

## Clinical evaluation of Cention–N and nano hybrid composite resin as a restoration of non-carious cervical lesion

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### Abstract

**Introduction:** Non carious cervical lesion, (NCCL) is the loss of tooth structure at the cemento enamel junction, or CEJ level that is unrelated to dental caries. These lesions can affect plaque retention, tooth sensitivity, structural integrity, caries incidence, and pulpal vitality.

**Objectives:** To compare clinical effectiveness of Cention–N and Nanohybrid composite resin as a restoration of non-carious cervical lesion for gross fracture, marginal integrity & surface texture.

**Materials and Methods:** Total 24 patients having two class V non-carious cervical lesion in the same arch, approximately of same size and shape were selected. Entire study was carried out by two operators. Both teeth were restored, finished and polished by one operator with Cention–N and Tetric N Ceram (Ivoclar – Vivadent) respectively. Evaluation for marginal integrity & surface texture was done by second operator on the same day of restoration. (USPHS, Ryge criteria for direct clinical evaluation). Follow up was done for gross fracture, marginal integrity & surface texture after 1 week, 1 month, 3 month & 6 month. All the data were collected according to USPHS, Ryge Criteria. Statistical analysis was done by chi square test.

**Results:** Cention–N is as effective as Tetric-N-Ceram for gross fracture and marginal integrity till 6 months. But Cention–N showed inferior surface characteristics than Tetric-N-Ceram after 1 week.

**Conclusion:** Cention – N is as effective as Tetric N Ceram for gross fracture and marginal integrity but Cention – N has an inferior surface characteristics than Tetric N Ceram.

**Keywords:** Cention-N, Non-carious cervical lesion, Nano hybrid composite.

### Introduction

Non carious cervical lesion, (NCCL) is the loss of tooth structure at the cemento enamel junction, or CEJ level that is unrelated to dental caries. These lesions can affect plaque retention, tooth sensitivity, structural integrity, caries incidence, and pulpal vitality.<sup>1</sup> Other problems which are commonly associated are cosmetic problems, unpleasant hypersensitivity, painful sensations, pathological changes in the pulp, and eventually tooth loss.<sup>2-4</sup>

There are various factors which are responsible for occurrence of non carious cervical lesions. Various factors like stress, friction, bio corrosion are responsible for occurrence of NCCL. Endogenous factors like parafunction, occlusion, deglutition, plaque (caries), gingival crevicular fluid, gastric HCl & exogenous factors like diet, mastication, habits, occupations, dental appliances, dental hygiene are also responsible. Electrochemical effects like piezoelectric effect on dentin also affect the teeth. So we can say that non carious cervical lesions are multifactorial in origin and single factor is responsible for occurrence of that.<sup>2</sup> It has not been clearly identified as to whether any one process is more responsible for lesion initiation or for progression, or vice versa.<sup>1</sup>

The lesion can be either in the shape of wedge, saucer or a combination of both. Various restorative materials are used for this like resin-based composite (RBC), glass-ionomer or resin-modified glass-ionomer (GI/RMGI) and temporary restorative materials.<sup>3</sup>

Further more special characteristics of these lesions include the presence of dentin or cementum in the gingival

margins and restorations that are more susceptible to micro leakage and postoperative sensitivity. Mechanical retention is not enough and difficulty to control moisture contamination in doing these restorations.<sup>5</sup> The role of mechanical stress is widely accepted as a cause of failure of restorations<sup>6</sup> and because of this occlusal loading at the cervical margin leads to cuspal flexure.<sup>7</sup> Hence, a critical factor for the restorative success of cervical lesions is the selection of the restorative materials.

These all materials have their advantages and disadvantages. Therefore, the aim of the current study is to compare the nano hybrid composite and newly arrived alkasite based CENTION-N for the restoration of non-carious cervical lesions.

