Full mouth rehabilitation using the Astra Tech Implant System® EV and SmartFix® concept

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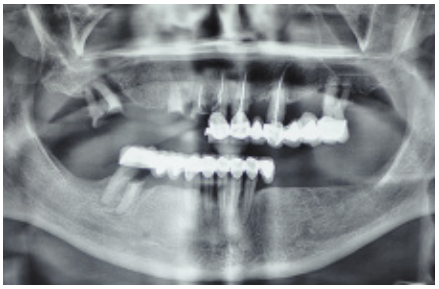
A facially driven treatment plan was carried out for a 56 year-old female patient with gummy smile and terminal dentition. After tooth extraction, in both arches, the patient was rehabilitated with provisional removable prostheses. After 12 weeks, four OsseoSpeed EV implants and Multibase Abutments EV were placed in the maxilla and mandible following the SmartFix concept. Guided surgery (Simplant guide) was used in the maxilla to place the implants in accordance to the biological 3A-2B rule,[1] followed by bone sculpturing to obtain an adequate soft tissue contour.[2] For the posterior mandible, tilted (30°) OsseoSpeed Profile EV implants were placed with the help of a SmartFix guide.[3] Immediate loading was applied for both arches. After 8 weeks, a definitive CAD/CAM PMMA prostheses was attached to the screw-retained Atlantis suprastructures.

1. The patient showed the failing fixed prostheses during smiling. The maxillary incisal curve was not parallel to the lower lip in the posterior area, and a gummy smile was indicated showing a band of more than 4 mm of soft tissue.

2. After removing tartar and bacterial plaque, a need to sculpture the maxillary soft tissue and to prosthetically restore the mandibular soft tissue was identified.

3. When smiling, the lip caught the protruding maxilla, showing too much soft tissue.



4. The bony profile anterior to the roots of the maxillary first molars was shown to be well suited for placement of tilted, regular platform OsseoSpeed EV implants. The bony situation in the mandible indicated placement of OsseoSpeed Profile EV implants.

5. Impressions were taken in alginate, and the casts obtained in plaster type IV were duplicated, and other casts in plaster type III were obtained. The four casts were mounted in the same articulator.

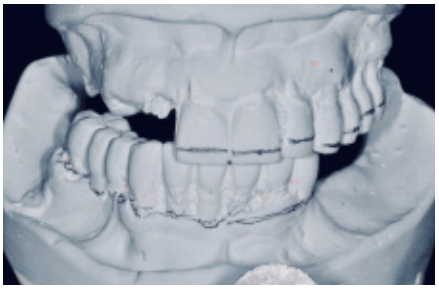
6. Smile design was performed over the existing prosthesis using a permanent marker, creating a parallel maxillary incisal curve with the lower lip during smile. Plans were made to move maxillary teeth apically.

1. Rojas-Vizcaya F. Biological aspects as a rule for single implant placement: The 3A-2B rule: a clinical report. J Prosthodont. 2013 Oct;22(7):575-580

2. Rojas-Vizcaya F. Prosthetically guided bone sculpturing for a maxillary complete-arch implant-supported monolithic zirconia fixed prosthesis based on a digital smile design: A clinical report. J Prosthet Dent. 2017 Nov;118(5):575-580

3. Rojas-Vizcaya F, ZadehHH. Minimizing the discrepancy between implant platform and alveolar bone for tilted implants with a sloped implant platform: A clinical report. J Prosthet Dent. 2018 Mar;119(3):319-324

Dentsply Sirona Implants

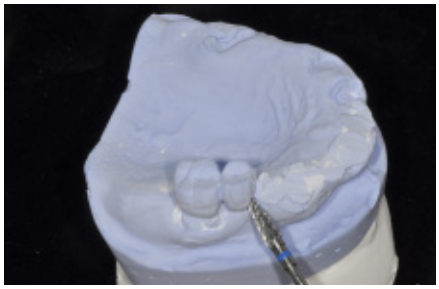


7. The maxillary incisal curve designed in the patient was marked on the maxillary cast. In the mandibular cast, the margin of the teeth was delineated.

