Combining implants and new restorative materials
From aesthetic risk assessment to final reconstructions – a case report

Introduction

To ensure both predictable treatment and a successful outcome when using an implant-supported reconstruction, meticulous preoperative treatment planning and diagnostics are crucial. These must include aesthetic risk assessment and prosthetically oriented implant positioning. Well-formulated guidelines have been established to help teams achieve long-term success, including detailed aesthetic risk assessment, principles for 3D planning of the implant position, and criteria for hard and soft tissue contour amelioration, when indicated.

New developments have led to new challenges in selecting restorative materials that guarantee predictable, long-lasting oral function and aesthetics for implant-supported reconstructions. All-ceramic materials are being more widely used, and their mechanical properties have increased promisingly. Since their biological and aesthetic characteristics can naturally match teeth and surrounding soft tissues, all-ceramic materials are becoming the primary option in patients with high aesthetic demands, as opposed to the once-conventional ‘gold standard’ of metal-ceramic reconstructions. Moreover, all-ceramic materials are becoming a less expensive alternative when the increased price of precious metals is taken into account.

All-ceramic materials still risk chipping of the veneering ceramic, especially with zirconia-based restorations. However, this can be minimised with ‘anatomical framework designs’ that provide support to the veneering ceramic, by centring occlusal contact points, and with attentive long-term follow-up.

The aim of this case presentation is to show how a partially edentulous young patient with very high aesthetic demands and expectations was restored using multiple implants and a combination of all-ceramic and metal-ceramic reconstructions, achieving function and acceptable aesthetics. The patient’s main desire was to avoid metal materials in the aesthetic zone.

Case presentation

A 32-year-old female patient presented with a failing splinted metal-ceramic fixed dental prosthesis (FDP) from teeth 15 to 22. Her chief expectations were re-establishment of oral health and aesthetic rehabilitation. There were no significant medical findings. The patient presented a thin gingival biotype and a high smile line that showed a variety of colours, with inadequate fit margins and asymmetric gingival levels (Figure 3).

The radiographic and clinical examination revealed periapical pathologies, absence of multiple teeth, inadequate endodontic therapies, and failing restorations with recurrent caries (Figures 4–6). The periodontal examination revealed generalised gingivitis.

The patient insisted on a conservative treatment option, excluded orthodontic treatment or extractions, and wished to avoid multi-unit fixed dental prostheses. Based on her desire and the existing clinical situation, the treatment plan included the elimination of local inflammation and re-establishment of adequate oral hygiene, followed by implant placement, provisional phase and final restorations (Figures 7–20).

Implant placement

Taking into account the remaining bone structure in the sites for implant placement, different types of implants were prosthetically placed as follows: Straumann® Tissue-level RN (Ø 4.1mm; SLA 8mm) on position 16 and 26. Straumann® Bone-level RC (Ø 4.1mm; SLActive 10mm) in position 14, and Straumann® Bone-level NC (Ø 3.3mm; SLActive 10mm) in position 22. Straumann® Tissue-level RN Roxolid® (Ø 3.3mm; SLActive 10mm) implants were placed in positions 36 and 46.

Prosthetic phase

The patient specifically wanted to avoid restorations including metal, particularly in the aesthetic zone.

Figure 1. Initial situation. The patient presented with a splinted metal-ceramic FDP from tooth 15 to 22 (cantilever).

Figure 2. Final situation.

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She didn’t present signs of wear or bruxism habits, although these were also controlled for during the provisional phase. Nonetheless, she agreed to use a nocturnal bite splint to protect the restorations, and also to attend routine follow-ups. With the consent of the patient, using all-ceramic materials that were available on the market at the time, the final restorations comprised: alumina-based restorations (NobelProcera Alumina™; VITA VM7) on teeth 15, 13, 12, 11 and 21 and two screw-retained zirconia-based single crowns (Cares® Straumann; VITA VM9) on teeth 22 and 14. Implant-supported metal-ceramic crowns were used on the first molar sites.

**Discussion**

This young edentulous patient presented high aesthetic demands and expectations. After a meticulous risk assessment and diagnostics, which revealing a high lip line and thin gingival biotype as the main characteristics, all-ceramic materials were chosen to restore the aesthetic zone. The restorations included tooth-borne and implant-supported restorations. The first included alumina-based (NobelProcera Alumina™; VITA VM7) single crowns. This type of restoration has shown survival rates ranged between 90.2–100% at 5 years15–17. The latter included zirconia abutments which were available on the market at that time (Cares® Straumann), veneered with VITA VM9. Especially for the lateral-maxillary narrow-diameter implant, the use of a narrow one-piece screw-retained zirconia abutment was a risky decision18. Even though the patient was informed about this drawback, she insisted on avoiding metal-ceramic. The positive points were that she did not reveal signs of bruxism and agreed to attend yearly follow-ups. Nowadays, we have the option of using a secondary metallic component that may improve the stability of zirconia abutments (i.e. Straumann® Cares® Variobase™).

For posterior implant-supported restorations, manufacturers currently provide monolithic CAD/CAM crowns made from lithium-disilicate blanks or yttrium oxide partially stabilised zirconia (Y-TZP), which can be luted on prefabricated-titanium implant abutments when all-ceramic materials are required. These should offer promising mechanical and economical advantages. Nevertheless, clinical data on this type of implant-supported reconstructions is not yet available19.

As for the alumina-based tooth-borne restorations and implant-supported crowns, an anatomical framework design was used to support the veneering ceramic20,21. This was followed by regular relief of occlusal contact points in unsupported veneer ceramic during follow-ups19.

**Summary**

Implant therapy depends on meticulous diagnosis and treatment planning. This case report shows how a young edentulous patient with high aesthetic demands was restored using different types of implants and restorative materials available at that time. After a rigorous aesthetic risk assessment, all-ceramic crowns were chosen for the aesthetic zone and metal-ceramic for the molar regions. Adhering to clinical recommendations such as anatomical framework designs and occlusal controls can reduce mechanical complications in cases like this.
Figure 7. Treatment plan

Figure 8. Provisional phase

Figure 9. Framework 'anatomical designs'

Figure 10. Frontal view anterior restorations

Figure 11. Final restorations

Figure 12. X-ray after screw-retained crown placement with zirconia abutment (Straumann® Bone-level NC implant 10mm)

Figure 13. Left-lateral view after final placement of restorations

Figure 14. Initial status: occlusal maxillary view

Figure 15. Final situation: occlusal maxillary view

Figure 16. Initial status: occlusal mandibular view

Figure 17. Final situation: occlusal mandibular view

Figure 18. Frontal smile 3-year follow up

Figure 19. 3-year follow-up panoramic radiograph

Figure 20. Traditional and digital pathways were performed to build final reconstruction
References


