

Article

# Esthetic Microprostheses for Anterior Teeth: Clinical Rationale for Selecting the Restoration Design

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**Abstract:** Microprosthetic restoration of anterior teeth is a widely used approach in contemporary aesthetic dentistry. Veneers allow correction of discoloration, shape abnormalities, and surface defects of hard dental tissues with minimal invasive intervention. Throughout life, teeth are exposed to various organic and inorganic pigments. Some remain on the enamel surface, causing superficial staining, while others penetrate enamel and dentin, leading to intrinsic discoloration. Modern veneers are considered an effective solution for aesthetic rehabilitation of the anterior dentition, providing high esthetic integration and functional stability. Proper clinical protocol ensures minimal impact on periodontal tissues. Contemporary ceramic materials and zirconia dioxide are commonly used for veneer fabrication. Dental ceramics are glass-based materials characterized by smooth surface texture, color stability, and biocompatibility. Zirconia dioxide is a high-strength material widely used in prosthetic dentistry for more than a decade due to its favorable mechanical and esthetic properties.

**Keywords:** Anterior Teeth Defects, Veneers, Aesthetic Microprosthetics, Ceramic Restorations.

## Introduction

In contemporary dental practice, priority is given to the implementation of high-technology treatment methods, among which direct aesthetic restoration of anterior teeth using light-cured composite materials occupies a significant place [5]. This approach enables restoration of the anatomical form and color of the tooth directly in the patient's oral cavity, ensuring minimal invasiveness and high modeling accuracy.

Indications for direct veneering include hard tissue defects involving one-third to one-half of the clinical crown, as well as the need to modify tooth shape, shade, or to perform minor correction of tooth position within the dental arch [1], [4]. This technique is particularly relevant in the management of carious and non-carious lesions of anterior teeth when a pronounced esthetic outcome is required while preserving the maximum amount of natural tooth structure.

According to several authors, the use of veneers provides more predictable and stable esthetic results compared with conventional direct restorations, even when modern light-curing composite materials are applied [2], [3], [7]. Long-term clinical observations demonstrate superior color stability, maintenance of anatomical integrity, and higher patient satisfaction associated with the veneering technique.

Over several years, we conducted a clinical study to evaluate the effectiveness of direct veneering for the restoration of anterior teeth in the treatment of carious and non-carious lesions, taking into account the above-mentioned factors. The analysis included assessment of composite veneers according to multiple criteria: marginal adaptation, color stability, degree of wear, presence of microcracks, preservation of anatomical form, and response of surrounding tissues. The findings allowed for a comprehensive characterization of the clinical performance of directly fabricated composite veneers over different follow-up periods [6], [8].

### **Aim of the Study**

The aim of the present study was to perform a comparative clinical evaluation of the effectiveness of veneers in the restoration of anterior teeth based on the analysis of a complex of morphofunctional and esthetic criteria assessed at different follow-up periods.

### **Materials and Methods**

The clinical study included 36 patients aged 20 to 52 years. Among them were 21 women (58.3%) and 15 men (41.7%). A total of 94 anterior teeth with hard tissue defects of various etiologies were restored.

The observed lesions included Class III, IV, and V carious cavities according to Black's classification, as well as non-carious lesions such as enamel erosion and wedge-shaped defects of moderate to significant depth requiring esthetic rehabilitation. In most cases, tissue loss involved approximately one-third of the vestibular surface of the clinical crown.

The patients were divided into two clinical groups:

- **Group I (n = 46 teeth):** restoration performed using the direct veneering technique with composite coverage of the vestibular surface.
- **Group II (n = 48 teeth):** defects restored using the conventional adhesive technique without complete coverage of the vestibular surface.

Inclusion criteria comprised preserved pulp vitality, absence of pronounced periodontal pathology, and satisfactory oral hygiene status. Absolute and relative contraindications to esthetic restorative procedures were considered in all cases.

### **Tooth Preparation and Restorative Technique**

In Group I, after removal of affected tissues, minimally invasive preparation of the vestibular surface was performed. Enamel reduction was carried out using diamond burs to an average depth of 0.3–0.5 mm, creating a uniform reduction layer. A smooth chamfer was formed in the cervical region, and controlled proximal extension was performed to ensure proper adaptation of the veneering material. An enamel bevel was created at the incisal edge to improve the transition between the restoration and natural tooth structure and to enhance esthetic integration.

In Group II, the preparation technique depended on the cavity class. For Class III defects, additional micromechanical retention features were created in the gingival area, and an enamel bevel up to 2 mm in width was prepared. For Class IV lesions, an extended retention area with a wider enamel bevel was formed to increase resistance to functional loading. Class V cavities were shaped in an oval or elliptical form with the gingival wall parallel to the gingival margin. Retentive grooves were created along the enamel–dentin junction, and an enamel bevel 3–4 mm wide was prepared.

In cases of deep caries, calcium-containing liners were applied and subsequently covered with glass ionomer cement for isolation.