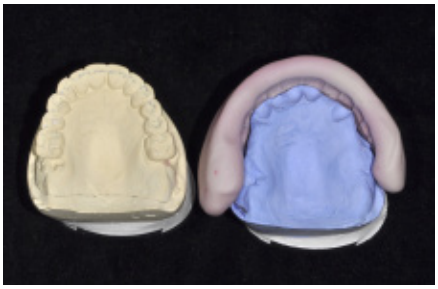
8. The maxillary incisal curve was reproduced in the cast, and the excess was trimmed. The new crown margins were determined using the average dimensions of natural teeth. The mandibular cast was prepared for an immediate complete denture.

9. A maxillary diagnostic wax-up and the waxing of an immediate mandibular prosthesis was performed, using the incisal edge of the maxillary centrals incisors and the occlusal plane given by the first maxillary left molar as reference.

10. On the modified casts, the maxillary and mandibular wax-ups were made for the immediate interim prostheses. Then the waxed casts were duplicated in plaster type III and IV and mounted on the articulator.

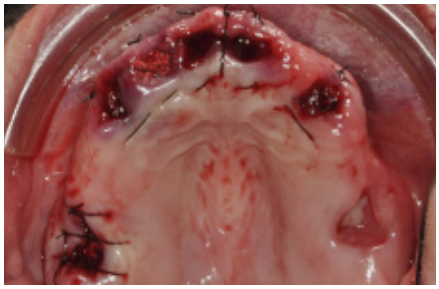


11. In a copy of the original cast, existing teeth were removed at soft tissue level using a laboratory drill.



12. A silicone key was made to copy the margins of the planned crowns, and then it was used to create the ovoid pontics for the teeth that were to be extracted.

13. The maxillary prosthesis was made in acrylic resin using the occlusal silicone key of the planned crowns and the cast with anterior ovoid pontics.



14. Maxillary and mandibular teeth extractions were made at different appointments. The immediate maxillary prosthesis did not carry ovoid pontics in the premolar area, only in the areas of extracted teeth.

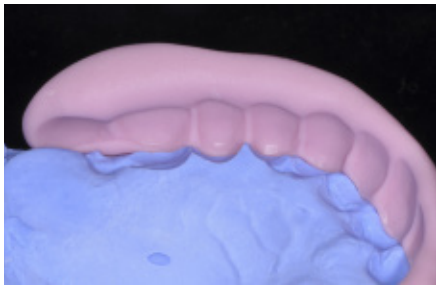
15. The maxillary prosthesis had no buccal flange and was retained using dental adhesive. The ovoid pontics in the anterior area and the design of the prosthesis guided the soft tissue during the healing process.

16. After 12 weeks, the soft maxillary tissue was adapted to the contour of the removable maxillary prosthesis; contoured in the anterior area and flat in the area of the premolars. The mandibular soft tissue took a flat shape, similar to the contact area of the immediate complete prosthesis.

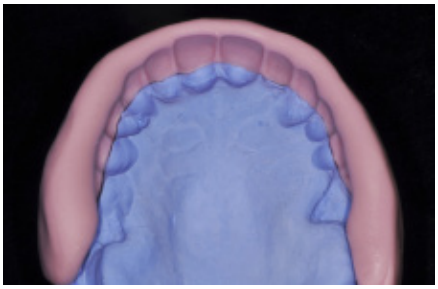
17. The new prostheses restored the esthetics and function for the patient. The maxillary incisor curve was parallel to the lower lip when smiling. Having the teeth in the correct position, the next step was the analysis of the relationship between the margin of each crown and the level of the existing bone.

18. To copy the shape of the new maxillary soft tissue, light body silicone was applied in the removable maxillary prosthesis, and an impression with alginate was taken to make a new cast.

19. Using the maxillary cast after the patient healed, the gingival contour of the ovoid pontics was observed in the area of the anterior teeth and the flat soft tissue in the area of premolars.



20. Using the margins of the premolars copied on the silicone key as a reference, the plaster of the model was cut to shape the ovoid pontics in the premolar area, with a depth of 1.5 mm from the margin of the planned crown.

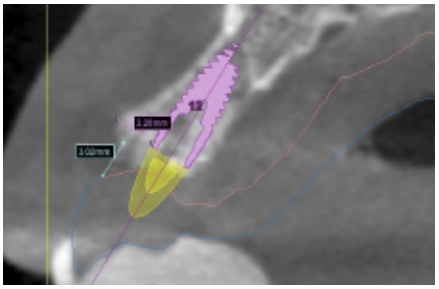


21. All the ovoid pontics were adapted to the margin of the planned crowns. Using an occlusal silicone key, a second provisional prosthesis was made with all the ovoid pontics to be used in the immediate load.

