Method for Structural Reinforcement of Mandibular Complete Dentures

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Advantages:
- Reduced fracture \(^1,2\)
- Dimensional stability \(^1,3\)
- Fit \(^3\)
- Accuracy \(^3,4\)
- Weight \(^3,5\)
- Retention \(^6,7\)
- Soft Reline \(^8\) - \(^10\)
- Implant Overdentures \(^1\)

Disadvantages:
- Difficult refitting/adjustments \(^3\)
- Time consuming process \(^11\)
- Ridge irritation using chrome-cobalt \(^5\)

Procedure: Internally Suspended Framework

1. Make primary alginate impressions using edentulous impression trays (Massad Edentulous Impression Tray, Global Dental Impression Tray, Inc.) to generate diagnostic casts.

2. Make master impressions in custom border molded trays using polysulfide impression material (Regular Permlastic Type 2 Medium Consistency and Light Bodied Permlastic Type 3 Low Consistency, Kerr Corporation).

3. Fabricate resin record bases (Triad, Dentsply International Inc.) and wax occlusal rims to prescribed dimensions. \(^12\)

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. Set denture teeth for both arches.

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

7. Separate cast from mounting and fabricate a duplicate cast of the denture tooth set-up using reversible hydrocolloid (Installloid Duplicating Material All-Purpose, CMP Industries, Inc.). Care must be taken to duplicate the cast's land area with good fidelity.

8. Form a clear matrix on duplicate cast of the denture tooth set-up. (1mm thick Biocryl; use the Biostar machine, Great Lakes Orthodontics).

9. Remove and trim matrix assuring that contact with land area of the cast is maintained in the matrix.

10. Remove the denture teeth from the wax trial denture and insert them in the matrix. The matrix permits visual access of the cast and denture teeth from all directions. Though inferior, a stone or putty matrix that indexes the land area of the cast may also be used.

11. Duplicate the edentulous cast without record base to serve as a framework design cast.

12. Draw framework design on cast giving consideration to frenum attachments and undercut areas.

13. Drill three parallel holes in master cast (3mm deep, widely spaced, ridge crest) using 1.4mm dia. drill (ParaPost XP Endodontic Post System, Casting Technique - Purple, Coltène Whaledent Inc.).
14. Position corresponding ParaPost patterns in the holes. Cut patterns 6-8mm long. Flatten or nail-head the top of each pattern. These patterns will eventually become part of the framework pattern.

15. Send design cast, master cast with ParaPost patterns, clear matrix with teeth, and prescription to laboratory technician. Prescribe 1mm of relief under framework for acrylic resin.

16. Leave post patterns on master cast with relief wax. Make refractory cast. The patterns will be pulled in the hydrocolloid. Cast the duplication in refractory material. The ParaPost patterns remain in the refractory cast upon separation from duplicating material.

17. Complete framework wax-up. ParaPosts patterns are incorporated within the framework pattern.

18. Use the clear denture tooth matrix to adjust the ridge lap portion of the teeth and/or alter framework as needed. Incorporate sufficient retentive and supportive elements in the design.

19. Invest, cast, recover, fit, and finish the framework.

20. Return framework to master cast. Reposition teeth on to the case using clear matrix.

21. Return master cast to the articulator. Refine tooth positions to establish desired occlusal scheme.

22. Complete denture contour waxing, invest and process denture.

23. Complete laboratory remount procedures and recover denture from master cast.

24. Section metal supporting struts from framework using a metal cutting bur. Finish this metal flush with the resin intaglio surface, or recess the metal and back-fill with chemically-activated resin.

25. Finish and polish denture.

26. Accomplish clinical denture placement procedures and clinical remounts as indicated.

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**Procedure: Internally Suspended Framework for Implant Overdentures**

The following is a case report involving a patient that presented to the University of Tennessee Advanced Prosthodontic Clinic with two mandibular implants (BioHorizons Internal implant 4.5 x 13mm, BioHorizons Inc.).


2. Make master impression using border molded custom trays and splinted, open-tray impression copings (Internal 4.5 indirect transfer coping, hexed, BioHorizons Inc.). Attach implant analogs to impression copings and generate master cast.

