheilitis, and periodontitis, may be associated with release of nickel from orthodontic appliances (Lindsten and Kurol, 1997). These reactions are associated with an inflammatory response

induced by corrosion of orthodontic appliances and subsequent release of nickel. It is manifested as Nickel Allergic Contact Stomatitis (**Starkjaer and Menne, 1990**).

A burning sensation is the most frequent symptom. The aspect of the affected mucosa is also variable, from slight erythema to shiny lesions, with or without edema. Vesicles are rarely observed, but when they are present, they quickly rupture, forming erosion areas. In chronic cases, the affected mucosa is typically in contact with the causal agent and appears erythematous or hyper-keratotic to ulcerated (**Genelhu et al., 2005**) (Figure 1).

Also another signs and symptoms of nickel allergy response after wearing earrings or a metal watchstrap, appearance of allergy symptoms shortly after the initial insertion of orthodontic components containing Nickel and confined extra-oral rash adjacent to headgear studs should raise alarm to clinician concerning nickel allergy. (**Rahilly and Prince, 2003**).

Nickel hypersensitivity induces many extraoral signs:- lichen planus, desquamation of the labial tissue, perioral rash, contact dermatitis and eczema (**Genchi et al., 2020**) as in ( table 1).

**Table 1:** Signs and symptoms of Nickel allergy (**Salve and Khatri, 2022**)

<b>Intra-oral</b>	<b>Extra-oral</b>
Stomatitis from mild to severe erythema	Generalized urticarial
Papula peri-oral rash	Widespread eczema
Loss of metallic taste	Flare –up of allergic dermatitis
Numbness	Exacerbation of pre-existing eczema
Burning sensation	
Soreness at the side of the tongue	
Angular cheilitis	
Severe gingivitis in the absence of plaque	

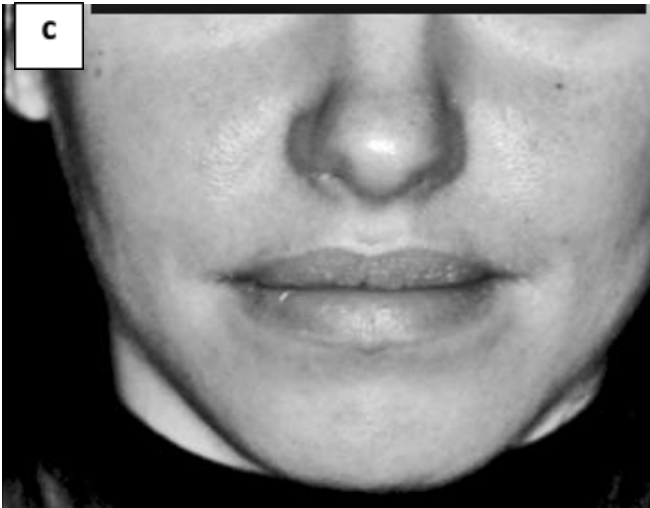
### **1.1.1.2 Diagnosis of Nickel hypersensitivity**

Making an accurate diagnosis of nickel hypersensitivity is very essential as the symptoms not always occur within the oral cavity (**Chakravarthi *et al.*, 2012**).