### Materials and Methods

Total 48 maxillary permanent premolar teeth of 24 patients were selected. Written consent was obtained from all patients. For the purpose of standardisation the occluso gingival height up to 4 mm, depth up to 1-2 mm of the lesions was maintained in all patients. Dimensions were measured with the help of a periodontal probe. For standardisation, teeth free of any restoration, caries & in occlusion were included in the study. Patient having periodontal disease, xerostomia, teeth without antagonist, crack, previous restoration and caries were excluded. Isolation of all teeth was carried out by gingival retraction cord. After isolation, 37% phosphoric acid gel was used for etching for 20 seconds and then it was rinsed with distilled water with the help of three way syringe. Tooth surface was

dried with cotton pellet to have a glistening appearance and to prevent excessive drying after etching. Bonding agent (Tetric N-Bond, Ivoclar Vivadent) was applied over the affected tooth surface with the help of applicator tip and cured for 20 seconds with the help of blue phase light. After curing both the teeth were restored simultaneously by incremental technique. One teeth was restored with Nano hybrid composite and another was restored with Cention-N and cured with the help of blue phase light for 40 seconds. Polishing of the restorations was done with super snap kit on same day of restoration.

Restoration was evaluated by another operator for gross fracture, marginal integrity & surface texture according to modified united states public health service (USPHS) Ryge criteria for direct clinical evaluation of restoration on the same day of restoration and then after 1 week, 1 month, 3 month & 6 month.

For Gross Fracture - Alpha (A) indicates Restoration is intact and fully retained. Bravo (B) indicates Restoration is partially retained with some portion of the restoration still intact. Charlie (C) indicates restoration is completely missing.

For Marginal Integrity follow up was taken by visual inspection and explorer. Alpha (A) is the explorer does not catch when drawn across the surface of the restoration towards the tooth, or, if the explorer does not catch, there is no visible crevice along the periphery of the restoration. Bravo (B) is, the explorer catches and there is visible evidence of a crevice, which the explorer penetrates, indicating that the edge of the restoration does not adapt closely to the tooth structure. The dentin and/or the base is not exposed, and the restoration is not mobile. Charlie (C) is, the explorer penetrates crevice defect extended to the dento-enamel junction.

For Surface Texture Alpha (A) Surface texture similar to polished enamel as determined by means of a sharp explorer. Bravo (B) Surface texture gritty or similar to a surface subjects to a white stone or similar to a composite containing supramicron-sized particles. Charlie (C) Surface pitting is sufficiently coarse to inhibit the continuous movement of an explorer across the surface.

**Statistical Analysis**

Descriptive and comparative statistics were performed using cross tabulation and Pearson Chi-Square test. P value < .00 was considered statistically significant for all tests.

**Results**

Table 1 shows marginal integrity of the material and there is no difference between Cention N and Tetric N Ceram at the

**Table 1:** Marginal integrity

| Materials      | Baseline |   |   |   | 1 week |   |   |   | 1 month |   |   |   | 3 month |   |   |   | 6 month |   |   |   |
|----------------|----------|---|---|---|--------|---|---|---|---------|---|---|---|---------|---|---|---|---------|---|---|---|
|                | α        | β | c | p | α      | β | c | p | α       | β | c | p | α       | β | c | p | α       | β | c | p |
| Cention -N     | 24       |   |   | - | 24     |   |   | - | 24      |   |   | - | 24      |   |   | - | 24      |   |   | - |
| Tetric N Ceram | 24       |   |   |   | 24     |   |   |   | 24      |   |   |   | 24      |   |   |   | 24      |   |   |   |

interval of 1 week, 1 month, 3 months and 6 months. Table 2 shows gross fracture of the material and there is no difference between Cention N and Tetric N Ceram at the interval of 1 week, 1 month, 3 months and 6 months. Table 3 shows surface texture of the material and there is statistically significant difference (p = 0.00) between Cention N and Tetric N Ceram from 1 week onwards.

**Discussion**

Non-carious cervical lesions (NCCL) are commonly encountered and raise considerable restorative challenges for the dentist. A critical factor for restorative success is represented by the selection of the restorative materials. These issues dictate the restoration’s integration in an area of the tooth, which involves multiple biomaterials and experiences complex stresses.<sup>6</sup> In today’s context of increased life expectancy and increasing number of people retaining their teeth for longer, there is a need to establish a more organized approach concerning non-carious cervical lesions (NCCL).<sup>7-10</sup> Thus, in the present study NCCL were selected.