3. Fabricate verification jig and complete clinical verification process using the single-screw test to assure master cast accuracy.\(^\text{13}\)

4. Fabricate record bases (Triad, Dentsply International Inc.) and wax occlusion rims to prescribed dimensions.\(^\text{12}\)

5. 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).

6. Set denture teeth for both arches.

7. Evaluate esthetics and phonetics. Verify occlusion and discuss patient acceptance of tooth arrangement at the wax-try in appointment.
8. Separate cast from mounting and fabricate a duplicate cast of the denture tooth set-up using reversible hydrocolloid (Instaloid Duplicating Material All-Purpose, CMP Industries, Inc.). Care must be taken to duplicate the cast’s land area with good fidelity.

9. Form a clear matrix on duplicate cast of the denture tooth set-up. (1mm thick Biocryl; use the Biostar machine, Great Lakes Orthodontics).

10. Remove and trim matrix assuring that contact with land area of the cast is maintained in the matrix.

11. Place clear matrix on master cast to evaluate restorative space. The clear matrix permits visual access of the cast and denture teeth from all directions. Though inferior, a stone or putty matrix that indexes the land area of the cast may also be used.

12. Use a heated periodontal probe to measure the thickness of wax over the Locator denture caps following guidelines proposed by Mattie and Phoenix when designing metal bases. For the case illustrated, there is less than 2mm of denture base thickness over the Locator denture caps rendering the denture susceptible to fracture during clinical loading.

13. To create a design cast, place Locator attachments and Locator denture caps (Zest Anchors LLC) on master cast and fabricate a duplicate cast. Place matrix with denture teeth on the master cast with Locator denture caps to evaluated restorative space.

14. Drill three parallel holes in master cast (3mm deep, widely spaced, ridge crest) using 1.4mm dia. drill (ParaPost XP Endodontic Post System, Casting Technique - Purple, Coltèn Whaledent Inc.).

15. Position corresponding ParaPost patterns in the holes. Cut patterns 6-8mm long. Flatten or nail-head the top of each pattern. These patterns will eventually become part of the framework pattern.

16. Send design cast, master cast with ParaPost patterns, clear matrix with teeth, and prescription to the laboratory. Prescribe 1mm relief under framework for acrylic resin. The metal framework overlying Locator denture caps is 0.75mm thick (strength to resist clinical loading). The design incorporates 0.5mm of space for resin engagement of Locator denture caps during processing.

17. Leave post patterns on master cast with relief wax. Make refractory cast. The patterns will be pulled in the hydrocolloid. Cast the duplication in refractory material. The ParaPost patterns remain in the refractory cast upon separation from duplicating material.

18. Complete framework wax-up. ParaPosts patterns are incorporated within the framework pattern.

19. Use the clear denture tooth matrix to adjust the ridge lap portion of the teeth and/or alter framework as needed. Incorporate sufficient retentive and supportive elements in the design.

20. Invest, cast, recover, fit, and finish the framework.

21. Return framework to master cast. Reposition teeth on to the cast using the clear or stone matrix.

22. Return master cast to the articulator. Refine tooth positions to establish desired occlusal scheme.

23. Complete denture contour waxing, invest and process denture.

24. Complete laboratory remount procedures and recover denture from master cast.

25. Section metal supporting struts from framework using a metal cutting bur. Finish this metal flush with the resin intaglio surface, or recess the metal and back-fill with chemically-activated resin.

26. Finish and polish denture. The resin-to-metal cameo surface interface results in a smooth transition of material that is not objectionable to the tongue.

27. Accomplish clinical denture placement procedures and clinical remounts as indicated.
**IMPORTANT:** The metal overlying Locator denture caps provides denture base fracture resistance to vertical forces during clinical loading of the prosthesis. The suspended framework provides strength and rigidity for implant overdentures susceptible to fatigue and fracture due to reduced restorative space. In cases where restorative space is extremely limited, the metal framework may be designed to incorporate Locator receptacles eliminating the need for a separate, resin-retained Locator metal housing. This approach is very technically sensitive requiring substantial dimensional accuracy at every clinical and laboratory step. Any inaccuracy in the process may necessitate framework remake! *When using this approach, repositioning Locator attachments within the prosthesis is not an option!!*

### Reference List