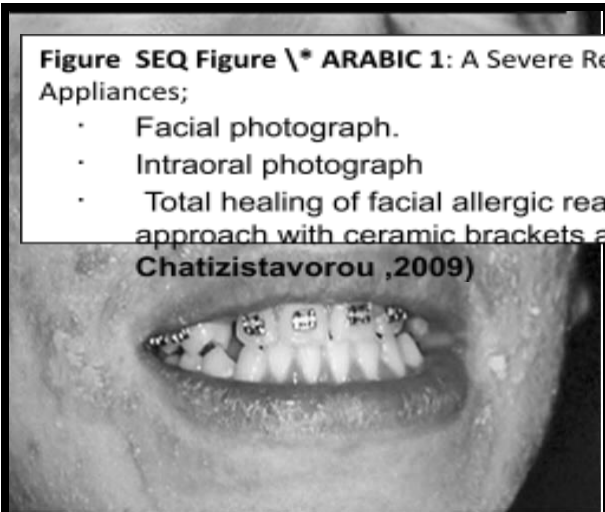
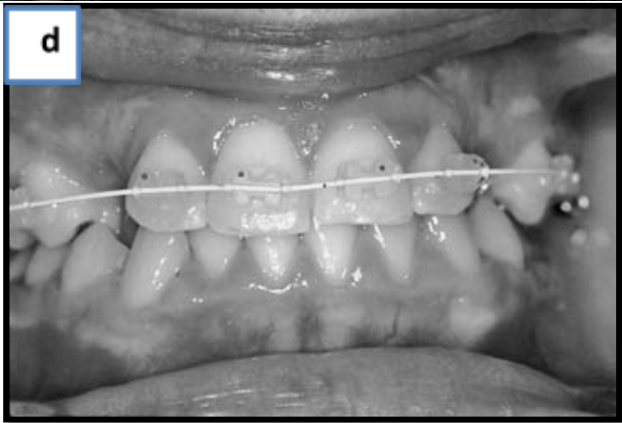
The following history may advocate a diagnosis of nickel hypersensitivity (**Rahilly and Price, 2003**):

- History of allergic reaction after using metallic watchstrap or earrings.
- History of an allergic response after the insertion of nickel containing orthodontic components.
- A history of extra-oral rash surrounding the studs of the headgear.

a



b



**Figure SEQ Figure \\* ARABIC 1: A Severe Reaction to Ni-Containing Orthodontic Appliances;**

- Facial photograph.
- Intraoral photograph
- Total healing of facial allergic reaction after using a modified treatment approach with ceramic brackets and coated archwires. **(Kolokitha and Chatzistavorou ,2009)**



### 1.1.1.3 Patch test

It is an in vivo test that utilized to discover the delayed type allergic reaction to haptens (**Spiewak, 2018**).

**Nassau and Fonacier (2020)** defined hapten as a low molecular weight antigen that can induce an immune reaction when it bind to a larger carrier, an example of hapten is the metals like nickel. Patch test include a controlled exposure of the skin of the patient (Figure 2) to the hapten for a determined duration (a standard time is two days) and then the units of the test removed and the area of exposure kept under frequent observations to see if the skin developed an inflammatory reaction, which occur after 2 days, 4-5 days and 7 days from the exposure. The substances of the patch test are attached to the skin by using chambers that loaded with hapten preparations either in vehicle of petrolatum or water. The best amount used is 20  $\mu\text{g}$  for petrolatum-based preparations and 20  $\mu\text{l}$  for aqueous solutions (**Spiewak, 2018**).The allergens are attached to the back of the patient mean while, the patient must avert taking showers, the ultraviolet irradiation, the extreme sweating, and the use of topical steroid on the area till the final reading taken (Burkemper, 2015) (table 2)

**Table 2:** Readings of patch test (**Salve and Khatri, 2022**)

	1	Absent
Negative	2	Light erythema



Figure SEQ Figure \\* ARABIC 2: patch test  
(Burkemper, 2015)

#### **1.1.1.4 Management of Nickel Allergy in orthodontic**

The management must begin at the phase of diagnosis and treatment planning. After the appliance insertion, if the patient exhibit mild signs and symptoms, the appliance must be removed, while if the reaction is sever,

medicines like antihistamines or topical corticoids must be used after the appliance removal (**Sanjeev and Dhiman, 2015**). Alternative treatment modalities should be employed to eliminate the risk of allergic reactions due to the specific allergen (**Leite and Bell 2004**). As known, the general composition of the metal components of the orthodontic appliances is 18/8 stainless steel (18% chromium and 8% nickel), leaching of these elements may induce an allergic reaction after sensitization, more commonly with nickel. However, most of the investigations have concluded that stainless steel is safe in all intraoral orthodontic components in nickel-sensitive patients, since the crystal lattice of the alloys binds the nickel, thus preventing it from reacting (**Toms 1988**). In cases where no history of nickel allergy is reported but allergic reactions do appear shortly after the attachment of fixed orthodontic appliances, treatment must be discontinued and any intra- or extraoral appliances containing nickel removed (**Eliades and Athanasiou, 2002**) (Figure 3).