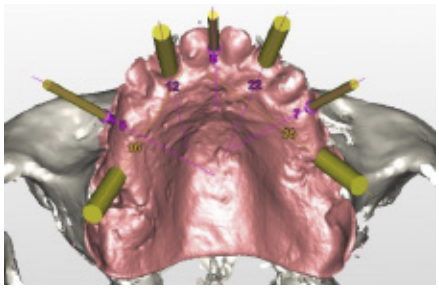
22. The new provisional prosthesis with the new ovoid pontics in the premolar area was perforated where the implants were to be placed. This prosthesis was to be used on the day of surgery facilitating immediate load; meanwhile the patient used the first prosthesis (without ovoid pontics in the premolar region).

23. For the radiological analysis, the double scan technique was applied. Six opaque radio markers were attached to each prosthesis in the buccal area. The maxillary prosthesis used was the one that did not have the ovoid pontics in the premolar area.

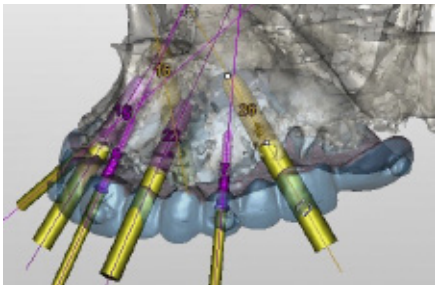
24. An interocclusal recording was made keeping a space of approximately 5 mm for the CBCT.



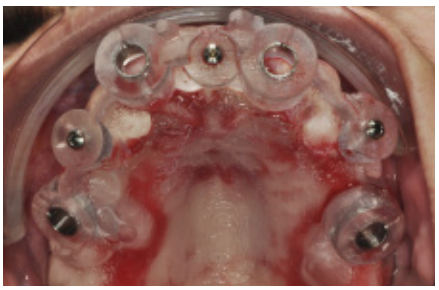
25. Using Simplant planning software, rule 3A-2B was applied. The four maxillary implants were planned to be placed 3 mm in the apical direction (3A) of the margin of the corresponding crown for biological width, leaving 2 mm of buccal bone after implant placement to avoid resorption.



26. Planning the implant positions in the Simplant software the posterior implants were placed perpendicular to the distally sloping crest in that area.



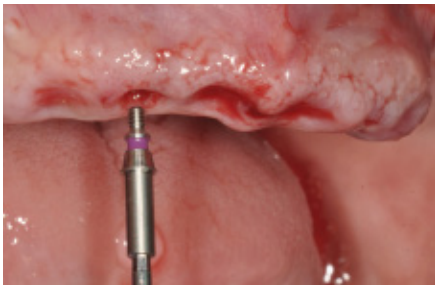
27. Mutibase Abutments EV 17° were planned for both maxillary lateral incisors to compensate for the buccal emergence of the anterior implants. To avoid the sinus, maxillary implants were tilted 30°, and Multibase Abutments EV 30° were planned to compensate for that inclination. The position of the implants was guided by the prosthesis.



28. A Simplant mucosa-supported guide was ordered which was fixed by three micro-screws.

29. After the Simplant guide was fixed, the corresponding drilling protocol was performed placing four OsseoSpeed EV 3.6 S-13 mm implants, two in the maxillary lateral incisor areas and two in the maxillary first molar areas. The insertion torque was measured to at least 35 Ncm.

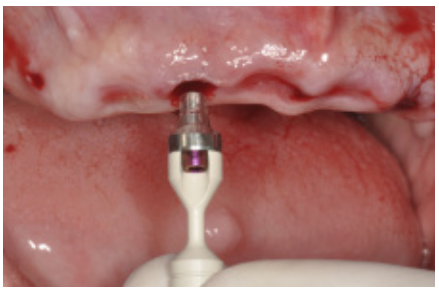
30. After the implants were placed, the Simplant guide was removed, appreciating the minimal bleeding characteristic for flap-less surgery.



31. When placing the anterior implants 3 mm apically from the margin of the crowns, the implants were slightly subcrestal. To avoid interferences between bone and abutments, Bone Reamer was used. First, the Bone Reamer Guide was screwed into the implant.

