ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 10, Issue, 11, pp.75553-75556, November, 2018

DOI: https://doi.org/10.24941/ijcr.32869.11.2018

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

PROXIMAL CONTACT TIGHTNESS EVALUATION OF THE TEETH RESTORED USING ZIRCONOMER IMPROVED AND CENTION N- AN *IN VITRO* STUDY

***[1]Dr. Aakrati Raina, [1]Dr. Saurav Paul, [2]Dr. Asheesh Sawhny and [2]Dr. Sridevi Nandamuri**

[1]Post Graduate Student, Department of Conservative Dentistry and Endodontics, Rama Dental College, Hospital and Research Centre, Kanpur
[2]Professor, Department of Conservative Dentistry and Endodontics, Rama Dental College, Hospital and Research Centre, Kanpur

ARTICLE INFO

Article History:
Received 26th August, 2018
Received in revised form
14th September, 2018
Accepted 19th October, 2018
Published online 30th November, 2018

Key Words:
Cention N, Zirconomer Improved,
White Amalgam,
Proximal Contact Tightness,
Sectional matrix,
Class II restorations.

ABSTRACT

Introduction: The ultimate aim while placing class II restorations is obtaining precise proximal contacts and creating exact proximal contours. Proximal contact tightness is important to protect the periodontium from damage due to food impaction. Stronger proximal contacts are obtained when Class II restorations are placed using sectional matrices and high viscosity or 'packable' restorative materials. The aim of this study was to evaluate proximal contact tightness between Cention N and Zirconomer Improved. **Method:** Eighty Nissin typodont posterior teeth with mesio-occlusal cavity preparation were used in this study. They were divided into two groups (n=40), where group 1 were restored using Cention N (ivoclarvivadent) and group 2 using Zirconomer Improved (Shofu). Proximal contact tightness was evaluated using dental floss, under the FDI criteria. **Result:** Chi square test was used to test the significance of difference between the two restorative material groups. The difference was statistically significant (p= 0.015) between the two groups. **Conclusion:** Cention N showed better proximal contact tightness than Zirconomer Improved. However, both Cention N and Zirconomer Improved were mostly within the clinically acceptable score categories.

Citation: Dr. Aakrati Raina, Dr. Saurav Paul, Dr. Asheesh Sawhny and Dr. Sridevi Nandamuri. 2018. "Proximal contact tightness evaluation of the teeth restored using zirconomer improved and cention n- an in vitro study", *International Journal of Current Research*, 10, (11), 75553-75556.

INTRODUCTION

One of the biggest challenges encountered by even the most skilled clinicians while placing Class II restorations is producing tight proximal contacts and obtaining anatomically accurate proximal contours. Proximal contact tightness (PCT) is a physiological dynamic entity of multifactorial origin that is largely affected by tooth type, location, time ofday, patient position, mastication and restorative procedures (Saber, 2010; Dörfer, 2000; Loomans, 2007). A significant variation in proximal contact is also seen both inter- and intra-individually (Dörfer, 2000 and Loomans, 2006). The use of pre-contoured circumferential or sectional matrix bands used with a separation ring has been shown to attain good contact tightness due to the interdental separation applied by the ring during restoration (Peumans, 2001). There is a wide variety of restorative materials available, ranging from silver amalgam to bulk fill composites resins. With arising demand for tooth coloured restorations, there is an advent of newer restorative materials in the market.

Corresponding author:* **Dr. Aakrati Raina,
Post Graduate Student, Department of Conservative Dentistry and Endodontics, Rama Dental College, Hospital and Research Centre, Kanpur.

Two of such recent materials include; Cention N (Ivoclarvivadent) and Zirconomer Improved (Shofu Inc. Kyoto, Japan).Cention N belongs to a group of alkasites whereas Zirconomer Improved is a zirconia reinforced glass ionomer restoration. There have been numerous studies conducted on the proximal contact tightness evaluation on teeth restored using composites and amalgam previously. The aim of this study was to evaluate proximal contact tightness between Cention N and Zirconomer Improved, using dental floss, under the FDI criteria.

MATERIALS AND METHODS

Eighty Nissin typodont posterior teeth were used in this study. (Fig. 1). In all the teeth, mesio-occlusal cavity preparation was done with a high-speed hand piece. Sectional matrix band was placed in all the teeth to build the proximal contour.(Fig.2).

The teeth were equally divided into two groups (40 each).

Group 1(n=40)– Restored with Cention N (ivoclarvivadent) (Fig.3)

Group 2(n=40) – Restored with Zirconomer Improved (Shofu) (Fig.4)

In Group 1, Cention N powder and liquid were mixed according to the manufacturer's instructions and then condensed and placed into the prepared cavities.

In Group 2, Zirconomer Improved, after mixing according to the manufacturer's instructions was placed into the prepared cavities.

