
Alternatives to Alginate Impression Materials

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Abstract: Introduction: The review is about alternatives to alginate impression material. It is an irreversible hydrocolloid used to study cast and fabricate models for intraoral appliances and is commonly used impression material. It is effective but hydrophilic which makes it difficult. Alginate impression materials produces an imprint which provides all the details which has good accuracy and undercut is also recorded. It is a most commonly used material in daily practice. The applications of alginates includes thickeners and stabilizers in the food, pharmaceutical and cosmetic industries. It is well tolerated by patients and accounts for the primary prosthetic, orthodontic and dental imprints.

Method: Articles were collected from search engines like PubMed, Google scholar, Medline etc

Keywords: Alternatives; Alginate; Impression material; Dust free

INTRODUCTION

Hydrocolloids are the first elastic materials which are used in dentistry. The impression materials could be broadly classified into reversible and irreversible hydrocolloids. Alginate impression materials is an irreversible hydrocolloid impression material. It is available in powder form which is mixed with water in proper proportions. After mixing, it turns into a soft paste which is placed on a tray and placed into the oral cavity to record all details of the oral cavity. The major limitation with irreversible hydrocolloid is that once it sets, it becomes hard and cannot revert back to its original state. Alginates differ from other forms of alginates based on the quality and purpose of the material. The reaction and setting time of alginates can be controlled by physical factors like temperature and amount of water used. Some water supplies which have a high amount of mineral content affects the accuracy and setting reaction of alginate. To avoid this, distilled water can be used. Cold water mostly tends to increase the working time. Mixing must be quick and done in a wide motion to obtain a creamy soft mixture of the alginate material. The alginate impression material must be washed with a jet of water and it has to be disinfected and dried. It must be stored in a plastic bag until a model is made.

The advantages of using alginate impression materials includes ease of manipulation, available at low cost, simple instrumentation and detailed impression is obtained. It endures numerous pours necessary and dispensed in double barrel mixing and foil bag magnums which is used to make anatomic models crown procedures study models. PVS does not require immediate for and recast if needed to make models. Pentamidine 2, Silginat, Xantasil, CDA, AlgiNot are the alternatives used for alginate. (Willms, Washington and Sheridan, 2012). The quality of the dental impression is a prime issue for enhancing the fit and comfort of complete and removable partial dentures (Jyothi et al., 2017).

Aim of the study is to assess the alternative to alginate impression materials. As a staple for this many years and have certain drawbacks like dimensional stability and repetitive hand mixing also hence can be overcome by use of alternatives ('INSIDE STORY', 2019). Microbial contamination may occur in dentures (Selvan and Ganapathy, 2016). Alginate is used to study cast and also for the fabrication of intraoral applications (Skinner and Carlisle, 1956). Ceramics have been extensively used in dentistry because of their good aesthetic and biocompatible properties (Ranganathan, Ganapathy and Jain, 2017). The most common impression material to fabricate crown and bridges (Website, no date a). Alginates can be used to fabricate preliminary impressions for crown restorations (Ashok and Suvitha, 2016).

Stability of alginate are affected by the reaction of syneresis and fibre cross linking which causes contraction and exudation of water. If poured once it is hydrophilic so causes hydrophilicity. It leads to problems with disinfection in various combinations with a multitude of alginates (Taylor, Wright and Maryan, 2002). Natural derivatives can also be used in future studies (Subasree, Murthykumar and Dhanraj, 2016). A study has shown

that impression materials are used as final impression materials and chamfer finish line is given in the preparation margins (Sorrentino et al., 2009). It also has applications in implant and can be used to make impression before and after the implant placement (Ganapathy, Kannan and Venugopalan, 2017). The most popular form of alginate powder mixed with water. It is supplied with a reaction indicator which changes the colour of the impression material when it is set (Ratnaweera et al., 2003). Alginates are also used to record impression before the placement of gingival cords (Kannan and Venugopalan, 2018). The usage of disinfectant sprays research in air bubbles in the cast (Website, no date b). It is used to maintain a good overall oral hygiene (Basha, Ganapathy and Venugopalan, 2018). Irreversible hydrocolloid is wrapped in a damp paper towel and then delivered to the laboratories (Website, no date c). It is used in the fabrication of lip bumpers (Ashok et al., 2014).

The previous literature done has emphasized on the alternative like Xantasil and others. It is a recently awarded the cost effective alternative to alginate. It is high quality material with good accuracy and simple to use also it relieves stress and time for 10 to 15 minutes. It is cost efficient and saves money and is 5 percent of practice overhead. It can be used to study models and registration of dentition and bleaching trace and also preliminary impression. The best quality is the delivery system which also has a precise ratio of components which helps the clinician to mix to clean up the mess. The evolution of Xantasil alginate is no longer preferred. The lacunae found out in my study is that it emphasizes on all the advantages of the alternative impression material which would be a great preferred choice of clinicians. Hence clinicians come to know about the product well and incorporate it into their practice. This research is needed to explain advantages of the alternative materials and enumerate on the positive aspects of alternatives efficiently which makes them work comfortably and is time conservative with reasonable cost. It also reduces the clinicians work and does not require a mix since it would be easily acceptable because of this advantage. It would not be a preferred impression material anymore and nobody would prefer to sit and work with the mixing of the material and then clean up the mess created as it is time consuming. Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Deogade, Gupta and Ariga, 2018; Ezhilarasan, 2018; Ezhilarasan, Sokal and Najimi, 2018; Jeevanandan and Govindaraju, 2018; J et al., 2018; Menon et al., 2018; Prabakar et al., 2018; Rajeshkumar et al., 2018, 2019; Vishnu Prasad et al., 2018; Wahab et al., 2018; Dua et al., 2019; Duraisamy et al., 2019; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Gheena and Ezhilarasan, 2019; Malli Sureshbabu et al., 2019; Mehta et al., 2019; Panchal, Jeevanandan and Subramanian, 2019; Rajendran et al., 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Sharma et al., 2019; Varghese, Ramesh and Veeraiyan, 2019; Gomathi et al., 2020; Samuel, Acharya and Rao, 2020)