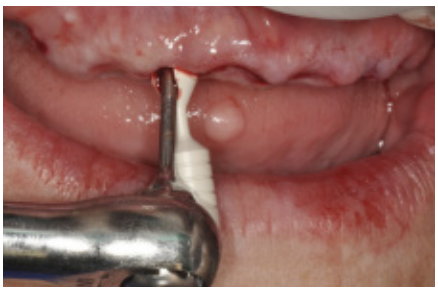
32. The Bone Reamer EV was used together with a driver handle. It was placed over the guide and rotated to remove excess bone.

33. The Bone Reamer was rotated until it was stopped by the depth gauge from the guide, preventing the Bone Reamer from touching the implant.

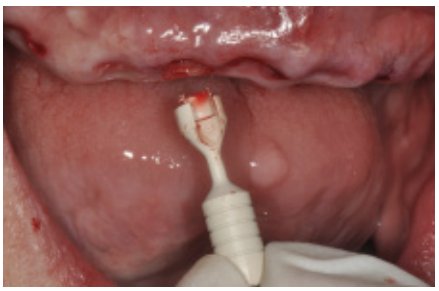


34. Installation of the Multibase Abutment EV 3.6 17° 1.5 mm. Using the abutment holder, the abutment body was placed and rotated until the most ideal position was determined, perpendicular to the plane of occlusion.

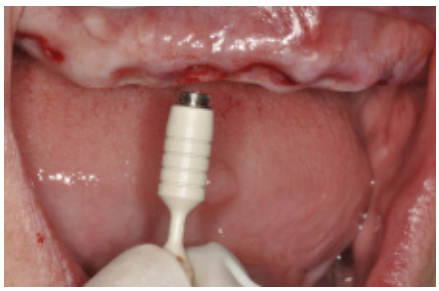
35. The abutment body was fixed manually to evaluate the parallelism with the other abutment holders.



36. After confirming the desired position of the abutments, the tightening of the abutment screws was performed. Using the Torque Wrench EV and the restorative driver handle together with the hexdriver, a torque of 25 Ncm was applied.



37. After applying the torque on the abutment screw, the abutment holder was unscrewed from the abutment body.



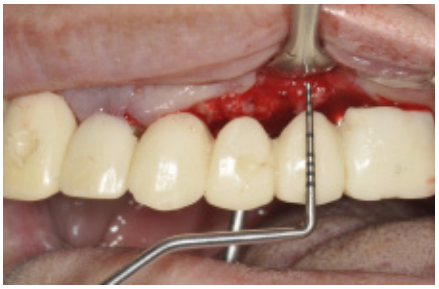
38. The holder was flipped 180 degrees to the side that holds the abutment head which was screwed inplace; then the holder was snapped off.

39. The head of the abutment was initially tightened with the manual Multibase Driver EV and then using the torque wrench tightened to 25 Ncm.

40. Two Multibase Abutments EV 3.6 17° 1.5 mm were connected to the anterior implants to obtain the screw access hole in a lingual position. Two Multibase Abutments EV 30° 1.5 mm were connected to the posterior implants to obtain the access in the occlusal surface.

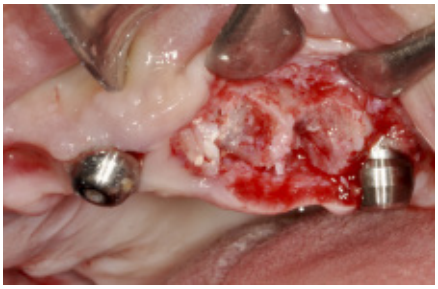
41. The removable interim prosthesis used by the patient before surgery did not have ovoid pontics in the premolar area. A second removable interim prosthesis was made with the four ovoid pontics of the premolar area, with a depth of 1.5 mm each to be used for the immediate loading.

42. When removing the interim prosthesis without ovoid pontics in the premolar area, an excess of soft tissue and bone was evident in this area, indicating a need to trim the bone to make room for the ovoid pontics of the new prosthesis. On each abutment a Multibase EV Heal Cap was placed to prevent the tissue from collapsing around the abutments.

