Material Selection for Complete-Arch Rehabilitation: A Patient Treated with Various Dental Materials

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Objectives |

Discusses available evidence for material selection in complete-arch rehabilitation and presents the workflow for a patient treated with various dental materials to achieve optimal mechanical and esthetics outcomes.

Patient Presentation |

Fig. 1. Patient's facial photo, intraoral images, full-mouth radiographs, and CBCT.

Existing conditions: Missing teeth #2, #7, #13, #15 and #19. Peg shaped lateral tooth #10, failing restoration #14 and #21. Amalgam restorations #4, #5, #12, #20, #28. Metal-ceramic crowns #3, #18, #19, #30, #31. Dental midline shifted to the right. Extrusion of #4 and #5. Class III Angle classification. Cross bite on the left side. Generalized Periodontal disease (Stage III - Grade C), with teeth #23, #24, #25, and #26 exhibiting grade 2 mobility. Last dental visit: 3 years ago.

Medical History: Type 2 diabetes mellitus, Hypertension, Congestive heart failure, Coronary artery calcification, Aortic valve disorder, Obstructive sleep apnea (CPAP user). Prostate cancer, treated with radiation in 2021. Former tobacco use.

Treatment Plan |

Maxila: Crown lengthening on #4 and #5, e-max single crowns on #3 to #6 and #8 to #11. Zirconia bridge on #12-14.

Mandible: Extraction teeth #23-26. Temporary partial denture. Zirconia crowns on #18 to 21 and #31. Zirconia bridge on #28-30. Metal-ceramic bridge on #22-27.

Treatment Sequence |

Fig. 2. PMMA temporaries.

Fig. 3. Interocclusal record.

Fig. 4. Occlusal view of the upper and lower preparations.

Commonly Used Materials	Advantages	Indications of complete coverage crown	Suggested Tooth Reduction
Lithium Disilicate	‣ Moderate strength (Flexural strength: 370-460 MPa) ‣ High esthetics	‣ Anterior and posterior crowns except second molar ‣ Three-unit bridge up to second pre-molar	‣ Occlusal reduction: 1.5-2.0 mm ‣ Axial Reduction: 1-1.5 mm ‣ Finishline depth: 1mm ‣ Modified-shoulder margin (More conservative reduction are indicated to benefit from bonding to enamel)
3Y Zirconia	‣ High strength (Flexural strength: 900-1200 MPa) ‣ Acceptable esthetics in monolithic form (Low translucency)	‣ Anterior and posterior crowns ‣ Bridge with maximum 2 pontics	‣ Occlusal reduction: 1-1.5 mm ‣ Axial Reduction: 1 mm ‣ Finishline depth: 0.5 mm ‣ Chamfer or Modified-shoulder margin
4Y/5Y Zirconia	‣ Moderate Strength (Flexural strength: 600-800 MPa) ‣ Better esthetics than 3Y Zirconia in monolithic form	‣ Anterior and posterior crowns ‣ Bridge with maximum 1 pontic	‣ Occlusal reduction: 1-1.5 mm ‣ Axial Reduction: 1 mm ‣ Finishline depth: 0.5 mm ‣ Chamfer or Modified-shoulder margin
Metal-ceramic	‣ High strength and long history of use (Flexural strength is dependent to the alloy used) ‣ Good esthetics with appropriate tooth reduction	‣ Anterior and posterior crowns. ‣ Long-span bridge	‣ Dependent to the framework design and metal alloy used ‣ Metal alloy thickness 0.2-0.5 depending to metal ally used ‣ Ceramic thickness 1-1.5 mm depending to the region

Table 1. Comparison of ceramic materials.

Material Selection |

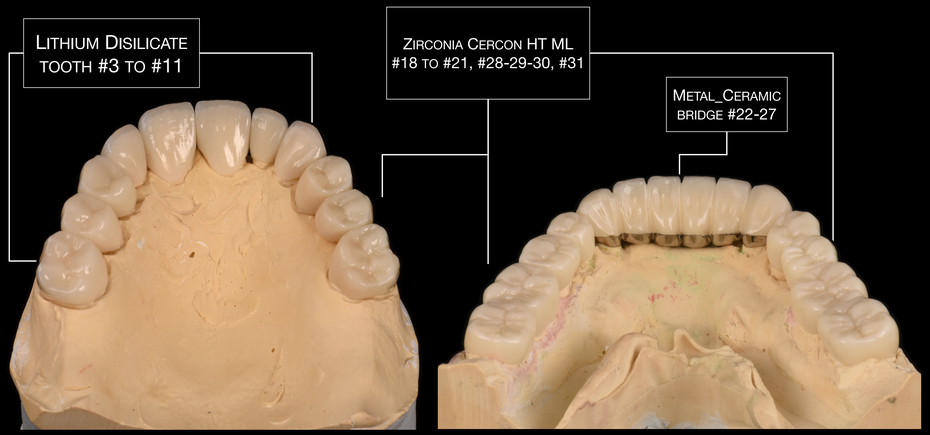

Fig. 5. Models with final crowns in position and the selected materials.

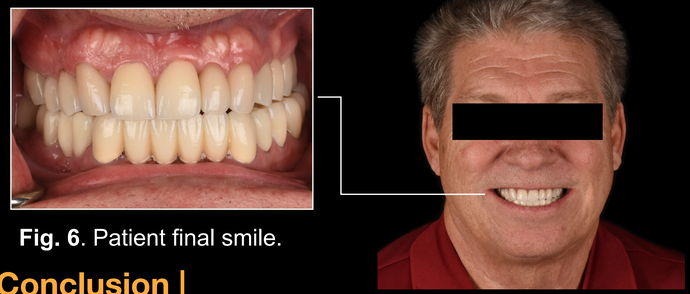

Fig. 6. Patient final smile.

Conclusion |

The use of various restorative materials in complete-arch rehabilitation is a viable approach for addressing diverse clinical needs. Careful selection and strategic application of these materials are key to achieving successful rehabilitation outcomes.