MATERIALS AND METHODS

The study design and the article is a review and hence 30 articles were reviewed in search engines like permit Google scholar. It has a Publication period between January to February 2009 and December 2019. It is a five step process in the selection of articles which include the article selection, data extraction, and charting, finally analysis and report. Recent similar article with recent publications is chosen.

RESULTS & DISCUSSION

Extended pour alginates

Alginate should be poured immediately within 15 minutes at room temperature. Cavex colour change is extended for use under specific conditions (Walker et al., 2010). Extended A Pour - Van R preserves the impression upto 4 weeks (Wadhwa et al., 2013).

Colour changing alginates

Conventional alginate are simply modified by the addition of pH indicators. During gelation the pH indicators show a colour change (Goodkind and Schulte, 1970). To overcome the pH gelation makes a combination of organic and inorganic compounds which are incorporated with PH indicators (Website, no date d).

Infection free alginates

Disinfection of alginate is done by emulsion and spray technique. Manufacturers incorporate disinfectant during manufacturing such as quaternary ammonium compounds and the chlorhexidine. Epimax is the highest disinfection which lasts for 10 minutes (McKinnon and White, 1987).

Dust free alginate

Conventional alginate contains silica as a filler material which causes silicosis. As it is coated with a de dusting agent like glycerine and glycerol (Crabill, 1953). Sepiolite is a natural fibre which has 20% magnesium silicate added to it as a substitute (Lee et al., 1995). Tetrafluoroethylene traps alternate and forms a web structure (Cervino, 2020).

Mixing device

Rotatable bowl with one or more nozzles above with injecting water. It consists of a dual chamber in which the first chamber has pre measured water and the second chamber with pre measured alginate(Frey, Lu and Powers, 2005).

Use of alginate waste

Alginate is mixed with silica and calcium salt to form calcium silicate. Pre fired alginate and Gypsum 1200 degree celsius forms a porous structure which is calcium silicate. Calcium silicate is mixed with phosphoric acid and deposits as brushite(Jow et al., 2007).

Clinical examples

Silignat is used to fabricate pre-operative models of temporary crowns and bridges. It is easy to remove and it is rigid, accurate, flexible and a bubble free mix is obtained. Xantasil is cost effective and high quality material with good accuracy. It is used to study models and registration of dentition. The best quality is the delivery system(Washizawa et al., 2012).

Alternative to traditional alginate impression materials. Conventional as it has alginic acid that reacts with calcium salts to form calcium alginate. Formation of gel structure makes up the impression material.Xantasil makes an impression within 10 to 15 minutes which is less time consuming. Silica dust is a major problem with traditional alternatives which causes silicosis and toxicity of cadmium full stop to avoid this alternative are coated with de dusting agents([No title], no date a; Kannan and Venugopalan, 2018). Alginate impression materials can be used to take preliminary impressions in silicone facial prosthetic patients(Venugopalan et al., 2014)(Ganapathy et al., 2016).And also for an edentulous patient of aesthetic concerns in maxillary anterior teeth(Arigo et al., 2018).The alternatives are available in double faced form which gives the clinician a convenient mix([No title], no date b; Basha, Ganapathy and Venugopalan, 2018)(Duraisamy et al., 2019).The impression materials may also cause allergic reactions in some people(Vijayalakshmi and Ganapathy, 2016).Traditional alginate has good dimensional stability and poor strength. But then Xantasil has overcome this due to its high accuracy. The use of these alternate materials for cement and screw retained implant restorations can be explored in future (Ajay et al., 2017).Our institution is passionate about high quality evidence based research and has excelled in various fields ((Pc, Marimuthu and Devadoss, 2018; Ramesh et al., 2018; Vijayashree Priyadharsini, Smiline Girija and Paramasivam, 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai et al., 2019; Sridharan et al., 2019; Vijayashree Priyadharsini, 2019; Chandrasekar et al., 2020; Mathew et al., 2020; R et al., 2020; Samuel, 2021)

Limitations

Alginate impression material cannot be electroplated. It has poor strength and poor dimensional stability and easy shrinkage. It has improper and delete mixing due to lack of bond formation. It has to be immediately poured and the case of delay pour causes distortion. This article has highlighted only specific or two three alternative impression materials

CONCLUSION

Newer alternative options have several advantages which can combat traditional alginate materials. Xantasil allows multiple pours and the accuracy is maintained. It is a self mix which results in a homogenous and void free impression. The impressions made are easy to trim and remove. AlgiNot is cost effective and reliable. It increases the patient's comfort and is a high accuracy material. With the help of this article, it can be concluded that alternative impression materials of alginates serve to be extremely helpful in clinical practise as it has high accuracy, patient and clinician comfort. The main advantage to a clinician will be pour free, and easy handling of the material.

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