

Clinical Technique:

A NOVEL TECHNIQUE FOR HANDLING THE FRAMEWORK-FIT DISCREPANCIES IN ALL-ON-4 CASES: A CASE REPORT

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ABSTRACT:

The clinical success and longevity of All-on-4 implants are controlled largely by the mechanical setting in which they function. A precisely designed and absolute passive-fit prosthesis plays a prime role in its relatively successful journey. A passively fitting All-on-4 prosthesis helps in load distribution at equal proportions to all the splinted implants. Any misfit/active engaging of the prosthesis onto the implants could lead to implant loss and ultimately failure of the treatment. Keeping in mind the importance of framework fit verification, this article describes a technique to correct the existing active fit/misfit cast metal superstructure eliminating the need for a repeated new framework fabrication that add to time and total costs.

INTRODUCTION:

The increasing popularity for the edentulous arch rehabilitation using All-on-4/All-on-6 concept tipped with tremendous digital manufacturing techniques, it is possible to fabricate prosthesis that have superior aesthetics, accurate fit and no compromise in its biomechanical properties.¹ The definitive All-on-4 prosthesis can be fabricated using traditional casting procedures, DMLS(Direct Metal Laser Sintering), CAD/CAM, 3D-printed.²

Although the digital advancements made the fabrication of All-on-4 prosthesis an effortless procedure, there are many instances where the accessed laboratory might not be able to provide such service and invariably the prosthesis has to be fabricated using the traditional casting procedures. However the traditional techniques have high probability of incorporating casting errors, that leads to the misfit of the metal framework even after a successful jig-trial.³

A passive fit of the prosthesis is necessary for an equal occlusal load distribution on all the splinted implants. Any discrepancies in the framework fit will cause active engaging of the prosthesis at that particular implant site and leads to an increased and uneven loading of forces on distal most implant of the same side. Hence, implant loosening and loss of such over-loaded implant leading to the prosthesis failure too.⁴ Therefore it should be made obvious that the screw-retained prosthesis must not be having any discrepancies in its fit onto the abutments. Errors incorporated in the metal framework that makes it have an active/misfit intraorally should be either corrected or the entire fabrication procedure has to be repeated again. The new prosthesis casting involves increased treatment time, cost, material wastage. This

article presents a technique to tackle such All-on-4 metal framework misfit and therefore eliminates the step of re-fabricating a new prosthesis.

CASE REPORT:

A 60-year-old male patient reported to the Department of Prosthodontics, Kamineni Institute of Dental Sciences, Narketpally, Nalgonda, Telangana with chief complaint of difficulty in eating and unpleasant appearance of face while smiling, completely missing upper teeth and partially missing lower teeth.

On intraoral examination it was seen that Maxillary arch was completely edentulous (Fig.1) and had missing 31,32,41,45,46 in the mandible. Patient showed an inclination for fixed prosthesis. He was then evaluated for implant-supported fixed prosthesis from CBCT findings. His past medical history was uneventful and past dental history too revealed no bleeding abnormality and uneventful healing. On medical examination no systemic association of immuno-compromised diseases were found. The “all-on-four” technique was scheduled to rehabilitate the maxillary arch. Patient was explained about the detailed treatment plan.

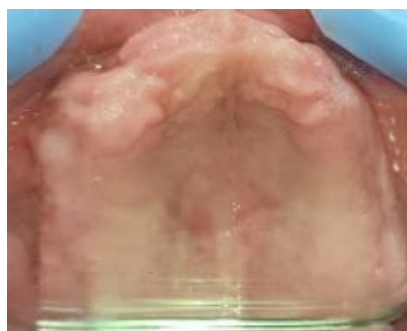


Fig.1: PRE-OPERATIVE MAXILLA

IMPLANT SURGERY:

1. Under local anaesthesia, 4 Bioline Spiral implants of dimensions 3.5*16 mm irt 12; 4.2*16mm irt 15; 3.75*16mm irt 22 and 25 regions were placed. (Fig.3)
2. Torquing of implants done and primary stability >80Ncm achieved and multi-unit abutments and healing caps were placed. (Fig.2,3)
3. Patient was recalled after 3 months to evaluate the osseointegration.