After healing, treatment should resume using alternative alloys, whether they be gold, platinum, nickel-free stainless steel, or titanium-molybdenum alloys (**Kusy, 2004**).



**Table 3:** A summary of Nickel free products that used in orthodontics (**Salve and Kharti, 2022**)

<b>Nickel free brackets</b>	<b>Nickel free arch wires</b>	<b>Another Nickel free materials</b>
ceramic (produced using polycrystalline alumina)	Beta Titanium wire	Plastic coated Head gear
single-crystal sapphire	Timmolium wire	TMA expansion screw
zirconia	TMA	Nickel-‘free’ stainless steel wire for removable appliances
polycarbonate (made from plastic polymers)	Bendalloy TMA wire	Titanium buccal tubes
titanium	Beta III Titanium,	Masks without NRL

### **1.1.2 Chromium**

Chromium is an important element for the human and the animals. The human exposed to that metal from the food, water, the atmosphere, jewelries, or from using articles that contain chromium. In orthodontics, the advantage of adding chromium to the alloys is for increasing its corrosion resistant, as this metal make a protective oxide film on the alloy surface which is the chromium oxide layer. It has been found that the content of 16–27% of chromium will offer the best corrosion resistance for the nickel-based alloys (**Sfondrini *et al.*, 2009**).

#### **1.1.2.1 Signs and symptoms of Chromium Allergy:**

The leaching of chromium ions from the alloys will lead to a potential health effects, as it may induce a hypersensitive reaction, contact dermatitis, asthma, toxic effect, carcinogenic potential and mutagenic potential (**Amini *et al.*, 2019**). The prevalence of chromium hypersensitivity is approximately 3% in females and 10% in males (**Sanjeev and Dhiman, 2015**).

Chromium ranks second among the metals allergy minute quantities of chromium salts can sensitize. Chromium compounds, on the other hand, can induce contact dermatitis and even cause severe corrosive irritation of the skin, if an orthodontic patient presents with mild signs and symptoms of chromium allergy during the course of treatment, the appliances should be removed immediately (**Menezes *et al.*, 1997**).

#### **1.1.2.2 Diagnosis of chromium allergy**

Patch testing used to test the allergy from materials which have or coated with chromium (**Bregnbak *et al*,2017**).

#### **1.1.2.3 Management of the Chromium allergy:**

To prevent chromium allergy in orthodontics would be the use of Teflon coated (Tooth- colored epoxy resin) wires, Optifelix archwires, Fiber reinforced composite archwires, Beta III Titanium, CNA Beta –Titanium and TMA wires (**Toms, 1988**) Patients with more intense reactions should be treated with antihistamines, anesthetics, or topical corticoids (**Dou, 2003**).

#### **1.1.3 Latex**

Latex is frequently utilized in dentistry as it present in various items, for example latex gloves, orthodontic elastics, and the dental rubber. However, it may induce various hypersensitivity reactions, such as latex hypersensitivity of the immediate type (type I) and the hypersensitivity of the delayed type (type IV) .

The reason behind the hypersensitivity reaction is the latex proteins that have the ability to penetrate through the skin and/or the mucosa after direct contact, or after their inhalation via the respiratory system, inducing various reactions such as stomatitis, bronchospasm, or anaphylactic reaction (**Papakonstantinou and Raap, 2016**).

