

# STANDARDS OF TEETH PREPARATION FOR ANTERIOR RESIN BONDED ALL- CERAMIC CROWNS IN PRIVATE DENTAL PRACTICES IN SOUTH INDIA

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## ABSTRACT:

**BACKGROUND:** Tooth preparation is one of the important aspects of restorative dentistry because it establishes the foundation for whatever restoration is being placed. Unfortunately, training in dental schools relative to tooth preparation is too often oriented to the dimensions of rotary instruments rather than tooth morphology. Understanding of tooth morphology is essential for developing preparations that will permit the restorations placed upon them to be functionally durable, provide optimal esthetics, and be biologically compatible with the periodontal tissues. The most important aspect of tooth preparation is retention of the crown and esthetics. These two are governed by finish line. Hence a proper, specific finish line has to be chosen for different types of crowns.

**AIM AND OBJECTIVE:** To analyse and evaluate the standards of teeth preparations for anterior resin bonded all-ceramic crowns in private dental practice in India.

**MATERIALS AND METHOD:** A cross sectional study was done in south indian population where 50 laboratory casts with tooth preparations for all ceramic crowns for anterior teeth were obtained from different general dental practitioners. Data obtained were statistically analysed.

**RESULTS:** The study revealed that 70% of the dentists preferred a supra gingival margin for the tooth preparation. Majority preferred radial shoulder finish line over other types but a handful of them had no clear type of finish line being prepared with a depth in the range of 0.5mm to 1.5mm and uniformity was being observed in 84% of the cases. An axial convergence of 6 - 10 degree was prepared by 56% of the dentists.

**CONCLUSION:** Preparation for resin bonded all ceramic crowns of the Indian clinicians work investigated were varied widely. Most of the clinicians follow proper tooth preparation principles while a handful of clinicians followed no specific principles. Hence, proper tooth preparation principles must be followed to ensure effective treatment in terms of esthetics and retention.

**KEYWORDS:** Tooth, finish line, tooth preparation, dentistry, crown.

## INTRODUCTION:

All-ceramic dental crowns are restorations whose full thickness is made entirely of a glass-like substance, such as porcelain [1]. They were used more than 10,000 years ago during the Stone Age. In 1723, Pierre Fauchard described the enameling of metal denture bases [2]. De Chemant, a French dentist, introduced the first porcelain denture tooth in 1789. In 1903, the first ceramic crown was introduced by Dr. Charles Land [3]. The most important feature of these crowns is that they have a high esthetic value as they are made from a translucent material which is attractive to look at and blends in well with the rest of the teeth. Usually the ceramic restorative materials require the maximum amount of tooth reduction of 2 mm with shoulder or heavy chamfer margin and this is considered to be the most aggressive tooth preparation[4]. These restorations usually offer superior biocompatibility than the composite resin and porcelain-fused-to-metal restorations [5, 6,7]. Now a days ceramic crowns are produced using computer technology, e.g. CAD/CAM technology which is based upon 3D design. There are two types of ceramic crown-Zirconia and E-Max. A zirconia crown is a popular type of all-ceramic crown which is worn to improve the appearance of a tooth which has become stained or disfigured over the years [8]. They are durable, easy to wear and long lasting. The E-Max crown is a type of all-ceramic crown which is preferred for its longer lasting, aesthetic qualities.

Tooth preparation is one of the important aspects of restorative dentistry because it establishes the foundation for whatever restoration is being placed [9]. Unfortunately, training in dental schools relative to tooth preparation is too often oriented to the dimensions of rotary instruments rather than tooth morphology [10]. Proper knowledge about tooth morphology is essential for

developing preparations that will allow the restorations placed upon them to be functionally durable, provide optimal esthetics, and be biologically compatible with the periodontal tissues [11]. The most important aspect of tooth preparation is retention of the crown and esthetics [12]. These two are governed by finish line. Hence a proper, specific finish line has to be chosen for different types of crowns. Hence this research was being conducted

## METHODOLOGY:

50 laboratory casts with tooth preparations for all ceramic crowns for anterior teeth obtained from different general dental practitioners in Chennai were analyzed with an inclusion criteria of fixed partial denture casts for anteriors for all ceramic crowns and excluding complete and removable partial denture dental casts.

The following were analyzed using the casts :

1. The positions of tooth preparation margin in relation to the gingival margin on the buccal and lingual aspects.:

- a. supragingival margin
- b. Subgingival margin
- c. Level with gingival margin
- d. No clear margin

2. The total amount of tooth reduction in the buccolingual and mesiodistal planes:

- a. >3 mm
- b. 1-2mm
- c. <1mm

3. The amount of incisal reduction:

- a. >3 mm
- b. 1-2mm
- c. <1mm

4. The type of finish line :

- a. radial Shoulder
- b. Chamfer
- c. knife edge
- d. No clear margin

5. Axial convergence angle between opposing walls of prepared tooth.

- a. < 6° axial convergence
- b. 6° and 10° axial convergence
- c. > 10° axial convergence

