Implant-Assisted Removable Partial Dentures
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Advantages

- **Esthetics:**
  1) Attachments adjacent to distal-most teeth may permit elimination of clasps and improvement in esthetics\(^3,8,9\)

- **Function:**
  1) Increased support and stability\(^3,8,9,10\)
  2) Eliminate Kennedy Class I & II situations with implant placement beneath most distal tooth\(^8,9\)
  3) Favorable functional load transfer and increased cross-arch stabilization\(^3,8,9\)
  4) Occlusal stability\(^3,5,9\)

- **Comfort:**
  1) Flange length may be shortened due to increased support and stability\(^8\)
  2) Extension to tuberosity and retromolar pad may be removed with elimination of distal extension\(^9\)
  3) Potential for increased retention\(^3,9,10\)

Disadvantages

1) Surgical intervention is necessary
2) Accuracy of implant placement is crucial\(^6\)
3) Increased treatment complexity & cost\(^3\)
4) Additional treatment time necessary\(^10\)

IARPD Considerations

**Diagnosis & Treatment Planning**

After a proper diagnostic examination, a thorough understanding of proper tooth positioning to satisfy functional and esthetic demands is necessary to minimize future complications and obtain ideal results. This is accomplished via a diagnostic mounting, diagnostic wax-up and eventual tooth try-in to verify esthetics. **Only when esthetic and functional demands have been met, can implant planning take place\(^10\).**

With the help of CBCT imaging, potential implant sites can be visualized 3-dimensionally relative to the desired tooth positions and contours. Implant sites to aid esthetics, function, and comfort can be evaluated with anatomic and biomechanic concerns in mind\(^10\). Restorative space (=10mm) can be visualized relative to scanned prototype (3.5mm Locator + housing, 2mm resin, 1mm metal, 2mm teeth)\(^2\). Lastly, implants must be planned parallel to determined path of placement if stud attachments are to be used.

**Abutments**

If attachments are to be used, guide planes must be made parallel to implant trajectory for proper engagement of attachments\(^3,4,8\). In claspless designs, it may be prudent to include additional rests and undercuts as a contingency plan in the event of implant failure\(^10\).

**Framework Design** (All traditional RPD concepts still apply to IARPDS)\(^8\)

After master casts have been fabricated and mounted, teeth should be set for esthetics and function. Matrices can then be fabricated to capture tooth positions and aid in framework design to maximize support without infringing on restorative space\(^1,8,10\). A strut of metal “over the top” of implant attachments is recommended to minimize stress and potential fracture in those areas\(^11\).

**Maintenance**

Natural teeth, periodontium, peri-implant tissues and edentulous ridges should be examined for health and stability. Occlusion should be evaluated for stability/wear and managed appropriately. Implant abutments and attachments must be carefully inspected for wear/damage to ensure optimal performance\(^10\).
Procedure: Digital Transfer of Survey Line for iRPD Implant Planning

1. Make primary alginate impressions to generate diagnostic casts.

2. Duplicate diagnostic casts using reversible hydrocolloid (Installloid Duplicating Material All-Purpose, CMP Industries, Inc.) Duplicate casts must remain untouched throughout procedure.

3. Fabricate resin record bases (Triad, Dentsply International Inc.) and wax occlusal rims to prescribed dimensions. Duplicate casts must remain untouched throughout procedure.

4. Make interocclusal records in centric relation at the planned OVD using vinyl polysiloxane registration medium (Regisil, DENTSPLY International Inc.). Make a facebow record and mount indexed casts in an articulator (Whip Mix 2340, Whip Mix Corporation).

5. Survey diagnostic casts and duplicated diagnostic casts to the desired tilt. Complete diagnostic waxup to desired contours and dimensions. Set teeth occupying edentulous spaces on resin record bases fabricated in step 3.

6. Evaluate esthetics and phonetics. Verify occlusion and discuss patient acceptance of tooth arrangement at the wax-try in appointment.

7. Drill a recess large enough to occupy survey orientation rod (SOR) into tongue space or palate of untouched duplicate cast. Arrange duplicate cast to determined tilt and lock the survey table.

8. Using the surveyor, lower (SOR) into recess and lute (SOR) into place with resin (GC Pattern Resin). Allow resin to fully polymerize before disconnecting (SOR) from surveyor arm.

9. Using a laboratory scanner (Nobel Procera Scanner), scan duplicate cast with (SOR) in place. Check to make sure (SOR) is captured accurately in scan. Now add resin record base with waxed prosthetic teeth and scan again to create a layered STL file.

10. Take a CBCT on patient to generate a DICOM file of the desired arch/arches for implant planning. Then, import DICOM and STL files into implant planning software (Nobel Clinician) and allow software to overlay the two datasets.

11. Plan implants parallel to (SOR) in strategic implant positions to facilitate improved RPD function/esthetics. All the while being conscious of anatomic structures, restorative space, and sound RPD principles. Overlay diagnostic waxup.

12. In cases where bone does not allow parallel trajectory, leave implant to serve as local reference. Insert and align implant, add appropriate angle correcting abutment, and parallel screw axis to reference.
13. Once plan is verified to be sound prosthetically and surgically, order CAD-CAM tooth-borne surgical guide

14. Place implants, allow for proper healing and continue IARPD fabrication as normal.

Reference List


