

**COMPARATIVE EVALUATION OF VARIOUS TECHNIQUES OF IMPROVING RETENTION OF CENTION N IN CERVICAL LESIONS- AN IN VITRO STUDY**

**Dr. Rachna Sharma**

Senior Lecturer, D.Y. Patil University- School of Dentistry  
rachna.sharma@dypatil.edu

**Dr Shilpa Shetty Naik**

Professor and Head of Department, D.Y. Patil University- School of Dentistry  
shilpa.naik@dypatil.edu

**Dr. Amil Joshi**

Senior Lecturer, D.Y. Patil University- School of Dentistry  
amil.joshi@dypatil.edu

**Dr. Shagorika Choudhury**

Post Graduate Student, D.Y. Patil University- School of Dentistry  
shagorika.choudhury6@gmail.com

**Dr . Shivani Mehta**

Post Graduate Student  
D.Y. Patil University- School of Dentistry  
shivanimehta1811@gmail.com

**Dr. Akshaya Mudaliar**

Post Graduate Student, D.Y. Patil University- School of Dentistry  
akshaya.mudaliar@gmail.com

**Dr. Rachna Anand**

D.Y. Patil University- School of Dentistry  
rachna.sharma@dypatil.edu

**Abstract:**

**AIM:**

To evaluate and compare various techniques of application of Cention-N in class V cavity and check its flexural strength and fracture resistance.

**METHODOLOGY:**

30 intact permanent teeth will be selected and ideal class V cavity was prepared. The teeth were divided into 3 groups of 10 each and restored with Cention N- Group A- with conditioning, Group B- after etching and bonding, Group C- without conditioning.

Further, teeth were subjected to occlusal load, increasing from increasing load of 50 to 100 Mpa and detachment of restoration was observed. The flexural strengths of the samples were determined.

**STATISTICAL ANALYSIS:** One way Anova and Post Hoc Tukey HSD (beta) has been used for compare and evaluate three different techniques of application of Cention N.

**RESULTS:** The application of dentin conditioning agent prior to placement of Cention-N in cervical lesion provides a far better chance of retention than the use of etchant and bonding agent or without using any conditioner. However the difference between the groups was statistically insignificant.

**Keywords :** Class V cavities, Cention N, flexural strength , retention

**Introduction:**

Abfraction is the condition in which there is non-carious lesion characterised by the loss of tooth structure in the cervical region of tooth caused by abnormal functions leading to stresses, attrition, abrasion and friction. The objective of the restoration of cervical lesions is to restore form, function and to prevent or eliminate sensitivity.

Numerous materials are available for restoration of Class V lesions such as glass ionomer, composites, amalgam, and compomer. The restorative rehabilitation of Class V cavities require a tooth coloured restoration which have a good adhesion property with the tooth structure. According to manufacturer's Cention N is indicated for restoring deciduous teeth and for permanent restorations of a Class I, II, or V.<sup>i</sup>

For the longevity of a restorative material various factors play an important role and strength is one of the essential criteria. A restorative material should provide moderate tensile and compressive strength to resist multidirectional masticatory forces for a long duration.<sup>ii</sup>

Cention N is Alkasite restorative material which is a subgroup of composite resin material namely compomer or ormocer. Cention N is commercially available available as powder and liquid. The powder consists of filler particles namely Barium aluminium silicate and initiator components. The liquid consists of four different dimethacrylates monomers and initiators.<sup>iii</sup> It is a dual-cure material, with the cross- link polymerization reaction between the monomers, urethane dimethacrylate, tricyclodecane- dimethanol dimethacrylate, and polyethylene glycol 400 dimethacrylate which leads to increase in strength and provides longevity of the restoration.

As compared to conventional glass ionomer cements significant levels of fluoride ions are released in Cention N. Apart from fluoride ions it also realises calcium and hydroxide ions preventing demineralisation of enamel.<sup>iv</sup> Properties of materials, such as fracture resistance and elasticity under stress, are evaluated by the determination of properties of flexural strength, flexural modulus, and fracture toughness.<sup>v</sup>

Though studies are done on the flexural strength on the material Cention N, in this study the flexural strength of Cention with different application technique for better retention is being evaluated.

