Original Research Paper

University J Dent Scie 2021; Vol. 7, Issue 1

Comparative evaluation of Cention N and Amalgam in Class II posterior restorations.

Abstract:

Aim of the study: To compare the clinical performance of Amalgam with Cention N in Class II cavities.

Methodology : After ethical approval, fifty patients were selected as per the inclusion and exclusion criteria and Class II cavities were prepared and divided into two groups by simple randomization. In one group the cavities were restored with Amalgam using standard protocols and in the second group the cavities were restored with Cention N. At 1 week, 3 months and 6 months the restorations were evaluated for parameters specified by modified USPHS Criteria for dental restorations.

Conclusion: The study showed that there was no significant difference in the performance of both the materials in the given time frame. It can therefore be concluded that Cention N can be used as an alternate to Amalgam in Class II posterior restorations

Keywords: Cention N, Class II cavity, Amalgam

Introduction:

Dental Amalgam has been used and viewed as a versatile material for restorations for more than 165 years (Rathore 2012)[1]. Studies have shown that ninety percent teeth restored with Amalgam restorations are functional after approximately 10 years and this is attributed to its self sealing ability(Anusavice 2003)[2]. But recently the popularity of Amalgam has declined due to concerns regarding esthetics and mercury toxicity.

However, current concerns over mercury toxicity are more related to its environmental hazards and less to the patient safety concerns. Dentists have long sought a material which can replace Amalgam as a bulk fill restorative material (Todd 2016)[3]. Cention N is a relatively recently introduced material offering the advantages of both amalgam and other tooth colored restorative materials. It is a resin based, self curing powder liquid restorative material and belongs to a group of alkasites which have been developed as an alternative to Amalgam. It has an optional light curing mechanism also.

Alkasite refers to a group which like compomer is a sub group of composite material class (Desai and Das 2012)[8]. It can be used with or without etching the tooth surface and is recommended for restoring deciduos teeth and permanent Class I, Class II and Class V cavities. The null hypothesis is stated that there is no difference in the clinical performance of Amalgam and Cention N in Class II posterior restorations over a time frame of 6 months using modified USPHS Criteria

Methodology:

Prior permission was taken by the institutional ethics committee and then the study was carried out in the Department of Conservative Dentistry and Endodontics, HPGDC, Shimla.

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Received : 31 Jan. 2021, **Published :** 30 April 2021

How to cite this article: Minocha, A., Sharma , V., Gupta, A., & Sharma, N. (2021). Comparative evaluation of Cention N and Amalgam in Class II posterior restorations . UNIVERSITY JOURNAL OF DENTAL SCIENCES, 7(1). 58 - 61

Access this article online	
Website: www.ujds.in	Quick Response Code
DOI: https://doi.org/10.21276/ujds.2021.7.1.11	

After calculating the sample size and compensation of 20% dropout, a total of fifty patients aged 16-50 years requiring minimum two Class II Restorations and willing to participate in the study were included in the study. After taking informed consent from the patient a diagnostic radiograph was taken to ascertain the suitability of the tooth for the study.

Exclusion criteria were patients with pathologic pulpal diseases, painful tooth, patients with chronic periodontitis, patients with bruxism and poor oral hygiene.

Two groups were made and teeth were assigned either of the two groups by simple random sampling method with each patient having one tooth each from both the groups.

Group I: The teeth were anaesthetised and then isolated and Class II cavities were prepared according to accepted standard protocols using an air rotor handpiece under air water spray. Deep caries was managed by CaOH liner and pulp protection was attained using a base of Zinc Phosphate cement followed by Amalgam restoration.

Group II: The teeth were anaesthetised and then isolated and Class II cavities were prepared according to accepted standard protocols using an air rotor handpiece under air water spray. Deep caries was managed by CaOH liner followed by restoration with Cention N

The patients were given instructions and were recalled after 1 week, 3 months and 6 months. They were evaluated using the Ryge or modified USPHS Criteria for dental restorations. The restorations were analysed for seven criteria which are Retention/ gross fracture, Marginal integrity, Anatomic contour, Color match, Marginal Discoloration, Secondary caries and Post operative sensitivity. The criteria were evaluated by visual inspection and by the use of an explorer. The data was the collected and statistically analysed by SPSS Software 18.00

Results:

Fifty patients were treated with two restorations, one restored with Amalgam and one restored with Cention N. The restorations were evaluated for seven criteria of modified USPHS criteria for dental restorations. The follow up was done at 1 week, 3 months and 6 months respectively. At 1week all the patients were available for evaluation but at 3 months 7 patients did not turn up for the follow up appointment.

Silver Amalgam: All restorations gave Alpha scores (best) for all the criteria except color match for which all the restorations gave Charlie (worst) score at 1 week, 3 months and 6 months.

Cention N: All the restorations gave Alpha scores for all the criteria at 1 week. At 3 months and 6 months 2 patients gave Bravo scores for color match while rest of the patients gave alpha scores

The p value was not relevant as both the materials showed constant values over a period of time. And so there was no statistically significant difference at the end of 6 months of the study.

