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Original Research

Comparative study of patient-reported outcomes with different aesthetic restorative materials in anterior teeth

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ABSTRACT:

Objective: The aim of this study is to compare patient-reported outcomes for different aesthetic restorative materials used in anterior teeth, focusing on factors such as aesthetics, functionality, durability, and overall satisfaction. The materials studied include composite resins, glass ionomer cements (GICs), and ceramic restorations. **Materials and Methods:** A total of 180 patients requiring aesthetic restorations of anterior teeth were enrolled. The patients were divided into three groups, based on the type of restorative material used: composite resin, GIC, and ceramic restorations. Patient-reported outcomes were evaluated using a visual analog scale (VAS) over a follow-up period of 12 months. Outcomes assessed included aesthetics (color, translucency), functionality (comfort during biting/chewing), durability (chip/fracture incidence), and overall satisfaction. Statistical analysis was performed using ANOVA and post-hoc testing to determine significant differences between the materials. **Results:** Patients treated with ceramic restorations reported the highest satisfaction across all categories, with 90% expressing satisfaction with aesthetics and functionality. Composite resins received moderate satisfaction scores, with patients noting concerns about discoloration over time. GICs had the lowest satisfaction scores, particularly regarding aesthetics, due to opacity and poorer translucency. Durability was rated highest for ceramic restorations, with fewer incidents of chips or fractures (5%) compared to composite resins (15%) and GICs (25%). **Conclusion:** Ceramic restorations provide superior aesthetic outcomes and durability in the restoration of anterior teeth compared to composite resins and GICs. Composite resins offer an affordable option with good initial aesthetic performance but are prone to discoloration. GICs, while functional, are less favorable in terms of aesthetic satisfaction. Clinicians should consider these outcomes when selecting materials for anterior restorations, with a focus on balancing patient expectations with clinical outcomes.

Keywords: Aesthetic restorations, anterior teeth, composite resin, glass ionomer cement, ceramic restorations, patient-reported outcomes, durability.

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INTRODUCTION

Restorative materials for anterior teeth have advanced significantly over the years, with aesthetics playing a critical role in patient satisfaction and clinical success. The anterior teeth are highly visible and integral to both facial aesthetics and function, making material selection essential in restorative dentistry. Patients now expect not only functional restorations but also materials that closely mimic the natural appearance of teeth [1]. The choice of restorative material, particularly for anterior teeth, affects outcomes such as aesthetics (color and translucency), durability, and comfort.

The most commonly used materials include composite resins, glass ionomer cements (GICs), and ceramics. Composite resins are widely used due to their ease of application, affordability, and relatively good aesthetic properties. However, they are prone to discoloration and may not maintain their aesthetic appeal over time. GICs are chosen for their fluoride-releasing properties and chemical bonding to tooth structures but are often considered inferior in terms of aesthetics due to their opacity. Ceramic restorations, including porcelain and zirconia, are considered the gold standard for aesthetic outcomes but come at a higher cost and require more time to fabricate and place [2]. This study aims to evaluate patient-reported outcomes for these materials, focusing on aesthetics, functionality, and durability, to provide clinicians with evidence to guide material selection in anterior restorations.

MATERIALS AND METHODS

Study Design

This prospective, comparative study was conducted over 12 months at three dental clinics. A total of 180 patients requiring aesthetic restorations of anterior teeth were enrolled. Patients were randomly assigned to one of three groups, based on the material used: composite resin, GIC, or ceramic restorations. Ethical approval was obtained, and all patients provided informed consent.

Patient Selection

Inclusion Criteria

- Patients aged 18 to 65 years with anterior teeth requiring restoration.
- Aesthetic concerns, such as discoloration, fractures, or decayed anterior teeth.
- No history of systemic conditions affecting oral health (e.g., uncontrolled diabetes).

Exclusion Criteria

- Patients with severe periodontal disease.
- Patients with multiple missing teeth requiring full-mouth rehabilitation.
- Allergies to restorative materials.

