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INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI:10.21474/IJAR01/11485
DOI URL: <http://dx.doi.org/10.21474/IJAR01/11485>



RESEARCH ARTICLE

SOFT LINER IN ELDERLY EDENTULOUS PATIENTS

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Manuscript Info

Manuscript History

Received: 05 June 2020
Final Accepted: 10 July 2020
Published: August 2020

Key words:-

Soft Denture Liner, Dental Materials,
Hardness, Color, Absorption,
Solubility, Silicone

Abstract

Soft liners had a wide range of applications in prosthetic dentistry as a result of their viscoelastic properties. They are used in special clinical situations, such as very advanced bone resorption, pronounced bone undercutting, where the hardness of conventional prostheses is unbearable for elderly edentulous patients. Their use increased also retention and minimized trauma by preventing a direct contact of hard denture base with compromised tissues. While no ideal soft material exists, the choice of type and technique should take into account the clinical conditions of the patient. The soft liner should never be used as a solution to prosthetic design errors. Limits of soft bases are mostly related to the ageing process. These include lack of adhesion to the hard base, hardness, colorability, and fungal colonization. The maintenance of a good hygiene with a correct use of different products and disinfection techniques allow the soft liners to keep their physical and mechanical properties as long as possible, and avoid their frequent renewal.

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Introduction:-

Senile atrophy makes mucosal tissues fragile and sensitive to pressure. Their repair is slower and slower and they progressively lose the possibility to be used as a support for removable prostheses. There is also a decrease in the elasticity of the mucous membrane and the disappearance of the hydraulic cushion acting as a shock absorber in the presence of external stresses, particularly prosthetic stresses. As a consequence, mucosal tissue is pinched between the prosthesis and the bone [6,10,9].

In this case, the use of removable prostheses with hard bases can cause unbearable pain for patients [13,5,6].

It may also be found, particularly for patients with very advanced resorptions in the maxillae, proximity of nerve emergencies to the prosthetic contact surface. Pressure on such areas may be intolerable for these patients. As is the case with the mandibular lower alveolar canal. When it is only covered by a thin lamina; the mental foramen then approaches the upper part of the alveolar ridge. [10,9].

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Lining the prosthesis with a soft material contribute to the patient's comfort.

Soft bases are also useful in cases of pain due to excessive bone prominences, bone exostoses, developed mandibular tori, pronounced internal oblique lines and when pre-prosthetic surgery is contraindicated.

Being elastic in character, it stretched during the insertion and the removal of prosthesis over bony prominences without traumatizing the tissues and spring back into close contact with the undercut area [3, 14,13].

Using the soft liner also facilitates patient's adaptation to the prosthesis if, despite all the care taken in the treatment and the psychophysiological integration of the prosthesis, there is a rejection of it [10].

Based on their chemical composition, soft bases are classified into acrylic resins, silicones, fluoroelastomer-based materials and ethylene vinyl acetate-based materials [9,15].

Denture liners are in direct contact with oral mucosa, which means they must be non-irritating, non-toxic, and inhibit bacterial and fungal colonization [1].

Two basic relining methods have been described in the scientific literature – direct (clinical), and indirect (laboratory) [15].

These materials are divided into two types according to the polymerization mode : Chemopolymerizable or heat-polymerizable [13,4].

The aim of this paper is to describe through a clinical case the benefits of soft bases in pain relief for edentulous patients.

Clinical case:

A 70 year old edentulous female was presented in consultation to the service of Prosthodontics with chief complaint of difficulty in chewing due to pain in the tissue underlying the mandibular prosthesis. Clinical examination showed a mandibular arch with a flat contact surface and a very thin mucous membrane (Fig 1), and poorly designed complete dentures.

Radiological examination showed very significant bone resorption with the emergence of mental orifices near the upper part of the ridge (Fig 2).



Figure 1:- Endobuccal view of the mandibular arch.



