

Integration of CAD/CAM technology in Global Dental Prosthetic treatment: A Case Report

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Abstract— *This case report describes how CAD CAM technology can be used in a complex dental prosthetic treatment. The patient was a 62 years-old man with loss of the vertical dimension resulting in chronic pain in his temporo-mandibular articulations. All the fixed prosthetic elements were created using CAD/CAM technology using the Lyra™3shape™Trios® system and vitro-ceramic blocs (IPS E.max CAD, Ivoclar Vivadent®) and (IPS Empress LT CAD, Ivoclar Vivadent®). The diagnostic set-up and wax-up served as references for the CAD/CAM system. The two-implant bridge and the mandibular removable prosthesis were produced using a conventional technique. At the end of the treatment, the patient reported good functional comfort with no pain.*

Key words: CAD/CAM, Global Prosthetic Rehabilitation

I. INTRODUCTION

The use of CAD/CAM systems is increasing in dental university hospitals and in private clinics, reducing the number of clinical sessions for patients. CAD/CAM technology also improves patient care when integrated in a complex prosthetic treatment plan. So when a such case attended at Clermont-Ferrand hospital a detailed examination of this patients was done and this patient relevant salient features were consolidated as case report.

II. METHODS

This case report observational study was conducted on a case who visited dental unit of the Clermont-Ferrand hospital for follow up use of a CAD/CAM system for the prosthetic treatment. A detailed case report was made of this patient and salient features were discussed.

III. CASE REPORT

This clinical case describes the use of a CAD/CAM system for the prosthetic treatment of a 62 years-old male patient who visited the dental unit of the Clermont-Ferrand hospital. The patient exhibited loss of the vertical dimension, which resulted in severe pain in his temporo-mandibular articulations. The patient presented a fully dentured maxillary arch with a metal-ceramic crown on one implant (16) and a metal-ceramic bridge on two implants (24-25-26-27). These two prosthetic elements were screwed on Straumann® implants (Figures A).

The partially edentulous mandible arch (Kennedy class III.1) was restored with a non-functional temporary removable partial prosthesis (Figure A). The treatment objectives were to restore a correct vertical dimension and a functional occlusal plane. In addition, the patient was particularly concerned about the aesthetic aspect of his maxillary incisors.

The first step was to validate a new vertical dimension. A transparent resin splint was placed on the lower jaw to increase the vertical dimension at the chosen level and which the patient had to wear for

two weeks outside meals. After two weeks, the functional comfort of the patient had greatly improved, and the pain had disappeared.

Figure A:

Initial occlusal situation



Figure B:

Diagnostic set-up and wax up of the prosthetic project



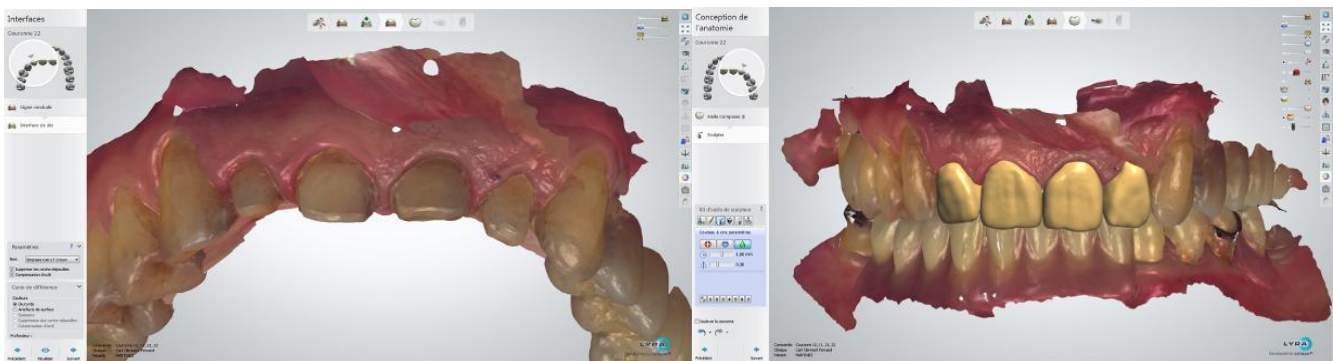
The new validated vertical dimension was used to produce the diagnostic set-up and the wax up (Figure B). The prosthetic project consisted of one endocrown (37), one overlay (47), a new bridge (24-25-26-27), a new removable prosthesis at the mandible arch and four ceramic crowns on the maxillary incisors.

The second step was to machine the fixed prosthetic elements on the posterior teeth: the endocrown and the overlay were processed with the Trios® system of 3Shape™ and machined in vitro-ceramic blocs strengthened with lithium disilicate (IPS E.max CAD, Ivoclar Vivadent®). The diagnostic set-up and the wax up were used as references after an optical impression was made on a plaster model.

Bonding was performed using a dental dam and dual bonding composite (Variolink II, IvoclarVivadent®). Within the same session, the new bridge was placed on the implants. Chemopolymerized acrylic resin was used to increase the height of the posterior resin teeth on the temporary removable partial prosthesis. An occlusal wedge was then created. At the end of this session, the mock-up was produced using resin (Structur premium base, VOCO GmbH®).

The third step involved the production of the new removable mandibular partial prosthesis, using conventional techniques.

During the fourth step, four ceramic crowns were placed on the maxillary incisors. The Trios® system of 3Shape™ was used and the vitro-ceramic crowns strengthened with leucite were manufactured (IPS Empress LT CAD, Ivoclar Vivadent®). Each optical scan was performed chairside. Provisional crowns were created by auto impression and resin (Structur premium base, VOCO GmbH® (Figures C1 and C2).

Figures C1 and C2: Modelling of four crowns with the 3Shape™ Trios® system.**Figure D: Front view after treatment**

The last step consisted of bonding these four ceramic crowns using a dual bonding composite (Variolink II, Ivoclar Vivadent®) (Figure D) and checking the occlusal contacts. The patient follow-up session took place one week later. The patient was completely satisfied with his new prosthesis in terms of comfort, and reported no more problems. Regular follow-up visits were planned to evaluate the long term effects of this oral rehabilitation.

IV. DISCUSSION

This present study observed that the decision to use CAD/CAM technologies in this particular case was made in order to save dental tissue and decrease the number of sessions. Indeed, these technologies allowed the production in only one session of overlays and endocrowns, the latter being the best option for the treatment of non-vital teeth with enough residual tissue.^{1,2}

Vitro-ceramic blocs strengthened with leucite at the anterior level have a better flexural modulus than other vitro-ceramic blocs.³ The fracture resistance of this material is as good as that of vitro-ceramic blocs strengthened with lithium disilicate.⁴

Considering the overlay, a space of two millimetres was ensured to obtain the recommended vitro-ceramic thickness.⁵

Although this patient was treated from the start at the Dental unit of the Clermont-Ferrand hospital (France), the lack of global prosthetic treatment planning at the beginning led to the implementation of an obsolete and non-functional prosthesis.

From the perspective of time management and economic viability for both the practitioner and the patient, this case perfectly illustrates the need for early planning of the prosthetic project.

V. CONCLUSIONS

The use of CAD/CAM technologies in this case, made it possible to propose a global prosthetic treatment to the patient, while saving dental tissue and using fewer sessions. This case points out the feasibility and the ease of implementing these new technologies in a global prosthetic treatment plan.

CONFLICT OF INTEREST

None declared till now.

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