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Review Article

A literature review on various luting cements used in dentistry

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ABSTRACT

The success rate of the given fixed partial denture and the longevity of the fixed partial denture is depend on the tooth preparation and the usage of the luting cement under the fixed partial denture prosthesis. Luting cement plays an important role in maintaining or securing the fixed partial denture prosthesis in the cemented position. Luting cement should be bio compatible, it should be non-irritating to the underlying tooth structure and non-irritating to the pulp, it should maintain the adequate marginal seal. In recent days so many newer luting cements has been introduced in to the dentistry, that are claiming for good as well as better clinical performance from the existing cements in the terms of improved and better characteristic properties. The different cements which can be used as luting cements are glass ionomer cements, zinc phosphate, zinc poly carboxylate, zinc oxide eugenol, newer cements like resin modified glass ionomer cements, compomers and resin cements.

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1. Introduction

The prime most goal in giving the fixed partial denture prosthesis to the patient is to provide the longevity to the prosthesis and to maintain the vitality of the pulp of the natural teeth that has been used a natural abutments. A luting cement can be defined as a dental cement which is used to attach the indirect restoration to the prepared teeth is known as the luting cement. The prime most function of the luting cement is to fill the void or the space which is present at the restoration and the tooth interface region and ultimately helps in maintain or holding the fixed dental prosthesis at the particular point and helps in preventing the dislodgement of

the fixed dental prosthesis during the process of mastication. Depending on the type of the restoration i.e. whether the restoration is permanent restoration or the provisional restoration, luting cement can be considered in the two patterns, one is the definitive luting cement, used for long term (cement used for the permanent restoration) and the second one is the provisional luting cement, the cement which is used for the short term (cement used for temporary restorations).¹⁻⁵

2. Basic Requirements for the Luting Cements

The ideal luting cement which is used for the luting purpose (either permanent reatoration or provision al restoration) must meet the basic mechanical properties, basic biological

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properties and the basic handling properties. Such as

1. The luting cement should be or must be bio compatible to the underlying tooth, it should not irritate the underlying tooth in any manner.
2. The luting cement should not irritate the soft tissue around the prepared tooth, it must be bio compatible to the soft tissue.
3. The luting cement should have sufficient working time to work with.
4. The luting cement should have adequate flow.
5. The luting cement should have adequate compressive strength.
6. The luting cement should have no or minimal micro leakage around the margins of the given fixed dental prosthesis.
7. The luting cement should possess the characteristic property of low solubility in to the oral fluids.
8. The luting cement should be adhesive in nature.
9. The luting cement should possess the basic characteristic of esthetics.
10. The luting cement should be easy available in the market.
11. The luting cement should be cost friendly i.e. it should be economical.
12. The luting cement should possess the characteristic property of ease of removal of the excess material.

Literature also stated that till date no such single material is present in the market that follows or satisfies all the above requirements of the luting cement. So selection of the luting cement is totally dependent on the need of the each individual patient and the clinician should have a thorough knowledge of all the available cements, that can be best used for the specific patient for the luting purpose.^{6,7}

3. Different classification of the Luting Cements, According to the Different Authors are as Follows

3.1.

3.1.1. According to the craig (chief ingredient)

Zinc phosphate

Zinc silico phosphate

Zinc oxide eugenol

Zinc polyacrylate

Glass ionomer cement

Resin cement

3.2. Based on the matrix bond type, luting cement can be classified as follows

Phosphate cements

Phenolate cements

Polycarboxylate cements

Resin cements

Resin modified glass ionomer cements.

4. According to Donovan (Based on Knowledge and Experienced of Use of Cement)

4.1. Conventional cement

Which includes zinc phosphate cement, zinc poly carboxylate cement, glass ionomer cement.

4.2. Contemporary cement

It includes resin modified glass ionomer cement.

5. Luting Cement Classified According to Willson, which is Based on Principal Setting Reaction

Acid base cements

Polymerization cements.