All the restorations were placed by a single operator and proximal contact tightness was evaluated using dental floss (Fig. 5) and the scoring was given under the FDI criteria (Deepak, 2017) (Table 1).

Figure 1. Nissin typodont posterior teeth

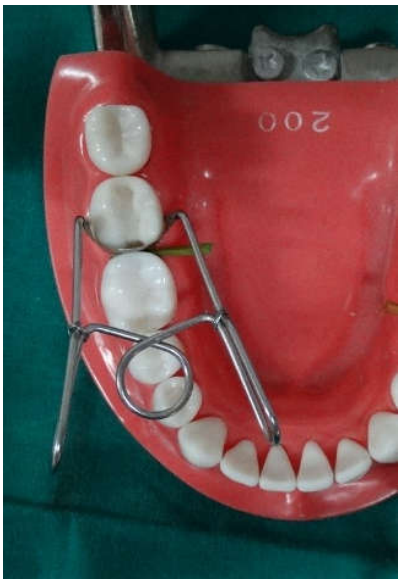


Figure 2. Mesio-Occlusal Cavity prepeartion with Sectional matrix band placement

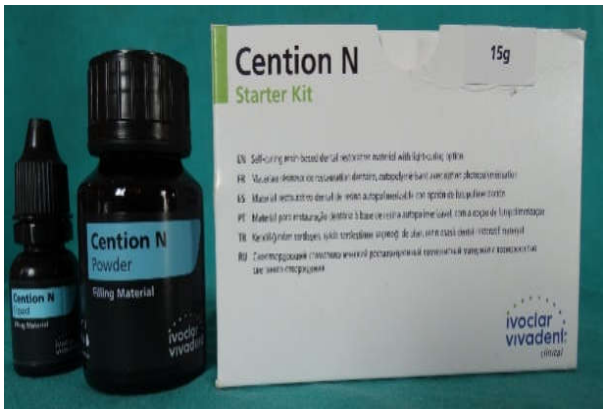


Figure 3. Cention N (Ivoclar Vivadent)

Figure 4. Zirconomer Improved (Shofu)

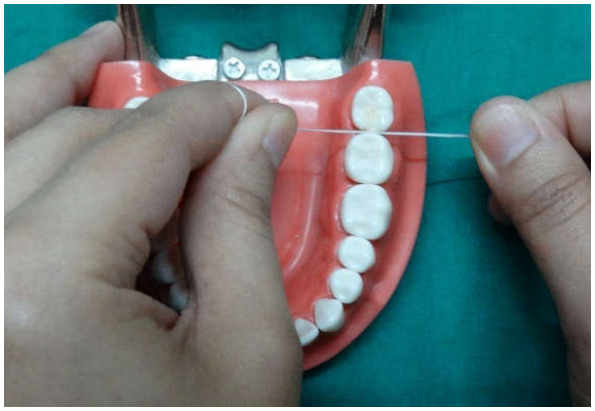


Figure 5. Evaluating Proximal Contact Tightness using Dental Floss

Table1. FDI World Dental Federation: Clinical criteria for the evaluation of direct and indirect restorations

Score	Proximal contact tightness	Functional properties
1	Normal contact point (floss or 25 µm metal blade can pass)	Clinically excellent
2	Contact slightly too strong but no disadvantage (floss or 25 µm metal blade can only pass with pressure)	Clinically good
3	Somewhat weak contact, no indication of damage to tooth, gingiva or periodontal structures; 50 µm metal blade can pass	Clinically sufficient/ satisfactory
4	Too weak and possible damage due to food impaction 100 µm metal blade can pass	Clinically unsatisfactory
5	Too weak and/or clear damage due to food impaction and/or pain/gingivitis	Clinically poor

Data Analysis

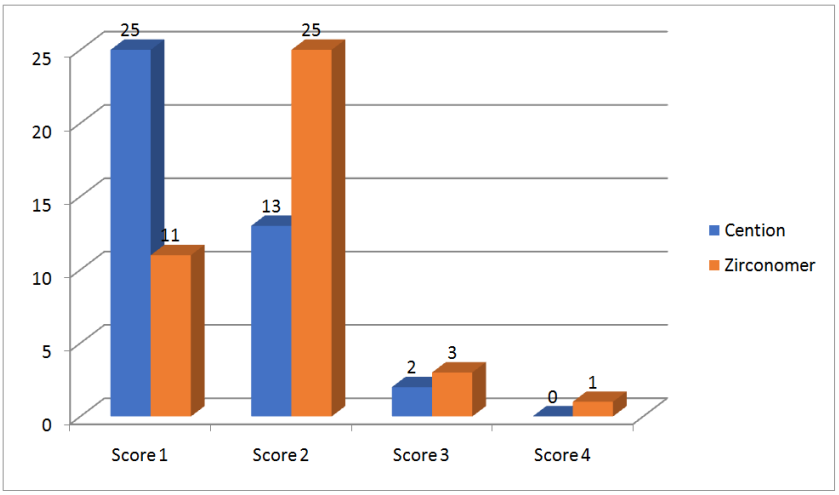
The results were analysed using Statistical Package for Social Sciences (SPSS- version 21). Frequencies and percentages were calculated for the scores assigned to both restorations. Chi square test was used to test the significance of difference between the two restorative material groups. P-value of ≤ 0.05 was considered statistically significant.