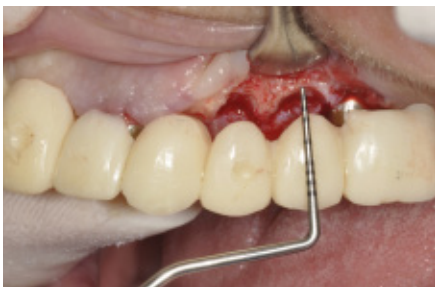


43. Using the removable interim prosthesis without ovoid pontics, the distance between the margin of each premolar and the alveolar bone was evaluated where no space for the ovoid pontics was found.

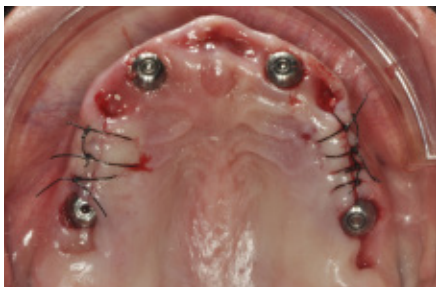
44. Using the margin of the crowns of the maxillary premolars as a reference, the bone was trimmed with a round surgical bur to create the space needed for the ovate pontics.



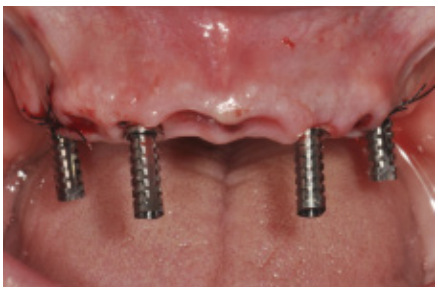
45. In the process of sculpting the bone below the pontics, the existing interproximal bone was kept and used as support for the interproximal papilla.



46. Using the margin of the crowns of the maxillary premolars as a reference, the bone was trimmed, until obtaining 3 mm distance between the margin of the crowns and the new bone level. In this space, the ovoid pontics would be 1.5 mm deep.

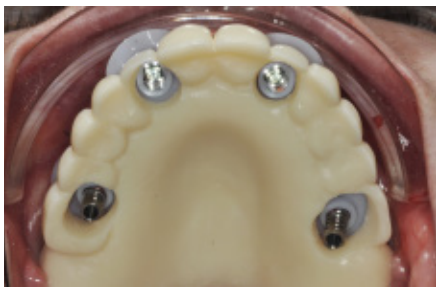


47. After having created the space for the ovoid pontics the soft tissue was sutured.



48. The Multibase EV Heal Caps were removed and Multibase EV Temporary Cylinders were placed in each abutment and fixed with the Multibase EV Bridge Screws. The parallelism obtained from using different angulated abutments was observed.

49. To prevent fixation resin material from interfering with the suture or soft tissue healing, a Polymerization Sleeve was placed around each cylinder.



50. The removable interim prosthesis with all the ovoid pontics was adjusted until no cylinder touched the acrylic. The prosthesis was compressed until it was seen to fit on the palate. Then fluid light curing resin was applied around the cylinders to fixate them to the prosthesis.

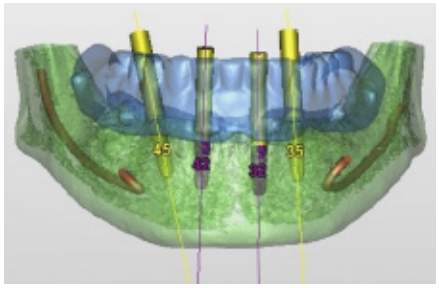
51. After unscrewing the immediate prosthesis, acrylic resin was added to improve the fixation of the temporary cylinders, and then the entire palatal area of the prosthesis was removed.

52. The shape of the papilla space was improved. Before connecting the prosthesis to the four abutments it was polished, shone, and soaked in chlorhexidine for 15 minutes.

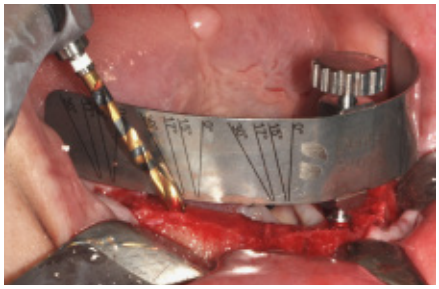
53. Using the Multibase EV Bridge Screws, the immediate prosthesis was connected to the abutments. The maxillary premolars compressed the soft tissue, but without touching the bone, thus guiding the soft tissue during healing. The screw access holes were partly filled with Teflonand then with silicon.

