

Original Article

Comparison of PFM with Zirconia Crowns- A Clinical Study

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ABSTRACT

Introduction- Zirconia is a high-strength ceramic material with high fracture toughness, almost similar to that of porcelain fused to metal (PFM) crowns. The present study was conducted to assess the comparison of PFM crown with zirconia crowns. **Materials & Methods:** The present retrospective study was conducted on 440 patients of both genders. Patients were divided into 2 groups depending upon type of crowns. Group I consisted of 220 patients who received PFM crowns and group II consisted of 220 patients who received Zirconia crowns. All patients were assessed for loss of retention, fracture, root separation, sensitivity, secondary caries and endodontic problem. **Results-** Out of 440 patients, group I had 220 patients (males- 100, females- 120) and group II had 220 patients (males- 140, females- 80). The difference was non- significant (P= 1). Loss of retention was seen in group I (12) and group II (10), fracture in group I (25) and group II (20), root separation in group I (10) and group II (12), sensitivity in group I (5) and group II (4), secondary caries in group I (17) and group II (18) and endodontic problem in group I (14) and group II (12). The difference was non- significant (P> 0.05). **Conclusion-** Both PFM and zirconia crowns found to be equally effective in terms of retention, sensitivity, secondary caries, root fracture. However, zirconia showed slight better results.

Key words- Sensitivity, Endodontic, Zirconia.

Received: 10 November 2017

Revised: 18 November 2017

Accepted: 21 November 2017

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This article may be cited as: Sharma A, Singh VP, Atri B. Comparison of PFM with Zirconia Crowns- A Clinical Study. Int J Res Health Allied Sci 2018; 4(1):113-115.

INTRODUCTION

In the last decades, since the development of porcelain-fused-to-metal (PFM) procedures in the early sixties, metal-ceramic restorations have represented the “gold standard” for years in prosthetic dentistry. This is due to good mechanical properties and to somewhat satisfactory esthetic results, along with a clinically acceptable quality of their marginal and internal adaptation. The predictability and consistency of positive clinical results, validated by long-term scientific evidence, the ease and accuracy of the conventional casting procedures, as well as the findings of rare adverse reactions to precious alloys have made PFM crowns and bridges more and more popular and widespread over time.¹

Dental ceramic is generally regarded as biologically inert. However, other toxicities may exist from depleted uranium as well as some of the other accessory materials; in addition, the restoration may increase wear on opposing teeth.

Zirconia is a high-strength ceramic material with high fracture toughness, chemical inertness, and decent aesthetic properties, which is used mainly as a core material for single and multiunit fixed dental prostheses (FDPs) and abutments.² The high fracture resistance of zirconia is due to the ability of the material to transform from one structural phase to another, when exposed to stress. The phase transformation results in a volume increase in the stress zone, which hinders cracks from growing. Compared to metal-ceramic (MC) FDPs, a zirconia restoration is more aesthetical. Further, its high fracture strength, considerably higher than alumina, enables the manufacture of all-ceramic FDPs.³

Zirconia-based prostheses can be used for both single and multiple-unit crowns that are anchored on either implants or teeth. However, there have not been a significant amount of data published regarding a comparison of long-term clinical results from the use of different kinds

of zirconia-based crowns, particularly for patients who have attended private dental practices. Indeed, most published studies have been laboratory-controlled investigations and the majority of these clinical evaluations have reported data on small numbers of patients.⁴ The present study was conducted to assess the comparison of PFM crown with zirconia crowns.

MATERIALS & METHODS

The present retrospective study was conducted in the department of Prosthodontics. It comprised of 440 patients of both genders. All were informed regarding the study and

written consent was obtained. Ethical clearance was obtained before the study.

General information such as name, age, gender etc. was recorded. Patients were divided into 2 groups depending upon type of crowns. Group I consisted of 220 patients who received PFM crowns and group II consisted of 220 patients who received Zirconia crowns. All patients were assessed for loss of retention, fracture, root separation, sensitivity, secondary caries and endodontic problem. Results were tabulated and subjected to statistical analysis. P value less than 0.05 was considered significant.