### **1.1.3.1 The allergic reactions of the glove`s containing latex**

There are three types of the gloves containing latex (**Ranta and Ownby, 2004**) :

- Irritant contact dermatitis: This is a non-allergic reaction resulting from a combination of chemical/mechanical irritation. Typically, it develops as dry, scaly, irritated areas on the skin, like ( Frequent handwashing ,Incomplete drying of the hands before wearing gloves.
- Allergic contact dermatitis (Type IV response) : Allergic contact dermatitis is a Type IV delayed hypersensitivity immune response, cell- mediated by T-lymphocytes to specific chemicals known as contact sensitizers. The allergens responsible for triggering a Type IV allergic response to gloves are usually not latex rubber itself but additives known as rubber accelerators: thiurams, carbaz, thioureas or mercaptos. The response is usually delayed rather than immediate, occurring hours or days after initial contact with the allergen. Allergic contact dermatitis results in hand eczema and may show: ( Blistering, weeping and fissuring) ,The mucosa may be involved in orthodontic patients wearing intra-oral elastics (figure 5) The mucosa may become erythematous or the patient may complain of a burning or itching

sensation in the affected area. A change in the brand of elastics or the use of non-latex elastics should resolve the symptoms.



**Figure 4:** Mucosa lesion after using intermaxillary elastic (**pithon et al., 2012**)

- Immediate Type I response :- This type of reaction is an IgE antibody mediated Type I response to naturally-occurring proteins in natural rubber latex and usually occurs within 5–60 minutes of contact. It produces varied symptoms, which commonly include: Swelling and redness at the site of exposure itching and burning .



The other features of latex hypersensitivity include pruritus, erythema ( Figure 6), and probably a systemic reaction (**Usatine and Riojas, 2010**). Despite the reduction in prevalence and incidence of latex hypersensitivity, but there are 4.3% of the population in the world still suffering from it (**Liberatore, 2019**)



**Figure 5: : Latex hypersensitivity (Liberatore, 2019).**

### **1.1.3.2 Diagnostic tests for Latex allergy**

There are different Diagnostic tests for Latex allergy like:

1. Skin-Prick Test :This test is used for type I latex-sensitivity diagnosis, to perform the test, a drop of latex extract is placed on the skin, and the skin is scratched with a sharp, bifurcated needle. The person is monitored for signs of an allergic reaction (Binkley et al., 2003).

2. Intradermal Test : This test is used for type I latex-sensitivity diagnosis. A needle containing latex solution is inserted into the skin. Reactions are monitored because this test generates a higher level of allergic reactions than a skin-prick test. It should be performed in a facility with emergency medical equipment available to handle an anaphylactic reaction (Kim et al., 1998). Typically, a powdered latex glove is cut into an 8- 8-cm square patch and soaked in 10 mL of extraction fluid overnight. Then it is passed through a sterile Millipore filter (Millipore Corp, Bedford, MA) and diluted to 1:10, 1:100, and 1:1000 for testing (Yunginger et al , 1994).

3. Skin-Patch Test: This test is used for irritant and contact dermatitis. A patch with immunogenic rubber chemicals is taped on the person's skin for 48 to 96 hours and then interpreted using standardized techniques (Muller et al., 1998).

### **1.1.3.3 Management of latex allergy:**

To manage the latex allergy the latex free products had been used in orthodontics (Ranta and ownby ,2004) such as:

