

A COMPARATIVE CLINICAL EVALUATION OF THE AESTHETICS AND BIOCOMPATIBILITY OF COMPOSITE VENEER RESTORATIONS WITH DIRECT AND INDIRECT TECHNIQUES

Manushaqe AJVAZI JASHARI^{1*}, Sonja APOSTOLSKA¹, Etleva QELI², Natyra FEJZA GASHI³

¹Department of Tooth Pathology and Endodontics - Faculty of Dentistry, "Ss. Cyril and Methodius" in Skopje

²Department of Conservative - Faculty of Dental Medicine, Tirana, Albania

³Department of Dental Pathology and Endodontics - University Dentistry Clinical Center of Kosovo

*Corresponding author e-mail: ajvazimanushaqe@gmail.com

Abstract

In recent years, dental aesthetics have garnered significant attention, prompting the advancement of noninvasive and minimally invasive techniques to preserve natural dental tissues while addressing aesthetic concerns. This study aims to evaluate and compare the clinical performance and biocompatibility of prefabricated composites and direct composite veneers by assessing changes in color, surface texture, marginal integrity, and gingival response. Emphasizing the modern landscape of dental materials, the study addresses the challenges associated with tooth wear and advocates for minimally invasive approaches. The utilization of contemporary nanofilled and nanohybrid composites provides a broad spectrum of aesthetic solutions while highlighting the critical importance of biocompatibility.

Study Design and Methodology: This investigation is structured as an in vivo, comparative clinical study involving a sample size of 72 teeth from patients aged between 20 and 60, with equal representation of both genders. Conducted under real-life conditions, the study systematically divides participants into two distinct groups for comprehensive comparative analysis.

Objective: The primary objective of this study is to assess and compare the clinical performance and biocompatibility of prefabricated composites versus direct composite veneers.

Keywords: Direct composite restorations, composite layering, indirect technique, aesthetic dentistry, composites.

1. Introduction

Tooth wear is a physiological phenomenon that, when it becomes serious or pathological, can lead to impaired aesthetics, pain, reduced quality of life, and threaten the prognosis for healthy oral functioning of the teeth. The treatment of dental wear should be focused on prevention, counseling, and follow-up. When tooth wear leads to functional or aesthetic problems, a restorative treatment plan based on minimally invasive interventions should be discussed with the patient. The desire for better aesthetics is one of the reasons an increasing number of patients seek cosmetic dentistry. Advances in modern dental materials provide practitioners with several choices to create more pleasing and natural-looking veneers. This study evaluates both direct and indirect composite techniques, focusing on the latest generation of composites. While indirect methods may offer procedural simplicity, direct techniques demand advanced skills. The study builds upon prior research, showcasing positive outcomes concerning color, texture, and marginal integrity with composite veneers. When composites are applied directly, advanced skills are required to build up and model the teeth, whereas indirect procedures can be technically less difficult as the restorations are designed and manufactured extra-orally.

2. Bibliography Review

(Parag Dua et al. 2020) states that color results ranged from excellent to good with minimal color changes after restoration. Clinical results and statistical analysis concluded that both componeers and direct composite laminates showed minimal changes in color, surface texture, and marginal integrity, and showed excellent gingival response. Gingival responses improved over the study period. Surface texture changes were significant only for the maxillary right canine and maxillary left lateral incisor. Intergroup comparisons for parameters, gingival response, surface texture, and marginal integrity did not show significant differences. Both groups showed minimal changes in these parameters and improved gingival response.

(DSJ D'Souza and M Kumar 2010) reported that both direct and indirect composite materials had clinically acceptable results in terms of aesthetic restoration. The biocompatibility with periodontal tissues of both materials was evident by the improvement of oral health indices.

(M. Gargari et al. 2014) reported that composite laminate restorations have been shown to be durable and aesthetic, protect tooth structure, and predictably restore aesthetics and function.

(Shetty A. et al. 2011) stated that the demand for aesthetic dental treatment is constantly growing. Several treatment options, such as full-coverage crowns and composite bonding, have been proposed. Full-coverage crowns are very invasive and can adversely affect the pulp or periodontal tissue, while composite bonding, although less invasive, is susceptible to discoloration, wear, and marginal fractures. Laminates have been reported to provide a superior alternative to direct bonding with composite resin for aesthetic tooth modification, offering a successful treatment that preserves tooth structure while providing excellent aesthetic results and patient acceptance.

(Dietschi D. et al. 1977) reported that Composeer composite systems are easy to use, and the restoration can be done in just one visit. Excellent aesthetic results can be achieved by optimal adjustment of colors, shape, and structures without laboratory work. Composeer composite laminates provide new options for functionality, economy, and aesthetics.