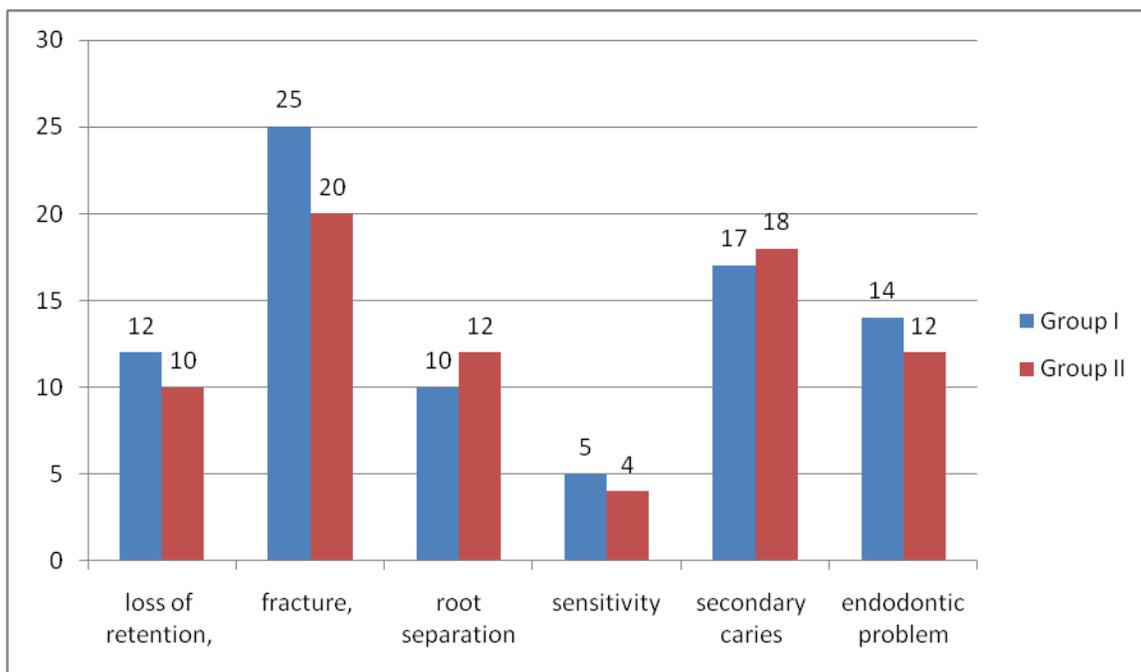
RESULTS

Table I Distribution of patients

| Total- 440 | | | | |
|---------------|---------|----------------|---------|---------|
| Group I (220) | | Group II (220) | | P value |
| Males | Females | Males | Females | |
| 100 | 120 | 140 | 80 | 1 |

Table I shows that out of 440 patients, group I had 220 patients (males- 100, females- 120) and group II had 220 patients (males- 140, females- 80). The difference was non- significant (P- 1).

Graph I Complications in patients



Graph I shows that loss of retention was seen in group I (12) and group II (10), fracture in group I (25) and group II (20), root separation in group I (10) and group II (12), sensitivity in group I (5) and group II (4), secondary caries in group I (17) and group II (18) and endodontic problem in group I (14) and group II (12). The difference was non- significant (P> 0.05).

DISCUSSION

Zirconia is chemically an oxide and technologically a ceramic material, not soluble in water, that was proved not to be cytotoxic and not to enhance the bacterial adhesion, that is lower than on titanium, as demonstrated by both in vitro and in vivo studies, moreover, it exhibits a favorable radio-opacity and a low corrosion potential. The mechanical performances of zirconia were extensively investigated on both SCs and 3- and 4-unit FPDs, with variable reported data, due to a noticeable difference of experimental conditions and measurements. Mechanical properties of zirconia were proved to be higher than those of all other ceramics for dental use, with a fracture toughness of 6–10 MPa/m^{1/2}, a flexural strength of 900–1200 MPa and a compression resistance of 2000 MPa.⁵

In this study, we included 440 patients. Out of 440 patients, group I had 220 patients (males- 100, females- 120) and group II had 220 patients (males- 140, females- 80). We found that loss of retention was seen in group I (12) and group II (10), fracture in group I (25) and group II (20), root separation in group I (10) and group II (12), sensitivity in group I (5) and group II (4), secondary caries in group I (17) and group II (18) and endodontic problem in group I (14) and group II (12). This is similar to Vultet al.⁶

A study by Gainluca et al⁷ included 142 patients who had received 248 single crowns (202 tooth-supported, 36 implant-supported) and 225 multiple units of up to six elements. Clinical events, including fracture and loss of retention, secondary caries, and marginal integrity, were recorded. The overall failure rate was computed for the fractured and lost prostheses. During the three-year follow-up period, four patients were lost from the study. Three of the zirconia prostheses suffered fractures in more than three units and the cumulative prosthesis survival rate was 98.2%. Twelve units lost retention and were re-cemented, and no secondary caries of the abutment teeth were reported. The aesthetic, functional, and biological properties were generally well-rated, and there were no differences between tooth- and implant-supported crowns. The lowest scores were given regarding the anatomical form of the crowns, as some minor chipping was reported. Relatively low scores were also given for the periodontal response and the adjacent mucosa. Overall, patient satisfaction was high.

Fernando et al⁸ showed that zirconia is one of the most promising restorative materials, because it yields very favourable mechanical properties and reasonable esthetic. Several in vitro and in vivo investigations reported suitable strength and mechanical performances of zirconia, compatible with clinical serviceability as a framework material for both single crowns and short-span fixed partial dentures.

CONCLUSION

Both PFM and zirconia crowns found to be equally effective in terms of retention, sensitivity, secondary caries, root fracture. However, zirconia showed slight better results.

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Source of support: Nil

Conflict of interest: None declared

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