Management of erosions and wedge-shaped defects in Group II involved conservative removal of softened dentin (0.5–1.0 mm), enlargement of the adhesive area through enamel roughening with fine-grit diamond burs, and formation of conditions ensuring optimal composite retention.

Following preparation, the procedures included antiseptic treatment, isolation of the operative field, acid etching, application of an adhesive system, and incremental placement of a light-cured composite material in accordance with the manufacturer's protocol.

Finishing procedures consisted of contouring, polishing, and surface refinement to achieve a smooth texture and natural gloss. All patients received individualized instructions regarding oral hygiene maintenance and follow-up visits.

### Evaluation Criteria and Follow-Up Methodology

The clinical assessment of restorations was performed over a 5-year period using modified USPHS (Ryge) criteria. The analysis included the following parameters:

- **AF** – preservation of anatomical form.
- **MA** – marginal adaptation.
- **C** – presence of secondary caries.
- **SR** – surface condition (roughness).
- **MD** – marginal discoloration.
- **CM** – color stability and match with the natural tooth shade.
- **DF** – postoperative sensitivity or patient-reported discomfort.

Each parameter was rated on a four-point scale:

- **Alfa (A)** – optimal condition of the restoration.
- **Bravo (B)** – minor changes not affecting function or esthetics, correctable without replacement.
- **Charlie (C)** – significant defects requiring planned replacement.
- **Delta (D)** – critical defects requiring immediate replacement.

Follow-up examinations were conducted at 12, 24, 36, 48, and 60 months after treatment.

## Results

### 1-year follow-up:

In the direct veneering group (Group I), 97.8% of restorations were rated Alfa across all parameters. One restoration (2.2%) showed minor marginal discoloration (Bravo), which was corrected by polishing. In Group II, 91.7% of restorations received an Alfa rating. Four restorations (8.3%) demonstrated marginal discoloration and minor color mismatch (Bravo), which required correction.

### 2-year follow-up:

In Group I, 95.6% of restorations maintained an Alfa rating. Two restorations (4.4%) exhibited minimal cervical marginal discoloration (Bravo), corrected without replacement. In Group II, the proportion of restorations with defects increased to 14.6%, including marginal discoloration and surface roughness in two cases, all classified as Bravo.

### 3-year follow-up:

Group I showed 93.5% of restorations with excellent outcomes. Three restorations (6.5%) had moderate cervical color changes (Bravo). No alterations in anatomical form or secondary caries were observed. In Group II, defect frequency rose to 27.1%. Four restorations exhibited pronounced marginal discoloration, and three showed anatomical form defects at the incisal edge (Class IV), two of which were rated Charlie, requiring planned replacement.

### 4-year follow-up:

In Group I, 10.9% of restorations showed minor defects (Bravo), all corrected by polishing and contouring. In Group II, 33.3% of restorations presented defects. Five restorations (10.4%) required replacement due to incisal edge chipping and pronounced marginal discoloration.

### 5-year follow-up:

Group I maintained high clinical performance, with 89.1% rated Alfa. Five restorations (10.9%) exhibited moderate cervical marginal discoloration (Bravo). No secondary caries or veneer fractures were reported, and no replacements were needed. In Group II, only 65.2% of restorations retained an Alfa rating. Twelve restorations (25.0%) had persistent marginal discoloration, four (8.3%) showed incisal edge chipping, and three (6.5%) developed secondary caries. A total of nine restorations (18.7%) required replacement.

**Summary:**

These results demonstrate that direct veneering provides superior esthetic stability, better preservation of anatomical form, and lower incidence of defects over five years compared to conventional adhesive restorations. Defects in the veneering group were less frequent, appeared later, and were mostly manageable without full restoration replacement.

**Discussion**

Analysis of the five-year clinical results demonstrated higher stability of both esthetic and functional outcomes in the direct veneering group. The most common defect observed in both groups was marginal discoloration. However, when veneers were used, this defect appeared later, was more localized (mainly in the cervical area), and could be corrected without full replacement of the restoration.

In the conventional adhesive restoration group, color changes appeared earlier, were more widespread, and were more often associated with alterations in anatomical form and secondary caries. The frequency of restorations requiring replacement was nearly three times higher compared to the veneering group.

Overall, five-year clinical follow-up confirms the advantage of using direct veneers for anterior teeth in terms of esthetic stability, preservation of anatomical form, and overall restoration longevity.

**Conclusion**

The results of this clinical study indicate that direct veneering is more effective than conventional adhesive restorations without complete vestibular coverage. The benefits of composite veneers were observed both in early and long-term follow-up and included superior color stability, more reliable marginal adaptation, and better maintenance of anatomical form.

During the five-year monitoring period, restorations performed using direct veneers exhibited a lower incidence of marginal discoloration, material chipping, and secondary caries, and required fewer reinterventions. Minor defects that did occur were mostly manageable without complete replacement.

These clinical findings support the broader implementation of direct veneers in therapeutic dentistry, particularly for anterior teeth restorations where high demands for esthetics and long-term durability are required.

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