RESULTS

Proximal contact tightness was clinically excellent (score 1) in 69% of the restorations with Cention N, as compared to Zirconomer Improved, which showed clinically excellent (score 1) proximal contact tightness in 31% of the restorations.

Table 1. Showing frequency distribution of scores assigned for proximal contact tightness according to fdi criteria (X^2 = 10.434, p= 0.015, N: Number of restorations given a particular score)

Restoration	1.0 N (%)	2.0 N (%)	3.0 N (%)	4.0 N (%)	Total N (%)
Cention	25 (69.4%)	13 (34.2%)	2 (40.0%)	0 (0%)	40 (50.0%)
Zirconomer	11 (30.6%)	25 (65.8%)	3 (60.0%)	1 (100.0%)	40 (50.0%)
Total	36 (100.0%)	38 (100.0%)	5 (100.0%)	1 (100.0%)	80 (100.0%)



Graph 1. Graph showing distribution of scores assigned

Score 2 (clinically good proximal contact tightness) was observed in 34% of the Cention N restorations and 66% of the Zirconomer Improved restorations. Score 3, i.e. Clinically sufficient/ satisfactory was observed in only 2 out of 40 Cention restorations whereas 3 out of 40 zirconomer improved restorations were graded under score 3. Score 4, i.e. clinically unsatisfactory was seen in none of the Cention N restorations, however, only 1 zirconomer improved restoration was graded under this category. Clinically weak and poor contact i.e. score 5 was not observed with either Cention N or Zirconomer Improved restorations. For scores1 and 2, the difference was statistically significant (p= 0.015) between the two groups.

Figure 6. Measurement of PCT using the TPM[(1)]

DISCUSSION

One must appreciate the role of a proximal contact in the natural dentition to acknowledge the importance of reproducing its shape and tightness during tooth restoration (Saber, 2010). The role of the proximal contact in protecting the periodontium from damage due to food impaction is very important (Dörfer, 2000 and Ash, 1993).

Loose proximal contacts predispose to food impaction, periodontal problems, tooth migration and carious lesions (Ash, 1993; Von Bethlenfalvy, 2000). Alternatively, trauma to gingival tissue has been seen when extreme pressure is applied to pass dental floss through tight contacts (Saber, 2010). An important pre-requisite to attaining interdental integrity is obtaining acceptable contact areas with adjacent teeth and re-establishing optimal physiologic contact between adjacent proximal surfaces (Peumans, 2001). According to Loomans et al, Class II restorations placed with a combination of sectional matrices and separation ring produced stronger proximal contact than when a circumferential matrix system was used (Saber, 2010). The Tooth Pressure Meter device, (TPM) (Fig 6), described by Dörfer and Loomans can precisely determine the proximal contact tightness. The PCT is measured as the maximum frictional force (N) applied on a 0.05 mm thick metal strip upon removal from the interproximal area in an occlusal direction (Saber, 2010). Since this method was not commercially available, we were forced to access the result using traditional method. With the decline in popularity of amalgam in recent years and an increased demand in tooth colored restorations, there is a need for equally strong and bondable materials. Two such recently introduced materials include Zirconomer Improved and Cention N. Cention N (Ivoclar Vivadent; Schaan, Liechtenstein) is a tooth-colored, bulk fill, restorative material that can be placed in retentive preparations with or without the use of an adhesive (Ende,, 2017). It is a type of an “alkasite” which is basically a subcategory of the composite resins, similar to compomers or ormocers (Samanta, 2017). It isradio-opaque, UDMA-based, self-curing powder/liquid restorative material which can even be light cured. The liquid part containsdimethacrylates and initiators, whereas the powder comprises of initiators, various glass fillers and pigments. It contains alkaline glass fillers capable of releasing calcium, fluoride and hydroxide ions (Mann, 2018). These Isofillers (special patented filler) act as a shrinkage stress relievers due to low elastic modulus and reduce polymerization shrinkage and micro leakage.