6. Finish line depth :

- a. < 0.5 mm depth
- b. 0.5 and 1.5 mm depth
- c. > 1.5 mm

7. Uniformity of finish line:

- a. present
- b. absent

## RESULTS:

From the below analysis (Table.1), it was found that 70% of the dentists preferred a supra gingival margin for the tooth preparation whereas 4% had subgingival margin, 4% of the tooth preparation margins were in level with the gingival margin and 22% gave no clear margin. Almost 20% of the dentists made a reduction of >3mm, 76% made 1-2mm, 4% made <1mm in the buccolingual and mesiodistal planes and 38% gave an incisal reduction of >3mm, 60% reduced 1-2mm and 2% reduced <1mm. Majority preferred radial shoulder finish line over other types but a handful of them had no clear type of finish line being prepared with a depth in the range of 0.5mm to 1.5mm. Uniformity of the finish line was observed in 84% of the cases. And an axial convergence of <6 degree was prepared by 36% of the dentists, 6-10 degree by 56% and >10 degree by 8%. Graphic representation of the result is given in FIG 1.

**DISCUSSION:**

Tooth preparation is one of the important aspects of restorative dentistry because it establishes the foundation for whatever restoration is being placed. Unfortunately, training in dental schools relative to tooth preparation is too often oriented to the dimensions of rotary instruments rather than tooth morphology [11,19,20]. Understanding of tooth morphology is essential for developing preparations that will permit the restorations placed upon them to be functionally durable, provide optimal esthetics, and be biologically compatible with the periodontal tissues [11,19]. Overall, the preparation should be as conservative as possible with retention of some enamel [13]. The overall amount of tooth reduction is 2.0 mm. Occlusal clearance should be a minimum of 1 millimeter in centric relation and lateral excursions [14]. A taper of 6° to 10° must also be obtained on the prepared tooth. The most important aspect of tooth preparation is retention of the crown and esthetics. These two are governed by finish line. Hence a proper, specific finish line has to be chosen for different types of crowns. The preferred finish line for all ceramic crowns is radial shoulder [15]. In this study 70% have achieved radial shoulder finish line. It is established when all the axial walls ( buccal, lingual and proximal) are prepared using a flat end tapered bur. And a uniform finish line has to be obtained. Finish line position can be placed supragingivally on sound tooth tissue, but in reality this is often not possible. 60% of cases in uor study showed supraginigival margin . Sometimes aesthetics dictates a margin to be placed subgingivally and in these situations it should extend by 0.5-1 mm, but certainly not more than half the depth of the gingival sulcus, to ensure the epithelial attachment is not compromised [16,17]. According to several authors like Ziad Nawaf AL-DWAIIRI, Ahmad Saleh AL-HIYASAT and Haitham ABOUD, the placement of tooth margins subgingivally is critical because of the possibility of microleakage if the margins are placed either on dentin or cementum [11,20,21].

The overall amount of tooth reduction is 2.0 mm. Occlusal clearance should be a minimum of 1 millimeter in centric relation and lateral excursions. A taper of 6° to 10° MUST ALSO be obtained on the prepared tooth.Overall, the preparation should be as conservative as possible with retention of some enamel [18].

A dentist must be aware of different types of finish lines and the most preferred ones for each type of restorative material used. This is important because the occlusal forces vary in different regions of the oral cavity ,for eg: the mastication load is more on the posteriors than on the anteriors. Hence preparing a suitable finish line for a specific restorative material can increase the retention of the restorative material. And moreover any marginal discrepancies disrupt smooth tooth surfaces and hence render the site vulnerable to plaque accumulation while micro-leakage at the margin which allows the passage of ions, molecules, bacteria between the prepared tooth and the restorative material. [ 16,17].

**CONCLUSION:**

This study showed that preparations for RBCs of the Indian clinicians' work investigated varied widely. Most of the clinicians follow proper tooth preparation principles while a handful of clinicians followed no specific principles. It is a dentist's duty to provide best treatment to the patients , hence proper tooth preparation principles must be followed to ensure effective treatment in terms of esthetics and retention.

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## ILLUSTRATIONS:

Table 1. Data showing the following analysis of the casts.

QUESTION	OPTION A	OPTION B	OPTION C	OPTION D
<b>The positions of tooth preparation margin in relation to the gingival margin on the buccal and lingual aspects</b>	Supragingival (35)	sub gingival (2)	level with gingival margin (2)	no clear margin (11)
<b>the total amount of tooth reduction in the buccolingual and mesiodistal planes</b>	>3mm (10)	1-2mm (38)	<1mm (2)	- -
<b>incisal reduction</b>	>3mm (19)	1-2mm (30)	<1mm (1)	- -
<b>type of finish line</b>	radial shoulder (30)	chamfer (3)	knife edge (2)	no clear margin (15)
<b>axial convergence angle between opposing walls of prepared tooth</b>	<6degree axial convergence (18)	6degree and 10 degree convergence (28)	>10degree axial convergence (2)	- -
<b>finish line depth</b>	<0.5mm depth (12)	0.5mm and 1.5mm depth (38)	>1.5 mm depth -	- -
<b>uniformity of finish line</b>	present (48)	absent (2)	- -	- -

FIG 1: BAR GRAPH SUMMARISING THE RESULT