The present study showed no statistically significant difference between Cention N and Amalgam for all the criteria in Class II posterior restorations at the end of 1 week, 3 months and 6 months.

Fig. shows restorations that were evaluated and color match was found to have Bravo score.

Discussion:

Amalgam has been the most widely used dental restorative material for ages and still continues to be so, as there is no alternative material available which has proved as good as amalgam for posterior restorations.

It has many properties like low cost, less technique sensitivity, self sealing and longevity that makes it an ideal material for posterior restorations. Its major drawback has been its color which is unesthethic and unpleasing to the patients. Along the course of time concerns are being raised on the use of mercury and its toxicity. The exposure to mercury mainly occurs during its placement into the cavity or its removal from the cavity. Once dental amalgam sets the amount of mercury leaching out is below the current standards of concern. (Bharti et.al. 2010)[4]

UNEP (United Nations Environment Programme) in a Minamata Convention agreed to phase out the use of amalgam. The need for a newer material led to the search of various materials like glass ionomer cement, composite restorations(Rathore2012)[1]. etc.

Composite materials have gained a lot of popularity in the past few years. Posterior composites and variations in them like use of nanoparticles and fibres have increased their use for posterior restorations. But composites have certain disadvantages like polymerization shrinkage, post operative sensitivity, technique sensitivity, discoloration with time etc.

Cention N is a recently introduced material offering the advantages of both amalgam and other tooth colored restorative materials. It is a resin based, self curing powder liquid restorative material, belonging to a group of alkasites which have been developed as an alternative to amalgam. It also has an optional light curing formulation.

Alkasite refers to a group which like compomer is a sub group of composite material.(Desai and Das 2012)[8].Cention N powder consists of barium aluminium silicate glass, ytterbium trifluoride and calcium fluoro silicate glass. Liquid consists of four different dimethaacrylates monomers and initiators. UDMA is the main component, it is hydrophobic and exhibits low water absorption (Biswas etal 2018)[7]. It exhibits moderate viscosity and yields strong mechanical properties. It also includes special patented filler (Isofiller) which acts as a shrinkage stress reliever minimizing the shrinkage force whereas the organic/ inorganic ratio as well as the monomer composition of the material is responsible for the low volumetric shrinkage. When the material polymerizes in either of the modes the monomer chains located on the filler together with the silanes begin a cross linking process and forces between the individual fillers come into play which place stress on the cavity walls. This stress is influenced by both volumetric shrinkage and the modulus of elasticity of the material. The silanes bonded to the filler particles improve the bond between the inorganic filler and the monomer matrix as they are able to establish a chemical bond between the glass surface and the matrix (Dedania, N Shah etal 2018)10.This leads to reduced polymerization stress in Cention N which allows its bulk placement, increased compressive strength and lesser microleakage.

Liquid part of Cention N has hydroperoxide and the standard filler in the powder is coated with the other initiator components. Hydroperoxide rather than conventional benzoyl peroxide imparts greater temperature resistance which is important regarding storage stability. Thiocarbamide also improves the color stability of the product .The photoinitiator Ivocerin and an acyl phosphine oxide initiator is an amine free initiator.

As it is dual cured it is a good option as a bulk replacement material. Its ion releasing property and durability makes it an excellent choice as a posterior restorative material (Todd 2016)[3]. The compressive strength of amalgam and Cention N are almost similar which is a major factor needed for posterior restorations as they have to bear masticatory forces.(Chowdhary &Guha 2019)[9]

The concept of Bulk fill technique has been introduced by which the cavity can be restored using single increments of 4 mm each. Bulk application technique has the advantage of being simpler as it makes the treatment quicker by reducing the number of clinical steps thus making it minimally technique sensitive(Roggendorf etal. 2011).

In the present study fifty patients were selected according to the set inclusion criteria. Allocation was randomly done in order to eliminate any bias in the selection. Randomization was done using the flip coin method which is the most common method of simple sampling. (Suresh 2011)[6]. Two restorations were placed in two separate teeth of each patient, one tooth being restored with Amalgam and the other being restored with Cention N. The patients were evaluated according to modified USPHS Criteria for seven different criteria by visual inspection and by explorer. The seven criteria are retention, marginal integrity, marginal adaptation, color match, post operative sensitivity, secondary caries and anatomic contour.(Wayne 2005)[5].

The patients were recalled after 1 week, 3 months and 6 months for the same and were evaluated for all the seven criteria.

Conclusion:

Under the limitations of the study, statistical analysis showed no significant difference in the clinical performance of Cention N and Amalgam and both the materials were found to be comparable for all the criteria except color match for which Cention N is found to be better. Therefore it can be concluded that Cention N should be preferred as an alternative to Silver Amalgam for Class II restorations. Further studies with longer follow ups are required to compare long term clinical performance of both the restorations.

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