In the comparison between Coltene Composite Veneers and Direct Composite Veneers, both options exhibited minimal changes in color, surface texture, and marginal integrity, with an excellent gingival response. Noteworthy is the finding of significant surface textural changes limited to specific teeth, suggesting nuances in outcomes based on tooth location. The intergroup analysis did not identify significant differences in the evaluated parameters.

The Composeer (Coltene/Whaledent) system is a new generation for the restoration of frontal teeth. It is produced industrially or prefabricated polymerizing nanohybrid composite enamel laminate. It has proven marginal adaptation, and due to the finished anatomical shape, it shortens the working time by 40%. The new Composeer anterior tooth restoration systems provide a treatment option for minimally invasive composite restoration and laboratory-made veneer technology. The direct composite system offers a new dimension to the treatment and provides new economic perspectives for both patients and dentists in just one visit.

(Ferracane JL et al. 2010) stated that although nanofilled composites and nanohybrid composites represent the state of the art in terms of filler formulation, a recent systematic review of in vitro studies found no supporting evidence that nanosized composites improved their mechanical properties.

From what can be seen, the new composite system is easy and efficient to use; only one visit is enough to obtain quality dental restorations with excellent aesthetic results, and no laboratory and tooth impressions are required. There is optimal placement in the choice of color, shape, and structure. The composite laminates of the Composeer system optimize and simplify restorative dentistry and provide a new option for function, economy, and aesthetics that benefits both doctors and patients.

3. Methodology

For the realization of the study objectives, clinical research is conducted at the private dental clinic "Ana Dent" in Kosova-Lipjan. This research is carried out under the scientific supervision of the Department of Tooth Pathology and Endodontics at the Faculty of Dentistry, "Ss. Cyril and Methodius" in Skopje.

1. **Clinical Trial Design:** The comparative clinical research includes 72 teeth in patients between the ages of 20 and 60 with representation of both sexes. The study is performed in vivo, and the patients are divided into two groups:
 - 1.1 **Experimental Group (Group A):** The first group - 36 teeth that will undergo aesthetic restorations with the nanocomposite material using a direct anatomical layering technique in the frontal maxillary region.
 - 1.2 **Control Group (Group B):** The second group – 36 teeth on which the direct technique of prefabricated composite laminates with the Componeer system will be applied in the frontal maxillary region.
2. **Clinical Examination:** Participants are examined three times: the first time in the first week after the application of the composite laminates with both techniques, the second after 6 months, and the third after 12 months. Participants are instructed to inform and report at any time if they have problems with the laminates.
3. **Evaluation Parameters:** The assessment includes the following parameters:
 - 3.1 **Gingival Bleeding Index:** Recorded by gentle probing of the gingival crevice. Scores are assigned based on bleeding, and the index is calculated for each tooth.
 - 3.2 **Surface Texture:** Evaluated by running an explorer on the veneered labial surface and visually examining it after air-drying. Tactile scores are awarded.
 - 3.3 **Marginal Integrity:** Assessed by running the explorer along the margins of the veneer down to the root surface. Scores indicate the degree of catches.
4. **Material Selection:** Both groups are informed about the procedure and the study's time frame (one to twelve months). Material choice for laminates will be ISP Empress direct composite veneering material for Group A and Componeer (Coltene) for Group B. Clinical evaluations will be conducted immediately after luting and at one, six, and twelve months.
5. **Data Collection and Processing:** For comprehensive coverage and realization of research goals, a combination of quantitative and qualitative methodological techniques is employed. Results are presented through tabular formats, graphical representations, and digital photography. The acquired data undergo rigorous statistical analyses supervised by a professional biostatistician, adhering strictly to the defined analytical plan. The entire study is conducted in accordance by ethical guidelines and after obtaining approval from the Institutional Ethics Committee

4. Statistical Processing and Data Analysis

The analytical backbone of this study rests upon intricate statistical analyses, focusing on variables such as color, surface texture, marginal integrity, and gingival condition. Hypotheses are crafted to scrutinize and compare outcomes between the application of Coltene-Componeer and nano-composite techniques. The robust application of rigorous statistical methods ensures the derivation of reliable insights, significantly contributing to the broader understanding of aesthetic dentistry.

5. Expected Results

This investigation aims to comprehensively assess the advantages and disadvantages associated with the application of two distinct tooth restoration techniques in the frontal region. It is anticipated that the results from the second group of respondents will demonstrate superior outcomes in terms of aesthetics, timing, longevity, and periodontal health. Parameters such as recession, gingival inflammation, bleeding, plaque index, and marginal tooth integrity are expected to exhibit more favorable results in this group.