Fig.2: MULTIUNIT ABUTMENTS PLACED



Fig.3: POST-OP OPG SHOWING ALL-ON-4 IMPLANTS WITH MULTIUNIT ABUTMENTS AND HEALING CAPS

PROSTHESIS FABRICATION TECHNIQUE:

1. After three months of healing, Multiunit open tray transfers were screwed onto multiunit abutments intraorally, then tray transfers were

splinted with dental floss and stabilized with pattern resin. (Fig.4)



Fig.4: MULTIUNIT OPEN TRAY TRANSFERS STABILIZED WITH ACRYLIC RESIN

2. Final impression was recorded with polyvinylsiloxane impression material using open tray technique. Resin jig was fabricated with the help of pattern resin, with definitive abutments in place and verified both clinically (Fig.5) and radiographically (Fig.6) for marginal discrepancy. The RVG images of each implant-multiunit abutment and tray transfers showed no gaps indicating a precise fit.



Fig.5: JIG TRIAL VERIFIED CLINICALLY

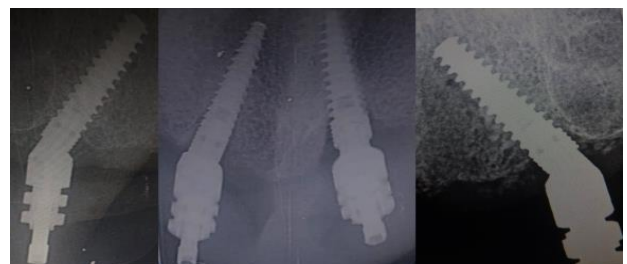


Fig.6: JIG TRIAL VERIFIED RADIOGRAPHICALLY

3. Casting procedure was carried out and Cobalt-Chromium superstructure was obtained.
4. After metal-framework try-in the prosthetic screws in 12,15,22 regions fit passively, however the screw at 25 wasn't. This indicated a discrepancy in the cast framework between 22 and 25 (Fig.7)

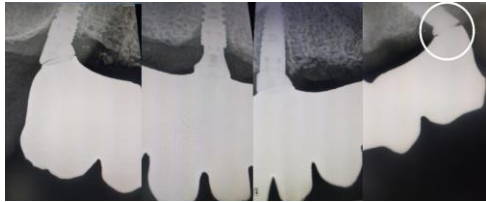


Fig.7: RVG SHOWING METAL FRAMEWORK FIT DISCREPANCY irt 25

5. Metal framework was sectioned in between 22 and 25 regions where the discrepancy was identified, this sectioned framework was screwed onto the multiunit abutments and passive fit was verified. (Fig.8)



Fig.8: SECTIONED FRAMEWORK SHOWING PREPARED HORIZONTAL SLOT

6. The sectioned framework pieces were then joined and picked up intraorally. For joining them: across the sectioned site a 10mm long, 2.5mm depth horizontal slot has been created using metal trimming bur. (Fig.8)
7. To fit in the same dimensions, a tooth-preparation diamond bur has been modified and checked for its

snug fit into the prepared horizontal slot, sandblasted (Fig.9) and fixed in place by using a cyanoacrylate adhesive and then entire sectioned area was reinforced using incremental addition of pattern resin-filled through and through the sectioned zone and over the prepared horizontal slot. (Fig.10)



Fig.9: SECTIONED FRAMEWORK JOINING USING TOOTH-PREPERATION BUR



Fig.10: PATTERN RESIN FILLED THROUGH AND THROUGH AT THE SECTIONED REGION

8. The verified metal framework was unscrewed from the multiunit abutments and transferred onto the model cast where only the 25-region implant analogue was carefully retrieved while the entire framework was still screwed onto the cast by engaging other 3 multiunit-implant analogues.
9. The retrieved implant analogue was screwed onto the tray transfer, this leaves: a cast with framework screwed onto only 3- analogues and 4th tray transfer screwed onto retrieved implant analogue.