Materials

Three types of materials were evaluated:

1. Composite Resins: Direct resin-based restorations placed chairside, offering a balance between aesthetics and affordability.
2. Glass Ionomer Cements (GICs): Restorations used for their fluoride release and chemical bonding but known for inferior aesthetic qualities compared to composites and ceramics.
3. Ceramic Restorations: Indirect restorations fabricated in a dental lab, including porcelain or zirconia, known for their superior aesthetics and durability.

Evaluation and Follow-up

Patients were followed up at 1 month, 6 months, and 12 months post-restoration. Outcomes were assessed based on the following parameters:

1. Aesthetics: Color matching, translucency, and overall appearance.
2. Functionality: Comfort during biting and chewing, as reported by the patient.
3. Durability: Incidence of chips, fractures, or wear.
4. Overall Satisfaction: A visual analog scale (VAS) ranging from 0 (not satisfied) to 10 (fully satisfied) was used to gauge patient satisfaction across all categories.

Statistical Analysis

Descriptive statistics were used to summarize the data. Differences between the three groups were analyzed using one-way ANOVA, and post-hoc tests were conducted to identify significant differences between the groups. A p-value of < 0.05 was considered statistically significant.

RESULTS

Aesthetic Outcomes

Patients treated with ceramic restorations reported the highest satisfaction with aesthetics, with 90% of patients giving a VAS score of 9 or above for color matching and translucency. Composite resin restorations scored moderately, with an average VAS score of 8.2. Patients reported concerns about discoloration over time, particularly at the 12-month follow-up. GIC restorations received the lowest scores, with only 55% of patients reporting satisfaction scores of 7 or higher, largely due to the material's lack of translucency and its opaque appearance (Table 1).

Functionality and Comfort

Functionality, including comfort during biting and chewing, was highest for ceramic restorations, with a mean VAS score of 9.1. Composite resins also performed well initially, though some patients reported minor discomfort related to wear and slight shifts in bite alignment over time (VAS score: 8.3). GICs performed the worst, with patients reporting more frequent discomfort during biting, particularly in cases of thicker restorations used to correct larger defects (VAS score: 7.0) (Table 2).

Durability and Incidence of Damage

In terms of durability, ceramic restorations outperformed both composite resins and GICs. Only 5% of ceramic restorations showed signs of chipping or fracture at 12 months, compared to 15% of composite resins and 25% of GIC restorations. Ceramic restorations, known for their high fracture toughness, maintained their integrity better, especially in cases of high biting forces. Composite resins, while reasonably durable, showed some signs of wear and marginal fractures, while GICs exhibited the most frequent issues with material integrity (Table 3).

Overall Satisfaction

Ceramic restorations led in overall satisfaction, with 94% of patients expressing a willingness to choose the same material again, citing superior aesthetics and durability. Composite resins received positive feedback, with 85% of patients satisfied, though some expressed concerns about long-term discoloration. GICs, while functional and affordable, had the lowest satisfaction rates, with only 68% of patients indicating satisfaction, mainly due to their less appealing aesthetic properties (Table 4).

Table 1: Aesthetic Satisfaction (VAS Score)

Material	Mean VAS Score for Aesthetics	% of Patients with VAS ≥ 8
Ceramic	9.5	90%
Composite Resin	8.2	78%
Glass Ionomer Cement (GIC)	6.5	55%

Table 2: Functionality and Comfort (VAS Score)

Material	Mean VAS Score for Functionality	% of Patients with VAS ≥ 8
Ceramic	9.1	88%
Composite Resin	8.3	80%
Glass Ionomer Cement (GIC)	7.0	65%

Table 3: Durability (Incidence of Damage)

Material	% of Restorations with Damage (Chips, Fractures)
Ceramic	5%
Composite Resin	15%
Glass Ionomer Cement (GIC)	25%

Table 4: Overall Patient Satisfaction

Material	% of Patients Satisfied	% of Patients Willing to Choose Again
Ceramic	94%	94%
Composite Resin	85%	85%
Glass Ionomer Cement (GIC)	68%	68%