The anticipated findings of this study are poised to offer a substantial contribution to the assessment of prefabricated composite veneers within the framework of "bio-aesthetics," emphasizing a minimally invasive approach. The study aims to delineate a valuable spectrum of non-invasive and minimally invasive techniques that align with contemporary trends in operative dentistry.

To the best of current knowledge, there exists a noticeable gap in the clinical evaluation of the impact of prefabricated composite veneers within the realm of "bio-aesthetics" and minimally invasive concepts. The novelty of this study lies in its potential to fill this void by providing empirical insights into the clinical performance of these veneers. Consequently, the outcomes may pave the way for more refined and effective approaches to aesthetic treatments for patients.

This study stands as a pioneering effort, offering a unique perspective on the clinical efficacy of prefabricated composite veneers. By addressing the specific context of "bio-aesthetics," the research aims to significantly contribute to the existing body of knowledge in aesthetic dentistry. The potential impact extends beyond the immediate scope of the study, providing practitioners with valuable data to enhance decision-making and optimize patient outcomes within a minimally invasive paradigm.

6. Application of Research Results

The expected results will be applied in everyday clinical practice in terms of the recommendation of prefabricated composite veneers in the context of "bio-aesthetics," a minimally invasive concept, and outlined a very useful spectrum of non-invasive and minimally invasive techniques, especially when ceramic veneers are contraindicated because of price, long chair time, and lifetime commitment. Based on the results of patient satisfaction provided in the questionnaire, it will be assessed which of the denture base materials is more suitable, since it is an essential factor in restorative dentistry.

References

- [1] Parag Dua, Sanjay Manohar Londhe, Gaurav Dua, Atul Kotwal, and Sachin Gupta. "Clinical evaluation of 'componeers' and direct composite veneers using minimally invasive enamel preparation technique: In vivo study," 2020.
- [2] DSJ D'Souza and M Kumar. "Esthetics and Biocompatibility of Composite Dental Laminates," 2010.
- [3] M. Gargari, F.M. Ceruso, A. Pujia, and V. Prete. "Restoration of anterior teeth using an indirect composite technique. Case report," 2014.
- [4] Shetty A, Kaiwar A, Shubhashini N, Ashwini P, Naveen DN, Adarsha MS, Shetty M, Meena N. "Survival rates of porcelain laminate restoration based on different incisal preparation designs: An analysis." *J Conserv Dent.* 2011 Jan-Mar;14(1):10-15.
- [5] Bora Korkut, Funda Yanikoğlu, and Mahir Günday. "Direct Composite Laminate Veneers: Three Case Reports."
- [6] Ferracane JL. "Resin composite—state of the art." *Dent Mater.* 2011; 27(1):29-38.
- [7] Dietschi D. "Free-hand bonding in the esthetic treatment of anterior teeth: Creating the illusion." *J Esthet Dent.* 1997; 9(4):156-64.
- [8] Dietschi D. "Free-hand composite resin restorations: A key to anterior aesthetics." *Pract Periodontics Aesthet Dent.* 1995; 7(7):15-25.
- [9] Sowmya K, Dwijendra KS, Pranitha V, Roy KK. "Esthetic Rehabilitation with Direct Composite Veneering: A Report of 2 Cases." *Case Rep in Dent.* 2017; 2017:7638153.
- [10] Sensi LG, Marson FC, Roesner TH, Baratieri LN, Monteiro S Jr. "Fluorescence of composite resins: Clinical considerations." *Quintessence Dent Technol.* 2006; 29:43-53.
- [11] Dietschi D, Devigus A. "Prefabricated composite veneers: Historical perspectives, indications and clinical application." *Eur J Esthet Dent.* 2011; 6(2):178-87.
- [12] Gomes G, Perdigo J. "Prefabricated composite resin veneers – A clinical review." *J Esthet Restor Dent.* 2014; 26(5):302-13.
- [13] Jain V, Das TK, Pruthi G, Shah N, Rajendiran S. "Comparative evaluation of effects of bleaching on color stability and marginal adaptation of discolored direct and indirect composite laminate veneers under in vivo conditions." *J Indian Prosthodont Soc.* 2015; 15:46-52.
- [14] Barham TP Jr, Mayhew RB, Cowan RD, Lubow RM, Pierson WP, Voss JE. "Gingival response to laminate veneer restorations." *Oper Dent.* 1983; 8:122-9.
- [15] Jain V, Das TK, Pruthi G, Shah N, Rajendiran S. "Comparative evaluation of effects of bleaching on color stability and marginal adaptation of discolored direct and indirect composite laminate veneers under in vivo conditions." *J Indian Prosthodont Soc.* 2015; 15:46-52.
- [16] Chandramouli MK. "Componeers." *Int J Prev Clin Dent Res.* 2017; 4:232-4.