54. Eight weeks from implant placement the soft tissue had adapted to the contour of the provisional restoration.

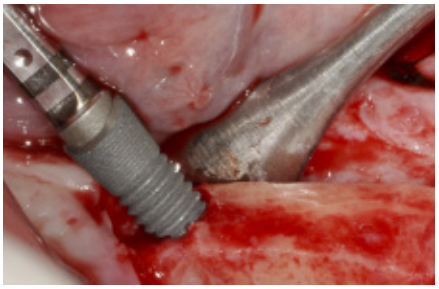
55. After approximately 12 weeks of healing the mandibular soft tissue had the shape given by the removable mandibular interim prosthesis.



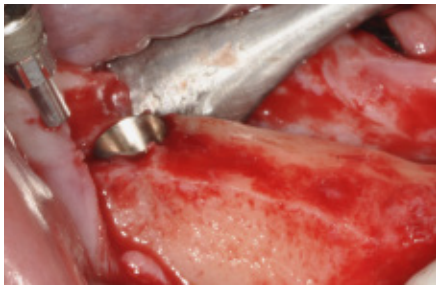
56. Using Simplant, it was planned to place two anterior axial implants with lingual access and two posterior implants tilted 30° to increase the AP spread. OsseoSpeed Profile EV implants were planned for the posterior positions to minimize the discrepancy between the implant platform and alveolar bone crest.



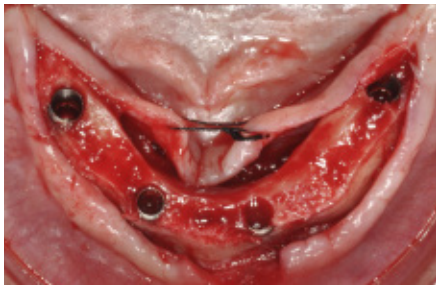
57. With the the 1-twist Drill EV, an 11 mm osteotomy was prepared in the mandibular anterior area for the SmartFix Guide fixation. The reference line of 30° inclination was used for the osteotomy preparation to place OsseoSpeed Profile EV implants in the most posterior position possible but anterior to the nerve.



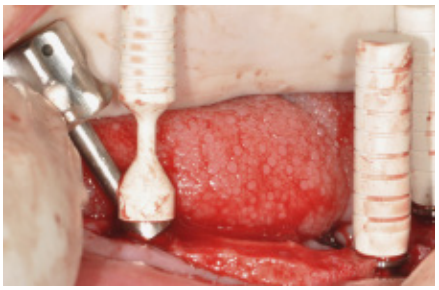
58. Two OsseoSpeed Profile EV implants were placed in the second premolar position with 30° angulation anterior to the mental foramen.



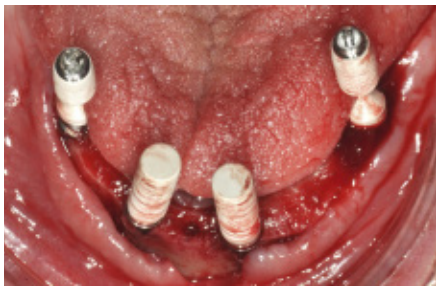
59. The slope of the OsseoSpeed Profile EV implant was facing mesially, thus minimizing the discrepancy between the implant platform and the alveolar ridge.



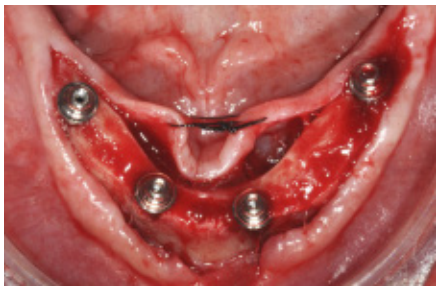
60. Two OsseoSpeed EV 3.6 13 mm implants were placed in the position of the mandibular lateral incisors, one OsseoSpeed Profile EV 4.2 C 13 mm in the mandibular second right premolar and one OsseoSpeed Profile EV 4.2 S 11 mm in the mandibular second left premolar.