USPHS criteria for clinical evaluation of the restoration was developed by Cvar and Ryge in 1971 and has been used extensively for clinical evaluation of restorations<sup>8</sup> which is the only available criteria widely used for long-term evaluation of restorations, and is considered valid for comparison purpose among studies at different observation periods.<sup>8</sup>

Non carious cervical lesions (NCCL) raise a considerable restorative challenge for the dentist in bonding, as adhesion is not as strong and predictable as enamel bonding.<sup>8</sup> Moreover, various types of stress also affects the lesion like static occlusal load, facial positional prominence as it eventually predisposes to toothbrush/dentifrice abrasion.<sup>2</sup>

In the current study Tetric N-Ceram was used because it is nano hybrid composite. Clinical evaluation over period of time, including long-term studies have documented a good clinical performance regarding all parameters, placing composite materials in a more favorable position compared to compositers and resin-modified GIC for NCCL.<sup>10</sup> According to Dalia et al, composite is proved to be effective in class V non carious cervical lesions because of high resiliency and flexibility of the material. It has been also evident that the nano-hybrid Tetric N-Ceram has good results for compressive and flexure properties.<sup>11</sup>

**Table 2:** Gross tracture

| Materials             | Baseline |         |   |   | 1 week   |         |   |   | 1 month  |         |   |   | 3 month  |         |   |   | 6 month  |         |   |   |
|-----------------------|----------|---------|---|---|----------|---------|---|---|----------|---------|---|---|----------|---------|---|---|----------|---------|---|---|
|                       | $\alpha$ | $\beta$ | c | p | $\alpha$ | $\beta$ | c | p | $\alpha$ | $\beta$ | c | p | $\alpha$ | $\beta$ | c | p | $\alpha$ | $\beta$ | c | p |
| <b>Cention –N</b>     | 24       |         |   | - | 24       |         |   | - | 24       |         |   | - | 24       |         |   | - | 24       |         |   | - |
| <b>Tetric N Ceram</b> | 24       |         |   |   | 24       |         |   |   | 24       |         |   |   | 24       |         |   |   | 24       |         |   |   |

**Table 3:** Surface texture

| Materials             | Baseline |         |   |             | 1 week   |         |   |             | 1 month  |         |   |   | 3 month  |         |   |             | 6 month  |         |   |             |
|-----------------------|----------|---------|---|-------------|----------|---------|---|-------------|----------|---------|---|---|----------|---------|---|-------------|----------|---------|---|-------------|
|                       | $\alpha$ | $\beta$ | c | p           | $\alpha$ | $\beta$ | c | p           | $\alpha$ | $\beta$ | c | p | $\alpha$ | $\beta$ | c | p           | $\alpha$ | $\beta$ | c | p           |
| <b>Cention –N</b>     | 24       |         |   | <b>0.00</b> |          | 24      |   | <b>0.00</b> |          | 24      |   | - |          | 24      |   | <b>0.00</b> |          | 24      |   | <b>0.00</b> |
| <b>Tetric N Ceram</b> | 24       |         |   |             | 24       |         |   |             | 24       |         |   |   | 24       |         |   |             | 24       |         |   |             |

Cention N is an “alkasite” restorative material. Alkasite refers to a new category of filling material. This new category utilizes an alkaline filler, capable of releasing acid-neutralizing ions with a particle size between 0.1  $\mu\text{m}$  and 35  $\mu\text{m}$ . It has flexural strength of 110 MPa.

In the current study Cention – N was as effective as Tetric N Ceram for gross fracture and marginal integrity till 6months. There was no difference in the result, these could be because of the adhesion system used was same for both.

Cention–N had an inferior surface characteristics than Tetric N Ceram after 1 week could be because of various factors like type of mixing and particle size of materials. In addition, the effect of composition, degree of conversion, finishing, and polishing procedures can also affect the surface quality of material.<sup>9</sup> Further more tetric n ceram is available in ready to use pre mixed direct placed material form and cention-n is available in powder and liquid form. Magdey and kola et al conducted a study in which Nano hybrid composite shows smoothest surface as compared to others.<sup>9</sup> Surface roughness of dental materials have an important effect on the initial adhesion and retention of dental plaques. A subsequent risk of dental caries and periodontal diseases is expected with rough surfaces. Surface roughness also affects the color, gloss and staining susceptibility of dental composites.<sup>11</sup>

## Conclusion

Within the limitations of this study, we can conclude that Cention – N is as effective as Tetric N Ceram for gross fracture and marginal integrity but Cention – N has an inferior surface characteristics than Tetric N Ceram.

**Conflict of Interest:** None.

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