Figure 2:- Panoramic radiography showing very advanced mandibular bone resorption.

The diagnosis for this patient was pain due to compression of the inferior alveolar nerve following significant resorption of mandibular arch.

After discussion of different possible therapeutic solutions with the patient, the therapeutic decision was realization of new complete dentures using the conventional technique and relining the mandibular prosthesis with the permanent silicone soft liner applying direct technique.

The tissue preconditioning was performed with the delay resin using the patient's old mandibular prosthesis (Fig 3).

Tissue conditioner materials are temporary soft lining materials. They helped to reduce patient's pain and to improve the health of soft tissues prior to fabrication of new denture.

The primary impression was taken with alginate (Fig 4). The final impression was made with a custom tray using the polyether material (Fig 5).



Figure 3 :- Mandibular prosthesis loaded with tissue conditioning material



Figure 4:- Alginate primary impression.



Figure 5 :- Final impression with polyether.

After polymerization of the prostheses, the mandibular denture was milled 1 to 3 mm in depth using metal milling cutter to provide enough space for the new material.

The Silicone adhesive was applied within the time specified in the manufacturer's instructions to ensure good bond with the hard acrylic base (Fig. 6 and 7).

The soft liner was applied using the mixing gun (Fig. 8).



Figure 6:- Silicone adhesive applied to the intaglio surface of mandibular denture.



Figure 7:- View of the mandibular prosthesis after adhesive application.



Figure 8:- Soft liner was applied using the mixing gun.

The charged prosthesis was inserted into patient's mouth. She was in maximum intercuspidual occlusion during the whole plastic phase.

The hardening phase was reached by self-curing after about 5 min. The excess was then removed with a scalpel and the prosthesis was finished. The finishing varnish was applied at the end (Fig.9). The patient's pain was relieved after insertion of the prosthesis (Fig.10).



Figure 9 :- Definitive polished mandibular denture



Figure 10 :- Patient satisfaction after one month of wearing the new prosthesis

Discussion:-

Soft liners can be short term (Tissue conditioners) or long term soft liners. Long-term soft liners can remain usable in the oral cavity for at least four weeks; however, they can be used in practice for months or even years [3,14].

In specific and painful clinical situations that are difficult to treat with conventional prostheses, the soft bases, due to their viscoelasticity and their ability to absorb stress and also to their equal distribution of a load during function, increase patient's comfort and eliminate pain [6, 13].

However, the use of soft bases should not be an easy solution as there is no ideal soft material [9].

A multitude of different incidents can be observed during the ageing of the soft liner, loss of mechanical properties specifically viscoelasticity and flexibility, dimensional variations and water absorption, changes in taste and color, loss of adhesion between the soft and hard base, fungal and bacterial colonisation, cracks and surface hardening [6].

All these incidents do not occur systematically on all types of soft bases; however they are the main causes of materials renewal.

Lack of adhesion to the hard base is one of the principal causes of failure of treatment with soft liner. That is why it is recommended to use a binding agent to the PMMA (polymethyl methacrylate) base. If the bonding is chemical, it is better. Mechanical bonding is less secure, even when using adhesives [9,12].

It has been reported that the treatment of a denture-based acrylic resin surface with chemicals (acetone, methyl methacrylate, methylene chloride) prior to the application of adhesive, increased bonding strength when using silicone as a soft liner [12].

The fungal colonization is also a problematic issue with soft lining materials.

The conditions under the base of the prosthesis are the main cause of the growth of microorganisms. High humidity and temperature, as well as the inaccessibility of self-cleaning by saliva, and also changes in the surface conditions of material that produce a roughness with many small cracks, create a favourable environment for the growth of bacteria and fungi [3,12,2].

Because of the surface condition of soft materials, their chemical nature and their porosity, they require strict hygiene and regular maintenance; otherwise, the soft base will deteriorate due to premature ageing. Plasticized resins behave less well than silicones. Rigorous use is essential to guarantee the durability of these products [9].