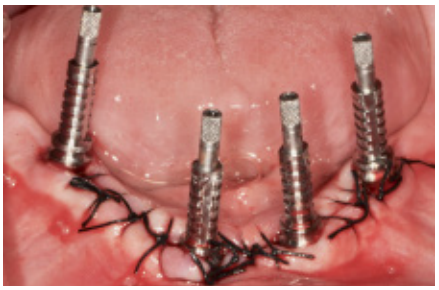
61. Multibase Abutments EV 30° 1.5 NI were connected to the tilted posterior OsseoSpeed Profile EV implants. Being an index-free abutment, it was possible to rotate it to any position to obtain parallelism with the other abutments.



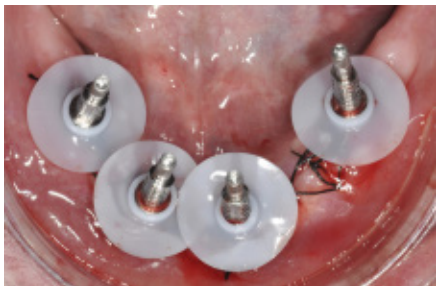
62. Parallelism between all four abutments was achieved before removing the holders from the abutments.



63. After connecting the abutment heads to the 30° abutments, they were tightened to 25 Ncm using the restorative driver handle together with the Torque Wrench EV.



64. The Multibase EV Temporary Cylinders were seated and secured using Multibase EV Lab Abutment Pins 18 mm long to prevent the fixing material from getting inside the cylinders, followed by suturing around the cylinders.



65. Polymerization Sleeves were placed to prevent fixation resin material from interfering with the suture or slipping under the abutments.

66. The interim mandibular prosthesis was perforated in the area of the cylinders, making sure there was no contact between the cylinders and the acrylic of the prosthesis and making sure the prosthesis fitted in the posterior zones. Once in position, the cylinders were fixed with fluid light curing resin.

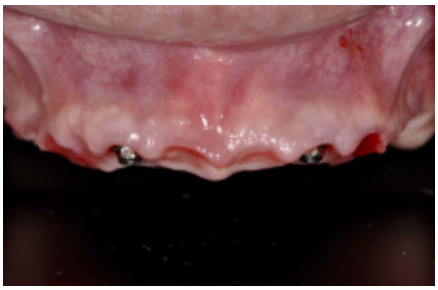
67. After the prosthesis was fixed to the cylinders, it was detached, pink self-curing resin was added to ensure the position of the cylinders, the distal ends were trimmed, keeping approximately 5 mm of resin distal to the cylinders.

68. The flat area in contact with the soft tissue was not modified, but the buccal and lingual flanges were removed. The prosthesis was modified to obtain a convex shape at the prosthesis tissue junction (PTJ).

69. The prosthesis was polished, shone and placed in chlorhexidine for 15 minutes before placed in the mouth.

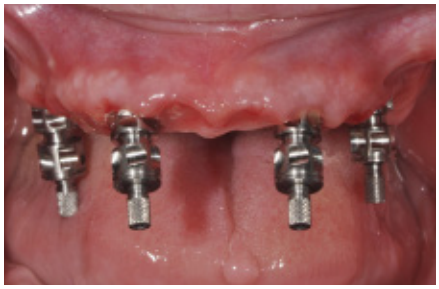
70. The prosthesis was seated by tightening the Multibase EV Bridge Screws to 15 Ncm. The screw access holes were partially filled with Teflon and then with silicone. The prosthesis was reviewed for bilateral contacts and no interference in excursive movements.

71. Eight weeks after implant placement, the immediate maxillary prosthesis was removed. A gingival contour sculpted by the immediate prosthesis was observed. The premolar area had a scalloped contour according to the treatment plan.



72. With the interim prosthesis an adequate, gingival balance, position of the zenith in each margin, and interdental papillae were achieved.

73. Six weeks following implant placement in the mandible, the soft tissue had been shaped by the immediate mandibular prosthesis.



74. Using the Multibase Abutment Pick-up, an open tray definitive maxillary abutment level impression was made using a polysiloxane impression material.

75. Six weeks following implant placement in the mandible, an open tray definitive mandibular abutment level impression was made.