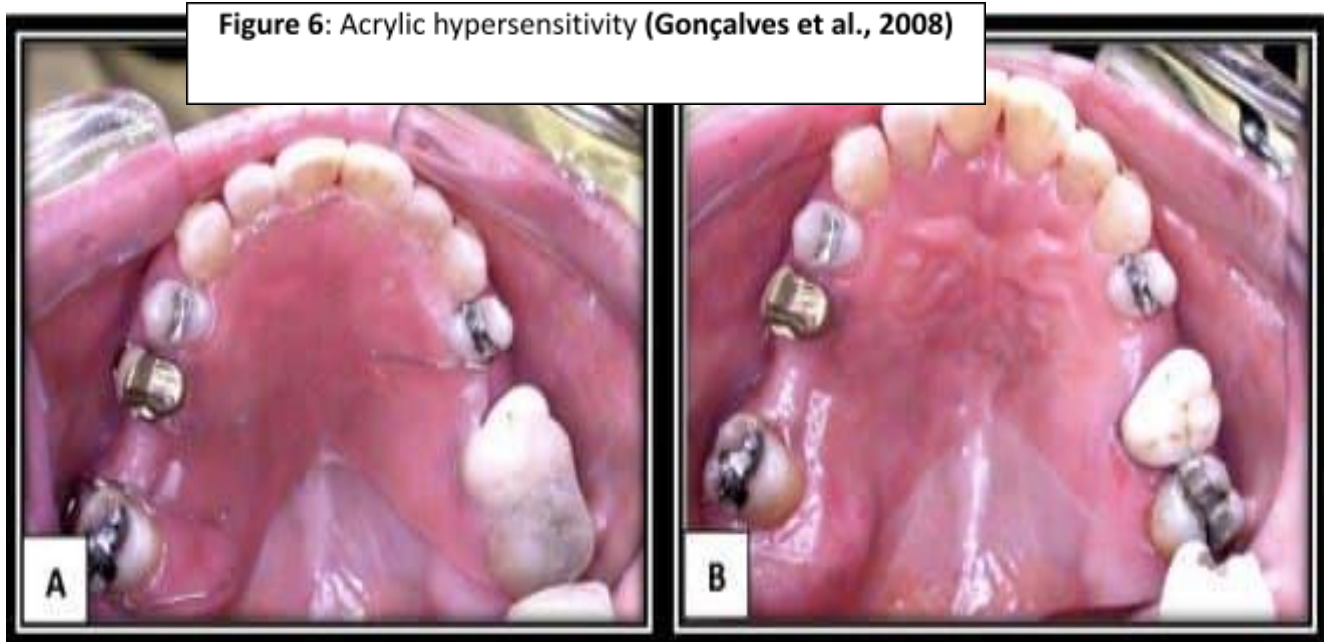
- Synthetic non-latex gloves made from nitrile, polychloroprene, elastyren and vinyl
- Latex free inter-arch elastics and intra-arch elastics are available from certain manufacturers
- Elastomeric elastics can be replaced with metal ligatures or the use of self-ligating brackets

- Elastomeric separators can be replaced with self-locking separating springs
- Manufactures can provide latex-free headgear components and latex-free band removers.

#### 1.1.4 Acrylic resin

Acrylic resin is made from a high molecular weight polymers, and its polymerization is by the addition reaction. The autopolymerized one is the most common resin used in the orthodontics, it may induce a type IV hypersensitivity reactions attributed to the elution of a toxic components from the resin **(Gonçalves et al., 2006; Gonçalves et al., 2008)**.

The material most often used for base plate is cold cure or heat cure acrylic. It forms a major part of the acrylic base plate in the removable appliances and helps in anchorage and retention of the appliance in the mouth **(Singh,2007)**. Also acrylate monomers are a key component of the acrylic baseplate **(Barber and Dhaliwal,2018)**.



These components are benzyl peroxide, plasticizers, formaldehyde, and particularly its residual monomer (methyl methacrylate monomer) which may trigger local and systemic reactions upon its leaching from the resin to the oral cavity (**Gonçalves *et al.*, 2008**), (Figure 7)

#### **1.1.4.1 Allergic reactions of the acrylic resin:**

The allergic reactions of the acrylic resin include:

- Burning mouth sensation, vesicles, redness ulcers, pain in the oral mucosa, and swelling (**Mesquita *et al.*, 2017**).
- The dental staff may also be affected because of the usual contact with the acrylic resin (**Gonçalves *et al.*, 2008**), the contact occur during the manipulation with that acrylic, or because of the vaporization of the monomer, and upon the inhalation of that vapor serious harmful effects may occur, such as the irritation of the lung tissues and the harmful effect on the central nervous system (**Rashid *et al.* 2015**).
- Lunder and Butina( 2000) reported that chronic urticaria was the only symptom of the allergic reaction and considered it the first case of isolated systemic involvement developed by acrylics.

#### **1.1.4.2 Diagnosis of the allergy of acrylic resin :**

Gonçalves (2008) reported that the hypersensitivity reaction confirmed by patch test, Generally, allergic reactions to acrylic are local manifestations, but there are different clinical presentations. **Ruiz et al ( 2003)** mentioned labial edema in a case of allergy to methylmethacrylate confirmed also by patch test.