The high polymer network density and degree of polymerization over the entire depth of the restoration is because of the sole use of cross-linking methacrylate monomers combined with as table, efficient self-cure initiator (Samanta, 2017). Apart from being an excellent replacement for amalgamitalso fulfills the need for an esthetic bulk fill material in the posterior region (Zirconomer Improved, 2018). A study was conducted to compare proximal contact tightness between charisma composite and Cention N, which showed that Cention N produces proximal contact tightness same as that of the composite material used (Deepak, 2017). Zirconomer is another newly introduced glassionomer material to overcome the drawbacks of traditional GIC formulations. Also termed as "White Amalgam" since it exhibits the strength of amalgamalong with the beneficial effects of GIC and eliminates the hazardous effect of mercury (Lagisetti, 2018 and Walia, 2016). Zirconomer Improved consists of novel nano-sized zirconia fillers that enhance the material translucency for a closer shade match to natural teeth with superior handling characteristics for a simple, easy and fast bulk placement (Zirconomer Improved, 2018). Attaining acceptable proximal contacts has been claimed to be easier when using high viscosity or 'packable' restorative materials (*Condensable composites, 1998*). As shown in the results of the current study, Cention N showed better proximal contact tightness than Zirconomer Improved, since,29 out of 40 Cention N restorations having were graded under score 1 and 25 out of 40 of the Zirconomer restorations with score 2. The difference was statistically significant (p= 0.015) between the two groups. This can be attributed to the difference in viscosity between two materials and needs further evaluation. However, both Cention N and Zirconomer Improved were mostly within the clinically acceptable (score 1 and 2) categories.

Conclusion

Within the limitations of the present study, both Cention N and Zirconomer improved when used in Class II restorations, offer clinically acceptable proximal contact tightness. Although, further studies along with long-term clinical follow-ups are needed to be conducted to provide valid evidence on the proximal contact tightness.

REFERENCES

Ash MM 1993. Wheeler's Dental Anatomy, Physiology and Occlusion WB Saunders Philadelphia 102-307.

Deepak S, Nivedhitha MS. 2017. Proximal contact tightness between two different restorative materials–An in vitro study. *Journal of Advanced Pharmacy Education and Research*| Apr-Jun. 7(2).

Dörfer CE, von Bethlenfalvy ER, Staehle HJ. and Pioch T 2000. Factors influencing proximal dental contact strengths. *European Journal of Oral Sciences* 108(5) 368-77.

Ende, A. V., Munck, J. D., Lise, D.P., Meerbeek, B.V. 2017.Bulk fill composites: A review of the current literature. *JAdhes Dent.,* 19: 95-09.

Lagisetti AK, Hegde P, Hegde MN. 2018. Evaluation of bioceramics and zirconia-reinforced glass ionomer cement in repair of furcation perforations: An *in vitro* study. *J Conserv Dent* 21:184-9.

Loomans BA, Opdam NJ, Roeters FJ, Bronkhorst EM and Plasschaert AJ. 2007. The long-term effect of a composite resin restoration on proximal contact tightness *Journal of Dentistry*., 35(2) 104-8.

Loomans BA, Opdam NJ, Roeters FJ, Bronkhorst EM, Burgersdijk RC and Dörfer CE. 2006. A randomized clinical trial on proximal contacts of posterior composites *Journal of Dentistry*., 34(4) 292-7.

Mann, J.S., Sharma, S., Maurya, S., Suman, A. 2018. CENTION N: A REVIEW. *Journal of Current Research.* 2018 Mar 22; 10(05):69111-2.

Peumans M, Van Meerbeek B, Asscherickx K, Simon S, Abe Y, Lambrechts P, Vanherle G. 2001. Do condensable composites help to achieve better proximal contacts?. *Dental Materials*. 2001 Nov 1;17(6):533-41.

Saber MH, Loomans AC, Zohairy AE, Dörfer CE, El-Badrawy W. 2010. Evaluation of proximal contact tightness of Class II resin composite restorations. *Operative dentistry.*, Jan;35(1):37-43.

Samanta, S., Das, U.K., Mitra, A. 2017. Comparison of microleakage in class V cavity restored with flowable composite resin, glass ionomer cement and Cention N. *Imp J Interdiscip Res*., 8(3): 180-3.

Von Bethlenfalvy ER, Staehle HJ and Dörfer CE. 2000. [Einflussmarginaler Parodontitis auf die approximale Kontaktstärke] Deutsche ZahnärtzlicheZeitschrift 55 411-6.

Walia R, Jasuja P, Verma KG, Juneja S, Mathur A, Ahuja L, et al. 2016. A comparative evaluation of microleakage and compressive strength of Ketac Molar, Giomer, Zirconomer, and Ceram‑x: An in vitro study. *J Indian Soc PedodPrev Dent.*, 4:280‑4.

Zirconomer Improved. Brochure. Available from http://shofu.com.sg/downloads/pdf/Zirconomer%20Impv%20Brochure.pdf [cited 21 September 2018].

*Condensable composites. The Dental Advisor.*1998; 15(07):1–4.

******