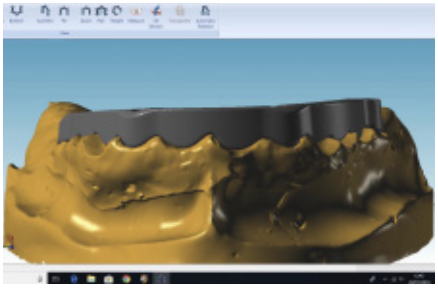
76. The master casts obtained from the final impressions were mounted on the articulator using the patient's temporary prosthesis.

77. Using a silicone key made of the provisional prosthesis screwed into the model, a prototype bar was manufactured in resin (Duralay) to be sent to Atlantis. The bar occupied the center of the ovoid pontics leaving space buccally and palatally.

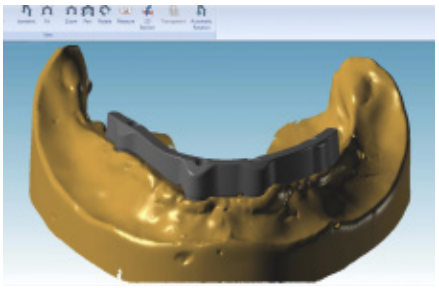
78. The bar was tested in the mouth, and the passive adjustment was evaluated. The bar was in very light contact with the soft tissue in all its extension.

79. The casts, the prostheses and the casts with the attached prostheses (individually and inocclusion) were scanned in an extraoral scanner. New prostheses were virtually designed, and 2 CAD/CAM prototypes were milled in PMMA to be evaluated in the patient's mouth.

80. The design of the prosthesis followed the 3A-2B rule, allowing soft tissue to fill the space below the prosthesis and to be reshaped by the prosthesis. The PTJ (Prosthesis Tissue Junction) in both prostheses is convex to facilitate hygiene, avoid problems of air escaping or food retention.

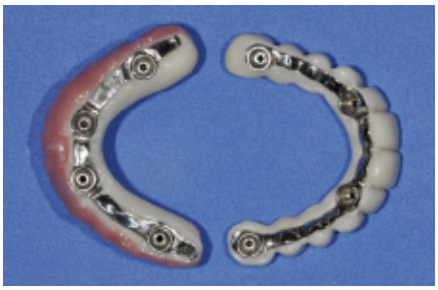


81. The master casts and a copy cast of the prostheses were sent to the laboratory, and Atlantis suprastructures were designed. The maxillary bar was in all its extension in contact with the soft tissue, but leaving space buccally and palatally for the prosthesis.



82. To facilitate dental flossing, some depressions were created in the mandibular bar design in the buccal-lingual direction at the soft tissue contact areas.

83. The CAD/CAM manufactured titanium bars were in contact with the contour of the soft tissue. The walls were at a 4° inclination, to allow the insertion of the prosthesis and its attachment.

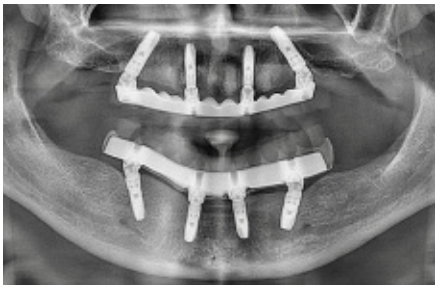


84. Two new CAD/CAM prostheses with space for the bars were milled from a block of PMMA. The mandibular prosthesis had a pink composite to simulate the patient's soft tissue. The bars were glued with dual resin inside the the prosthesis.

85. The prostheses restored the intra- and extraoral esthetics of the patient, as well as function. The soft tissues were adapted to the contour of the prostheses according to the established treatment plan.

86. With the comprehensive treatment plan that was facially driven, especially by the patient's smile, the prosthodontics, surgery, and biology were integrated. Teeth were harmonized with the patient's smile as well as the hard and soft tissues.

87. The convex shape obtained at the PTJ for the two prostheses, allowed the patient to floss and clean the entire surface of the prosthesis that is in contact with the soft tissue.



88. Radiological images showed presence of bone at the platform level for all implants.

89. The new position of the teeth with the maxillary prosthesis improved the patient's profile and decreased the amount of soft tissue that showed in the gummy smile.

90. This full mouth rehabilitation with the SmartFix concept, restored the patient's esthetics and function in a simple way at a reasonable cost.

This case report is published as an inspiration for you as a clinician/technician and not necessarily as a recommendation from Dentsply Sirona.

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