#### **1.1.4.3 Management of the acrylic resin allergy:**

Overcoming allergic reactions in denture patients sensitized by methylmethacrylate might require, according to **(Tanoue et al, 2005)** 1 of 6 possibilities: cover the prosthesis with light polymerized methyl methacrylate, cover it with ultraviolet polymerized urethane acrylate, cover it with ultraviolet polymerized methacrylate, use a polycarbonate prosthesis, use vulcanite, or use titan associated to ceramic teeth. Instead of methacrylate resin Clear aligner can be used as a retainer to avoid the allergic reactions **(park and Shearer, 1983)**. A clear retainer (Essix retainer, thermoplastic retainer, or vacuum-formed retainer) is a removable retainer that was introduced in 1993 by Dr. John Sheridan **(Sheridan et al,1993)** as an esthetic, comfortable, and inexpensive appliance compared with conventional fixed and removable orthodontic retainers **(Lindauer and Shoff,1998)**. It is a transparent and thin but strong vacuum-formed appliance **(Chaimongkol and Suntornlohanakul, 2017)**.

Also a bonded lingual retainer can be used instead of acrylic based removable retainer **(park and Shearer, 1983)**. Fixed retainers are most commonly used in the orthodontic retention phase as they better aesthetics and no need for

patient cooperation (**Chinvipas et al,2014**). Fixed bonded retainers are generally used in two ways. First, thicker 0.032 inch wires are bonded to canines only. Although stainless steel wires are mostly preferred in this technique, **Liou et al (2001)** reported successful results for nickel–titanium wires as well. Second, retainers made of 0.0175–0.0215 inch wires are bonded to each tooth usually from canine to canine. The indications for these two techniques differ from one another (**Bearn,1995**).

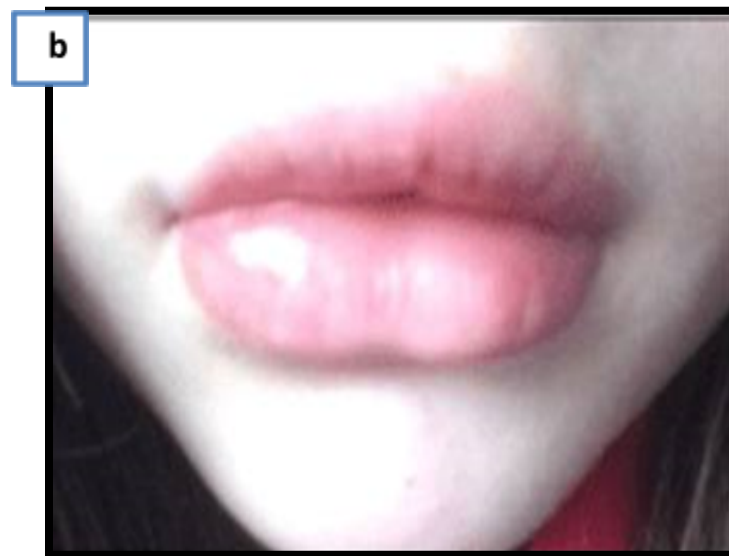
#### **1.1.5 Resin composite material :**

**Lind (1988)** showed that the resin composite materials could be an etiologic factor in the development of lichenoid reactions in the oral mucosa. The pathogenic mechanism may be related to contact allergy to formaldehyde formed in resin composite restorations. Formaldehyde causes more than one third of all allergic reactions caused by dental materials, A report by (**Oysaed et al**) indicated that formation of formaldehyde was found in light , ultraviolet light-, and chemically activated resin composites.