5.1. Zinc phosphate cement

One of the most commonly used luting cement and is one of the oldest luting cement used in dentistry. Zinc phosphate cement has been used from a long time because of the various advantages like, it possesses very high early strength, because of this advantage, this cement can be used in the cementation of prefabricated crowns or for the cementation of cast metal post core. This cement is considered as the standard cement to which the other cements can be compared. Zinc phosphate cement is set by acid base reaction and the properties of the cement are subjected to variables like powder liquid ratio, mixing temperature. It is an inexpensive cement having low tensile strength and high compressive strength. It is the cement of choice for cementing long span fixed dental prosthesis or long span bridges. It does not bond to the tooth structure chemically. Mixing time of the cement is 60 to 90 seconds and powder. Is mixed into the liquid in small increments and is spread over the broad area that's how allowing maximum powder incorporation and keeping the viscosity of the mix low. The initial setting reaction occurs after five to nine minutes after mixing. Literature also stated that zinc phosphate is very soluble in the initial setting stage.⁵⁻¹²

5.2. Zinc poly carboxylate cement

This cement was developed in the year of 1968 by De smith. This cement was widely recommended as it adhered mechanically to the tooth structure. The mixing time of the cement is in between 30 to 60 seconds. Viscosity of the cement is inversely proportional to the rate of the mixing. Setting time of the cement is seven minutes. It is very compatible to the pulpal tissue as it is having low pH values. It is having high tensile strength as compared to the zinc phosphate cement and having low early compressive strength. This cement is mostly used in short span fixed bridges as it has the capacity to undergo plastic deformation under masticatory forces.⁴⁻¹³

5.3. Zinc oxide eugenol cement

It falls under the category of provisional luting cements. The working time of the cement is reduced when it is exposed to the water. It is used in luting temporary bridges as it is having poor physical properties, but on the other hand it is having good sealing ability.^{3–13}

5.4. Glass ionomer cement

It is also known as aluminosilicatepolyacrylic acid and was introduced by Wilson and kent in the year of 1969. It has many advantages like, it is easy to mix, having good flow rate, having good adhesion to tooth structure as well as good adhesion to the base metals, this cement is having an exceptional property of fluoride release which makes it different from the other cements, it is having the characteristic property of good esthetics, adequate strength along with relative low cost of the cement. This cement can be used in the cementation of the long span fixed dental prosthesis. The one disadvantage of the cement is micro cracking of the cement can occur if it becomes extensively dry.¹

5.5. Resin modified glass ionomer cement

It is a hybrid material which is derived by adding polymerizable resin material in to the conventional glass ionomer cement. Resin modifies glass ionomer cement having modified properties than glass ionomer cement as, it is less soluble in the oral cavity, bears good strength, less susceptible to early erosion, and it also bears high compressive and tear strength, it is having similar film thickness and adhesion property to the tooth structure as conventional glass ionomer cement is having.^{2–12}

6. Compomers

Also known as poly acid modified composite resins, basically it is a combination of composite resin and glass ionomer cement. The physical properties that offering by the compomers are mostly like composite resins. These compomers shows high compressive strength as well as high flexural strength when compared to resin modified glass ionomer cement, but less than the conventional composite, the property of fluoride release is present, but it is less than the conventional and resin modified glass ionomer cement. These compomers can be used in the cementation of the long as well as short span fixed partial denture bridges.^{8–11}

6.1. Resin cements

In today world resin cements has been used widely because of the advantages like good marginal seal, good compressive strength as well as good tear strength, they also possesses less oral solubility and bears good esthetic properties. resin

cement can be used in the cementation of long span as well as short span fixed dental prosthesis, they can be used in the cementation of all ceramic crowns, all ceramic bridges, metal porcelain crowns, in all the cases where retention are compromised. Resin cements can be cured by three different mechanism as they can be self-cure, they can be light cure, they can be dual cure resin cement.^{5–12}

7. Conclusion

To improve the longevity of the fixed dental prosthesis, proper knowledge of all the luting cements are required. Selection of luting cement is totally dependent on the type of the prosthesis, depend on the span of the fixed dental prosthesis. And the cement should be selected which provides good esthetics to the prosthesis, provide good marginal seal to the fixed dental prosthesis, should aid in retention of the prosthesis and should or must prevent the dislodgement of the prosthesis under masticatory forces.

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9. Conflict of Interest

None declared.

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