Poorer hygiene can be due to disability, but is more often caused by carelessness. It is a contraindication to the use of soft bases [10].

The elderly person's ability to learn hygiene instructions is affected by age.

It is necessary to establish adequate hygiene, maintain and monitor it, motivate the patient, and to train and empower his entourage and the nursing staff.

For oral hygiene:

The patient brushes the supporting surfaces daily with a soft brush. Once a week, this brushing is completed with a mouthwash based on chlorhexidine gluconate diluted at 0.2%. It is important not to increase the frequency of these mouthwashes as they may disturb the oral bacterial flora.

For prosthetic hygiene:

The patient should clean his prostheses twice a day with a very soft surgical toothbrush with simply soapy water, or with water and toothpaste. Mechanical cleaning is preferable to the use of detergent solutions that are too aggressive and poorly tolerated by the material. As for the oral cavity the patient should avoid daily disinfection with a solution containing chlorhexidine [10].

The patient must respect the control sessions during where the dentist proceeds to the manual cleaning of the prostheses with a special brush and curettes or an ultrasonic insert. In Addition, he will immerse it a few minutes in an ultrasonic cleaner with a power of at least 100 WATTS.

Afterwards, a bezalkonium chloride solution is used to disinfect the prosthesis [10].

The chemical cleaning is the first and most important step to avoid damaging the liner. Immersion impacts malleability, ductility, and resistance to traction.

More than one method is used to remove contaminants from liners, but it is important to evaluate their effects on the surface because cleaning solutions can infiltrate the resin and change its morphology. In addition, immersion time and concentration can affect the structure of the polymer [8].

Baysan et al reported 3 soft base disinfection techniques. Using a dilute sodium hypochlorite solution to disinfect the silicone material proved to be a more effective method than exposure to microwave energy, which in turn was more effective than leaving the lining dry overnight [2].

It could also be noted that disinfection by microwave energy and different chemical solutions modified the hardness values of the silicone but had no effect on the resin. Nevertheless, more disinfection cycles could lead to hardening of the material [3].

The hardness of lining materials is affected by the frequency of use of cleaners, temperature fluctuations and changes in pH in the oral cavity [8].

Hardness has a direct relationship with the viscoelastic properties that are responsible for the distribution and absorption of stresses generated during clinical function. The higher the hardness value, the lower the ability of the material to absorb the impact of mastication.

Adhesion defects, rough surfaces and changes in hardness are factors that promote microbial accumulation and compromise the durability of the liner [8].

The aging of all material affected the cushioning effect [7].

The long-term soft denture lining materials maintain their softness for more than 30 days and can be used for up to one year, while short-term lining materials are recommended for use up to 30 days [8].

According to several authors, silicone liners are mechanically superior and more durable than resin liners [3,8].

The plastified resins present optimum qualities only for a period of 5 to 6 months; their use must therefore be limited to a maximum of six months [6]. The majority of soft bases can not be used for more than 3 years. [9].

Conclusion:-

While the indications of soft bases are relatively limited, they represent the only therapeutic outcome in a number of cases in elderly people with very advanced bone resorptions.

The ideal material does not exist. An acrylic material which has a chemical nature close to that of the rigid base will have excellent adhesion to the prosthesis, but it will be, by its components and the degree of hydrophilicity, colonizable by bacteria and yeasts. On the other hand, a silicone material will be denser, less porous, but due to its nature will have a poorer adhesion to the rigid resin. Failure of adhesion between the prosthesis and the soft liner compromises the durability of the treatment and promotes microbial colonization.

The selection of the liner should be based on the objective of the procedure, considering the ease of use and the expected results.

The patient must be informed of the importance of the control visits and the maintenance of good oral hygiene in order to guarantee the durability of the results obtained and to overcome the problem posed by the ageing of the material.

Conflicts of Interest:

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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