10. Carefully the cast was placed in a base-former, a uniform mix of dental stone was poured around the retrieved implant analogue and allowed to set (Fig.11).



Fig.11: 25 REGION SHOWING MODIFIED POSITION OF IMPLANT MULTIUNIT-ANALOGUE

11. The final intraorally verified and picked metal framework on a modified cast was obtained and the framework was soldered using LASER ARC SOLDERING extra-orally.
12. A second-metal trial was done to verify the modified framework, once the fit was verified clinically (Fig.12) and radiographically (Fig.13), it was porcelain veneered.



Fig.12: ARGON LASER SOLDERING DONE IN BETWEEN 22 and 25 REGION

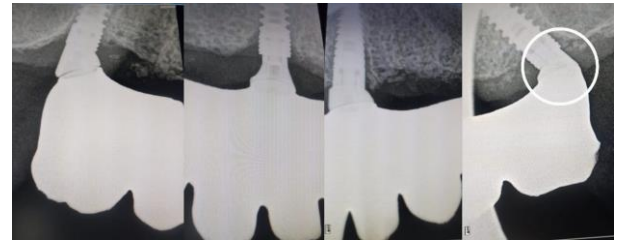


Fig.13: RVG SHOWING MODIFIED METAL FRAMEWORK FIT

13. Bisque trial was performed, Implant Protected Occlusal scheme was provided in the definitive prosthesis. Final glaze applied. The definitive prosthesis was screw-retained onto the multiunit abutments.
14. After 1-year follow up, patient condition was re-evaluated according to Albrektsson's criteria. Radiographically and clinically the condition was satisfactory.

DISCUSSION:

A recent shift in practice paradigm has been to minimize treatment costs and patient morbidity while providing the most satisfying patient-centred treatment outcomes according to the state of the art dental practice. The "All- on-Four" treatment concept is an attempt to reach these objectives by providing relatively straight forward, predictable treatment option to rehabilitate edentulous patients with a high outcome of quality of life⁵. The All-on-4 protocol immediate function approach to rehabilitate edentulous jaws combines immediate function techniques: 4 implants (2 straight medially and 2 tilted distally) to support a fully fixed prosthesis.⁶

In the present case report, Angulated implants were placed in maxilla owing to the close approximation to the anatomical structures and to increase the

anteroposterior spread. And then multiunit abutments of 30degree angle were placed to make the implant parallel and to get tissue level prosthesis. However, despite splinted open tray transfer technique of impression making and a jig-trial confirmation. The cast framework did not provide a proper/accurate fit probably because of casting errors due to the metal bulk of the FP3 prosthesis.

Management of processing errors in the concept of All-on-4 have always been technique sensitive. Most of the time, the repairs and the adjustments made to fit the metal framework in an All-on-4 implant concept may fail to gain a passive fit of the prosthesis superstructures. This may facilitate a need to repeat the entire prosthetic framework as in this case. However, this case report deliberates on a simplified method to manage the seating errors during the trial phase of All-on-4 metal framework which could be cost-effective as well.

Argon Laser arc soldering procedure is used in this case report to join the sectioned framework extra-orally. Laser soldering offers benefits such as high mechanical strength, reduced distortion due to a narrow heat affected zone, least contamination with oxide free part, faster process time, corrosion resistant joint⁷. This method saves on the added efforts due to the repeat casting and also saves on time and costs.

CONCLUSION:

This case report deliberates on finding a simplified solution to manage the metal misfit that occurred during metal framework try-in of All-on-4 metal framework due to casting errors. Simplified and an easy solution to avoid the repetition of entire prosthetic procedure that is required in fabricating a new metal

framework for All-on-4 implant concept has been explained in-detail. The prosthesis has been lasting for an year. However, long-term follow-up is essential to assess the success rate of such techniques used for managing the misfit of the screw-retained implant frameworks used in the restoration of Implant-supported prosthesis.

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CONFLICT OF INTEREST: Nil

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