**Methodology:**

Permanent 30 intact permanent premolars were selected with neither carious lesions nor restorations were recently extracted for this *in vitro* study. The extracted teeth were cleaned and stored in formaline. They were then mounted on acrylic blocks. Ideal class V cavities were prepared on the buccal surface of the tooth measuring 3 mm mesiodistal width, 3 mm occlusogingival height, and 1.5 mm axial depth using high speed airtor by a single operator.

The teeth were divided into 3 groups of 10 each and restored with

Group A- Cention N- with conditioning (Dentine Conditioner 3M ESPE)

Group B- Cention N-after etching and bonding (3M ESPE)

Group C- Cention N-without conditioning.

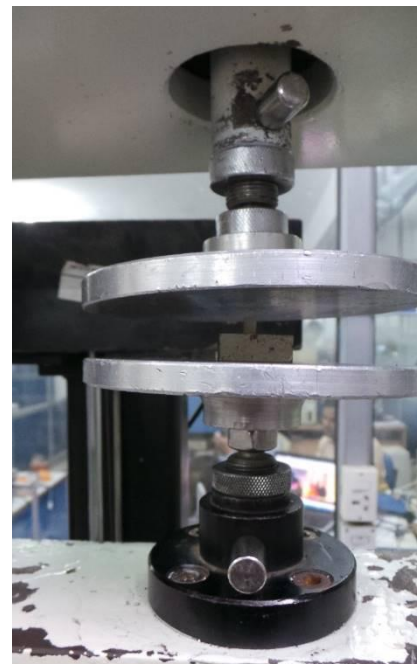


Sample collected and mounted on acrylic blocks



Ideal Class V cavity prepared using airtor

Further, teeth were subjected to occlusal load and detachment of restoration was observed.



They were tested on Universal testing machine with increasing load of 50 to 100 Mpa.

Universal Testing machine

	Group 1	Group 2	Group 3	Total
N	10	10	10	30
Mean	134	107	128.4	123.133
Std.Dev.	4.4721	2.9155	5.5498	12.7272

Results:

Summary of data:

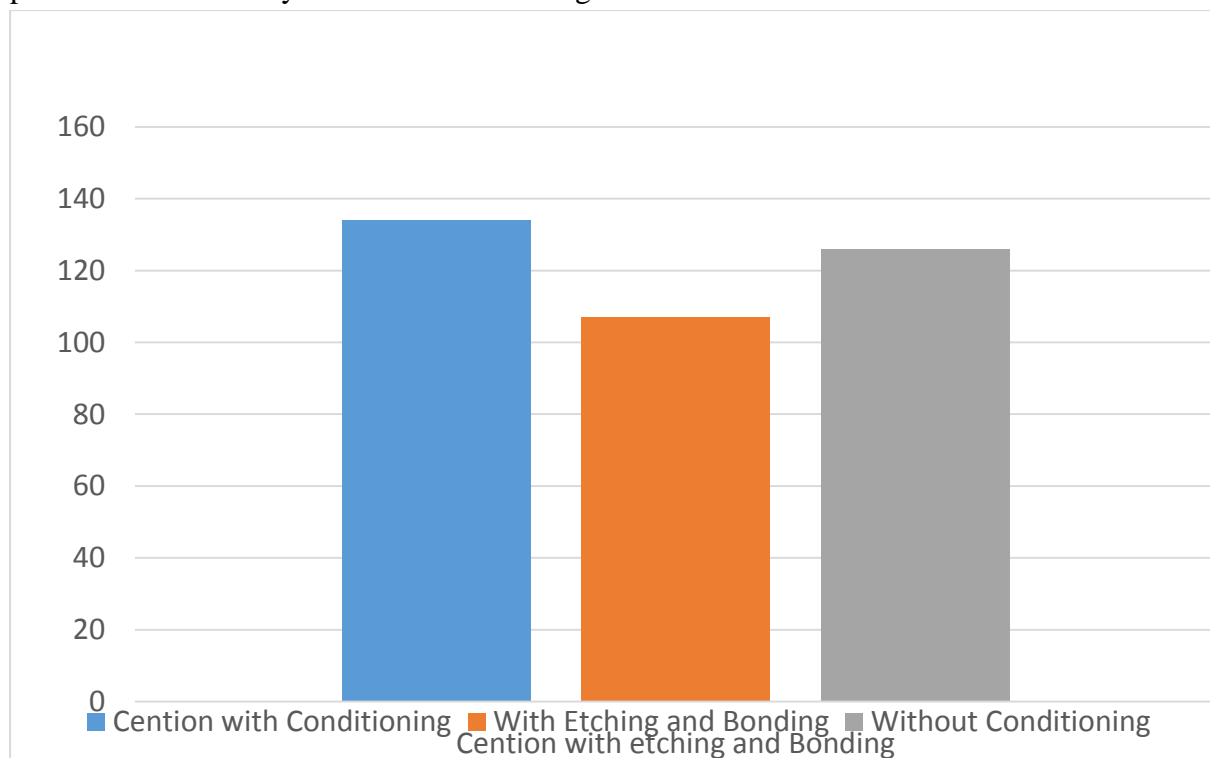
The flexural strength of all the three different techniques to evaluate retention of Cention N in cervical lesions was found be statistically insignificant. However group 1 – Cention N with conditioning showed higher resistance to fracture followed by group 3- Cention N with

