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4 UNITS ZIRCONIA FIXED PARTIAL DENTURE ON PARTIAL CROSSBITE: CASE REVIEW

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ABSTRACT

An ideal Crown material that is well conforming and demonstrates increased biocompatibility, strength, fit and esthetics in clinical dentistry has always been desirable. However, the main obstacles were the inherent brittleness, low flexural strength, and fracture toughness of conventional glass and alumina ceramics. The recent introduction of ceramics based on zirconia as a dental material has generated considerable interest in the dental community. Zirconia has high density, high strength, great esthetics as well as biocompatibility with oral tissues which makes it one of the most desirable crown materials in advanced dentistry. In this case review, we can see a prosthetic 4-unit bridge construction when there is a unilateral crossbite in anterior region.

KEYWORDS :

INTRODUCTION

One of the most common cases in dentistry is the restoration of anterior teeth, which require enhanced esthetic results. Some of the options for restoring the anterior teeth are Porcelain fused to metal crowns, Zirconia crowns, Leucite crowns, Lithium Disilicate, Alumina crowns. All of them have their own advantages and disadvantages [table 1].

All these options for a crown are developed very recently with the development in CAD/CAM technology. So, the clinical use of these types of crowns are still under research and giving a long-term prognosis on the basis of material is quite questionable.

As we can see in the Table 1. Zirconia is the material of choice for an all ceramic long span bridge. Strength of zirconia overpowers the other and the esthetic properties of the material is still comparable to best ones. Having the combination of strength and esthetics, it makes a clear choice to use in an anterior 4-unit bridge.

The case under review presents with a 4-unit Zirconia bridge on a partial crossbite patient. The abutments are Lateral Incisors and bridge spans from one side Lateral Incisors to other side Lateral Incisors including missing Centrals Incisors. Due to crossbite on one side of anterior, the bridge spans from positive overjet to negative overjet.

Table 1: Brands, composition, and manufacturers of ceramic materials with recommended clinical indications [1][2]

Core material	System	Manufacturing techniques	Clinical indications
Glass ceramic			
Feldspathic (SiO_2-Al_2O_3-Na_2O-K_2O)	Vitablocs Mark II (VITA Zahnfabrik, Bad Sackingen, Germany)	Milled	Onlays, 3/4 crowns, crowns, veneers
	VITA TriLuxe Bloc (VITA Zahnfabrik)	Milled	Onlays, 3/4 crowns, crowns, veneers
	Vitablocs Esthetic Line (VITA Zahnfabrik)	Milled	Anterior crowns, veneers
Leucite (SiO_2-Al_2O_3-K_2O)	IPS Empress (Ivoclar Vivadent)	Heat pressed	Onlays, 3/4 crowns, crowns
	Optimal Pressable Ceramic (Jeneric Pentron, Wallingford, Conn)	Heat pressed	Onlays, 3/4 crowns, crowns
	IPS ProCAD (Ivoclar Vivadent)	Milled	Onlays, 3/4 crowns, crowns
Lithium-disilicate (SiO_2-Li_2O)	IPS Empress 2 (Ivoclar Vivadent, Schaan, Liechtenstein)	Heat pressed	Crowns, anterior FPDP
	IPS e.max Press (Ivoclar Vivadent)	Heat pressed	Onlays, 3/4 crowns, crowns, FPDP
	IPS™ e.max CAD (Ivoclar Vivadent)	Milled	Inlays, onlays, veneers, anterior and posterior crowns
Alumina			
Aluminum-oxide (Al_2O_3)	In-Ceram Alumina (VITA Zahnfabrik)	Slip-cast, milled	Crowns, FPDP
	In-Ceram Spinell (VITA Zahnfabrik)	Milled	Crowns
	Synthoceram (CICERO Dental Systems, Hoorn, The Netherlands)	Milled	Onlays, 3/4 crowns, crowns
	In-Ceram Zirconia (VITA Zahnfabrik)	Slip-cast, milled	Crowns, posterior FPDP
	Procera (Nobel Biocare AB, Goteborg, Sweden)	Densely sintered	Veneers, crowns, anterior FPDP
Zirconia			
Yttrium tetragonal zirconia polycrystals (ZrO_2 stabilized by Y_2O_3)	Lava (3M ESPE, St. Paul, Minn)	Green milled, sintered	Crowns, FPDP
	Cercon (Dentsply Ceramco, York Pa)	Green milled, sintered	Crowns, FPDP
	DC-Zirkon (DCS Dental AG, Allschwil, Switzerland)	Milled	Crowns, FPDP
	Denzir (Decim AB, Skellefteå, Sweden)	Milled	Onlays, 3/4 crowns, crowns
	Procera (Nobel Biocare AB)	Densely sintered, milled	Crowns, FPDP, implant abutments

FPDP: Fixed partial denture prosthesis

CASE REVIEW

32 Years old male patient presents with missing Central Incisors and Carious lateral Incisors. After careful diagnosis, Root Canal Treatment was done on the Lateral Incisors. After clear 2 weeks post RCT checkup, the bridge construction was started.

The laterals were prepared for Zirconia bridge and were given provisional bridge till the fabrication is finished [Figure.1]. The purpose of provisional bridge was also to see whether the forces on the anterior were normal or excessive. The provisional bridge was given at an edge to edge bite on the crossbite side to improve esthetics [Figure.2].

After a week of follow up it was found that the forces were excessive leading to the fracture of provisional bridge at the point of contact. So, the decision was made not to make a contact between the maxillary and mandibular anterior teeth. After careful consideration the crown on the crossbite side were made in crossbite to prevent any contact and excessive force.

Permanent Zirconia Bridge with anterior crossbite was fabricated and cemented as seen in Figure.3

Figure 1: Crown Preparation on Lateral Incisors for Zirconia Bridge.

Figure2: Temporary bridge with edge to edge bite.

Figure3: Permanent Zirconia bridge with anterior crossbite.

DISCUSSION

Due to the Exceptional properties of Zirconia (example high flexure strength and fracture resistance). It is the most recent framework material for fabrication for Anterior Fixed partial Dentures. Zirconia has the highest load bearing capacity among other esthetic crowns.

If connectors are properly designed, the longevity of the Zirconia bridge can be significantly increased. The CAD/CAM fabricated Zirconia bridges meet the clinical requirements of the margins and curvatures.

Zirconia was discovered by Martin Klaproth who was a chemist in 1789.[3] In pure state Zirconia cannot be found. It can be found as Zircon ($ZrO2 \times SiO2$) with silicate oxide or as Baddeleyite a free oxide (ZrO2)[4]. Baddeleyite occurs in three forms: monoclinic, tetragonal, and cubic and is a polymorphic material [5][6]

CONCLUSION

Zirconia Bridges can be used in wide variety of treatment planning's in dentistry. The strength and esthetic properties of Zirconia makes it a better choice for bridges that have to bear occlusal forces or impacts. The patient was followed up every 6 months for 3 years and presented with no occlusal or marginal distress. The bridge was esthetically pleasing as well as functionally stable.

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