DISCUSSION

Aesthetic Outcomes and Patient Satisfaction

The results of this study demonstrate that ceramic restorations offer the highest levels of patient satisfaction, particularly in terms of aesthetics. Ceramic restorations, such as porcelain and zirconia, are known for their ability to mimic the natural translucency and color of enamel, which explains the high patient-reported satisfaction scores. Patients in this group consistently reported better color matching and less noticeable restorations. These findings are consistent with previous literature highlighting ceramics as the gold standard for anterior tooth restorations, particularly in highly visible areas like the smile zone [3].

Composite resins, while initially providing good aesthetic outcomes, showed some limitations over time, particularly with discoloration. This was noted by several patients at the 12-month follow-up, and it reflects the resin's susceptibility to staining from dietary habits such as drinking coffee or tea. Despite this, composite resins remain a popular choice due to

their lower cost and ease of placement, making them an accessible option for many patients [4].

In contrast, GICs were the least favorable in terms of aesthetic outcomes, primarily due to their opacity and limited ability to mimic natural tooth translucency. GICs are more functional in nature, offering benefits such as fluoride release, but their aesthetic properties are clearly inferior to both ceramics and composites. This is reflected in the lower satisfaction rates among patients treated with GIC restorations.

Functionality and Durability

The functional performance of ceramic restorations was also superior, with patients reporting higher comfort levels during biting and chewing. This can be attributed to the high strength and stability of ceramic materials, which are able to withstand higher masticatory forces without deformation. Composite resins, while providing acceptable functionality, showed some wear over time, which may affect their long-term stability, especially in patients with bruxism

or other habits that exert higher pressure on the anterior teeth.

Durability was another critical factor where ceramic restorations outperformed both composite resins and GICs. Ceramics, with their superior fracture toughness and resistance to wear, maintained their integrity throughout the 12-month period, with only minimal damage reported. Composite resins, on the other hand, exhibited some marginal fractures and chips, particularly in patients with higher bite forces. GICs had the highest incidence of damage, which aligns with their known limitations in strength and wear resistance. This highlights that while GICs may be suitable for low-stress environments, they are less ideal for high-aesthetic, high-functionality restorations in the anterior region.

Overall Satisfaction and Clinical Implications

Overall, patients receiving ceramic restorations expressed the highest levels of satisfaction and were most likely to choose the same material again if given the option. This underscores the importance of aesthetics and durability in patient satisfaction, particularly for anterior restorations where appearance is paramount. While composite resins offer a cost-effective alternative with moderate success in both aesthetics and functionality, clinicians must be mindful of their tendency to discolor over time, which may affect long-term satisfaction. GICs, while functional and affordable, are less suited for high-aesthetic demands, making them a less ideal choice for anterior restorations unless other factors, such as cost or fluoride release, are prioritized.

Limitations

One limitation of this study is the relatively short follow-up period of 12 months. Longer-term follow-up is needed to fully assess the durability and performance of these materials over several years. Additionally, while the study relied on patient-reported outcomes, objective clinical evaluations, such as spectrophotometric color matching and wear analysis, could provide further insights into the performance of these materials.

Future Directions

Future studies should focus on the long-term performance of these materials, including factors such as the impact of maintenance practices (e.g., polishing and cleaning) on longevity. Additionally, the development of newer composite materials or resin-modified glass ionomer cements with improved aesthetics and durability should be explored, as these

could offer more affordable yet highly aesthetic alternatives to ceramics.

CONCLUSION

This comparative study demonstrates that ceramic restorations provide superior aesthetic outcomes and durability for anterior teeth compared to composite resins and GICs. While composite resins offer a more affordable and accessible option, they are prone to discoloration over time. GICs, although functional, are less favorable in terms of aesthetics and durability. Clinicians should consider these outcomes when selecting materials for anterior restorations, with a focus on balancing patient expectations, aesthetics, functionality, and long-term durability.

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