Result Details				
Source	SS	df	MS	
Between-treatments	2030.5333	2	1015.2667	$F = 51.36256$
Within-treatments	237.2	12	19.7667	
Total	2267.7333	14		

conditioning and least was seen in group 2– Cention N with etching and bonding.

Pairwise Comparisons	HSD <sub>.05</sub> = 7.5017		Q <sub>.05</sub> = 3.772
	HSD <sub>.01</sub> = 10.0328		
<b>T<sub>1</sub>:T<sub>2</sub></b>	M <sub>1</sub> = 134.00	27	<b>Q = 13.58 (p = .00000)</b>
	M <sub>2</sub> = 107.00		
<b>T<sub>1</sub>:T<sub>3</sub></b>	M <sub>1</sub> = 134.00	5.6	<b>Q = 2.82 (p = .15668)</b>
	M <sub>3</sub> = 128.40		
<b>T<sub>2</sub>:T<sub>3</sub></b>	M <sub>2</sub> = 107.00	21.4	<b>Q = 10.76 (p = .00002)</b>
	M <sub>3</sub> = 128.40		

The Tukey's HSD (honestly significant difference) procedure facilitates pairwise comparisons within the ANOVA data. The F statistic shows whether there is an overall difference between the sample means. Tukey's HSD test determination between which of the various pairs of means - if any of them - there is a significant difference.



**Discussion:**

Restoration in the cervical area requires ideal placement of restorative material due to presence of only dentin and have additional challenges in terms of progression rate of caries and difficulty in proper isolation of the lesion along with placement, finishing, polishing of the restorative material.<sup>vi</sup>

Various methods can be employed in order to improve the retention of the restorative material like using undercuts to improve retention, box shaped cavity design, removal of smear layer using etching and application of bonding agent for improved adhesion of the material to the tooth structure.

Cention N when compared to GIC exhibits higher FT, FS, and acid buffer capacity.<sup>vii</sup> In vitro studies have shown Cention N using adhesive system with least microleakage at the gingival margin when compared to RMGIC.<sup>viii</sup> The property of high flexural strength of Cention N which arises due to cross linked polymer structure making the material ideal for cervical lesions.

A study conducted by Paromita Mazumdar, Abiskrita Das and Chiranjan Guha evaluating the hardness of different restorative materials namely GIC Type II, Cention N, Silver Amalgam, Nanohybrid Composite Resin , Cention N showed highest microhardness amongst all the material.<sup>ix</sup>

In the current study Cention N with dentin conditioning performed better than Cention N with etching and bonding agent and Cention N without conditioning but no significant difference was seen.

Our results are based on *in vitro* study. Further *in vivo* study are required for evaluation of Cention N. Clinically, features such as hypersensitivity, marginal discoloration, and other criteria traditionally associated with microleakage may be more reliable on the overall caries risk of patient.

**Conclusion:**

The application of dentin conditioning agent prior to placement of Cention-N in cervical lesion provides a far better chance of retention than the use of etchant and bonding agent or without using any conditioner.

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