##### **1.1.5.1 Signs and symptoms of Resin composite allergy:**

Gingival inflammation and lip oedema (Figure 8) ,attributed to an acrylate allergy arising from the composite adhesive used with fixed appliances. There are few reports of patient reactions to orthodontic bonding materials (**Jacobsen et al.,1991**). A case of urticaria has been described in connection with bonding

materials (**Tinkelman and Tinkelman, 1979**). Also the most common presentation in dental professionals is contact dermatitis resulting from direct contact with various uncured monomers (**Aalto-Korte et al., 2007**). This can cause itching, burning, scaling and blistering confined to the areas of contact (**Prasad Hunasehally et al., 2012**). Moreover oral manifestations varied from burning, pain and dryness of the mucosa to a non-specific lichenoid reaction, stomatitis and cheilitis (**Barber and Dhaliwal,2018**).



1.1.5.2 Diagnosis of Resin composite

#### allergy :-

Inclusion of specific dental materials in the patch testing may have enabled confirmation of the constituent components that initiated the hypersensitivity reaction(**Barber and Dhaliwal,2018**).Patch testing with dental series containing the commonly used materials can be used to detect contact allergies to these dental materials (**Reap et al.,2009**). It is a standardized series of 30 materials commonly used in dentistry. Using Finn Chambers, the allergens present in the

dental series were placed and then strapped to the patient's back (**Rai et al.,2014**).

#### **1.1.5.3 Management of the Resin composite allergy:**

As alternative material the conventional chemical-cure glass-ionomer cement (GIC) adhesive can be used. Brackets were replaced with bands where heavy occlusal forces were anticipated (**Barber and Dhaliwal,2018**). Removal of all offending agents and replacement with non allergenic material may have a beneficial effect for the patient (**Rai et al.,2014**).



## CHAPTER TWO: DISCUSSION AND COMMENTS

In dentistry, the contact allergy is a type of delayed hypersensitivity reaction in which a lesion of the skin or mucosa happens at a localized after multiple contact or exposure. There could be burning sensation of tongue, inflamed and edematous mucosa that is associated by severe burning. On the hands, it begins with transient vesicles, then rupture to form erosions and ulcerations that are much painful. The characteristics of allergic manifestations are erythema, papules, and edema and weeping blisters may appear in severe cases **(Sohn and Pandain, 2019)**.

Nickel is known to be a common cause of contact allergies and hypersensitivity reactions **(Peltonen, 1979)**. While orthodontic bonding materials may have allergenic potential in man which could lead to adverse reactions in patients or occupational allergy **(Schoel et al., 1994)** Further more the acrylic resins based on methylmethacrylate can produce type IV hypersensitivity reactions. However the protein content of latex is a known allergen. Allergy caused by latex proteins, including immediate hypersensitivity reactions has been well documented and the prevalence of latex allergy **(Perrella and Gaspari, 2002)**.

Diagnosis and treatment should include a multidisciplinary team. In all instances, the patient's well-being should guide treatment decisions, and general health—not just oral health—should be the goal **(Gonçalves et al., 2006)**. A detailed history, with special attention to previous allergic reactions, is the main

prognostic factor to avoid allergic reactions during orthodontic therapy. The clinician should be mindful of these reactions during the course of orthodontic treatment, and should know to diagnose and subsequent action to be taken in treatment plan (Singh *et al.*, 2019).

## **CHAPTER THREE: CONCLUSION AND SUGGESTIONS**

### **3.1 Conclusion**

Allergic reactions are host immune responses to endogenous or exogenous antigens, which can result in local and systemic problems. Among the main allergens are the dental materials used in orthodontics, which faces some challenges with regard to biocompatibility with oral tissues is possible to conclude that reactions such as erythema, edema, papules, blisters and periodontal changes, for example gingival inflammation, are frequent manifestations of contact with orthodontic materials in patients allergic to nickel or, in some cases, chromium. Therefore, prior knowledge of the dentist is essential for the correct management and treatment of these adverse reactions.

### **3.2 Suggestions**

1. Add a question to the patient case sheet include the presence of allergies or not to any orthodontic materials ,and determine the type of these material after performing an appropriate allergy test.
2. Providing an alternative orthodontic materials in the event of an allergy to a particular orthodontic substances to be replaced during or at the beginning of treatment, if any of the symptoms of an allergic reaction appear in the patients.

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