CDR
Columbia Dental Review

Columbia University
College of Dental Medicine

Immediate Post-Extraction Placement and Provisionalization of a Single Tooth Implant

Daniel Greenbaum

Brock Goodman

Michelle Mirsky, DDS

Robert Memory, DMD, MD

Mandibular Advancement Deuce Used for Treatment of Sleep Apnea: A Case Report

Anthony Prousi

Heera Chang, DDS, MD

Lateral Periodontal Cyst: A Case Report

Brock Goodman

Tiffany Madison

Din Lam, DMD

Eagle's Syndrome: A Case Report

Kael Rogers

Heera Chang, DDS, MD

Adjustment of Complete Denture Occlusion with the Coble Balancer: A Case Report

David Tavelin

Jason J. Psillakis, DDS, MS

Volume 11 | 2006-2007

CDR Columbia Dental Review 2006-2007

Columbia University
College of Dental Medicine

Editorial Board

Aim and Scope

The Columbia Dental Review (CDR) is an annual publication of Columbia University College of Dental Medicine (CDM). This journal is intended to be a clinical publication, featuring case presentations supported by substantial reviews of the relevant literature. It is a peer-reviewed journal, edited by the students of the school. The editors are selected on the basis of demonstrated clinical scholarship.

Authors are primarily CDM students from pre-doctoral and postdoctoral programs, CDM faculty and residents, and attendings from affiliated hospitals. Peer reviewers are selected primarily from the CDM faculty. Instructions for authors wishing to submit articles for future editions of the CDR can be found on the last page of this journal. Opinions expressed by the authors do not necessarily represent the policies of the Columbia University College of Dental Medicine.

Editors' Note

Dear Readers,

The CDR was created to give Columbia dental students a voice in current dental research. In an effort to create a diverse dental journal, our authors, in collaboration with faculty, have researched a wide array of topics covering many different facets of dentistry.

On behalf of all the editors and assistant editors, we would like to thank Dr. Letty Moss-Salentijn for all her guidance and expertise on journal publications. You have been a great mentor throughout all aspects of our education. Dr. Salentijn's guidance for the CDR has kept this award winning student publication alive and well, creating a smooth transition as the torch is handed down from one class to the next. Finally, we would like to thank the authors, faculty reviewers, and assistant editors. Certainly, this eleventh volume of the CDR would not have been possible without their contributions. We hope that you find the topics covered in this edition valuable to your future clinical practice.

Sincerely,

Keith Da Silva '07 & Michael Perrino '07

CDR Columbia Dental Review 2006-2007

Columbia University
College of Dental Medicine

Table of Contents

Adjustment of Complete Denture Occlusion with the Coble Balancer: A Case Report

David Tavelin[1], Jason Psillakis, DDS, MS[2]

[1]Class of 2007, College of Dental Medicine, Columbia University, New York, NY
[2]Assistant Clinical Professor, Division of Prosthodontics, College of Dental Medicine, Columbia University, New York, NY

Abstract
The need for complete denture prostheses is currently increasing in the United States. The central bearing point device is an instrument that aids in delivery of functionally and esthetically acceptable complete denture prostheses. The Coble Balancer is one such device that, when utilized with selective grinding, can provide an optimally balanced maxillo-mandibular denture occlusion.

Introduction
Information extrapolated from the 1991 NHANES III study and the U.S. Census Bureau Report has suggested an overall increase in the need for complete denture prosthodontic therapy in the coming years. The adult population that will require at least one arch of complete denture prosthesis will increase 13% by the year 2020[1]. Concurrently, more adults of advancing age will be affected by the myriad of deleterious consequences that accompany edentulism, including but not limited to: psychosocial effects, anatomic remodeling, masticatory function deficits, and dietary limitations.[2] Hence, the pursuit to provide the growing edentulous population with functional and esthetic complete denture prostheses will continue to be a worthwhile one.

One of the most important goals of denture fabrication is the restoration of masticatory function[3]. The performance of the denture is largely determined by the degree of retention, stability, and support[4]. Concomitantly, patient acceptance and satisfaction with the replacing prosthesis are anchored in the successful re-establishment of functional stability[5,6]. Of paramount importance in achieving these facets of optimal performance are the dentist's techniques in capturing and establishing vertical dimension, centric relation, and balanced denture occlusion. Numerous tools are used in this process including occlusal wax rims, phonetics, a clinical remount procedure, and the extra-oral Gothic arch tracer. Included but often overlooked in this armamentarium is the central bearing point device; a tool currently and unwarrantedly limited to the circles of academicians and prosthodontists. Despite its generally perceived complexity, it is a very viable and accurate way to ascertain centric relation, establish a reproducible occlusal vertical dimension and a verifiably balanced occlusion.

The Coble Balancer (LeeMark Dental Products) is one such central bearing point device. It maintains denture stability on the movable tissues of the basal seat while simultaneously creating an intra-oral Gothic arch tracing through mandibular protrusive and excursive movements. It was initially created to locate centric relation, provide a means for its transfer to an articulator, and in conjunction with spot grinding, to balance denture occlusion at delivery[7]. It's use has since been described in the determination of vertical dimension as well[8].

Figure 1
Balancer apparatus constructed

The Coble Balancer represents a culmination of the ideas and inventions put forth by Hesse, Gysi, Phillips and Hardy in the early 20th century. Hesse first introduced his needlepoint tracing device in 1897. It provided an extra-oral tracing to determine centric relation[9]. Gysi enhanced and popularized the apparatus in 1910 with his inclusion of modeling compound rims to maintain vertical dimension while recordings were taken[9]. The ensuing central bearing point concept was pioneered by George Phillips who developed a ball bearing tripod device in combination with Hesse's needlepoint extra-oral tracing device. Phillips' self described "tool" minimized occlusal rim movement while simultaneously recording an extra-oral gothic arch[10]. Coble then built upon these ideas to create a central bearing point device that both maintained vertical dimension, tissue stability, and produced an intra-oral gothic arch tracing[7]. The device consisted of a centering ring guide, a maxillary tracing pin, a mounting jig, and a lower bridge with graph plate[11]. These components were typically attached to the acrylic base plates with modeling compound. The pin was adjusted to provide equalized pressures on the ridges while vertical dimension is manipulated according to procedural protocol.

Figure 2
Lack of occlusal contact

Figure 3A
Adjustment of dentures. Prematurity detected on the right

Figure 3B
Adjustment of dentures. Prematurity detected on the left.

As stated earlier, an important use for the Coble Balancer is to balance maxillary and mandibular complete denture occlusion at the time of insertion. A balanced occlusion can yield significant benefits and improvement in function, even in the face of coexisting jaw relationship errors, fitting inaccuracies, and flange extension errors[12].

Yet despite the benefits, denture delivery can be a difficult process (for both dentist and patient) that may last several appointments and extend into a long period of adjustments and/or relining. There are numerous opportunities for the introduction of error into the delivery process that dentists must contend with. Laboratory processing errors such as acrylic shrinkage, thermal contraction, water sorption, and stress relaxation are major sources of discrepancy[13,14]. More error may be introduced in the conventional occlusion check with articulating paper, followed by spot grinding. Although popular, this procedure unfortunately does not account for the mobility of the basal tissues. A forward shift or asynchronous bite may go undetected and eventually contribute to muscular soreness, sore spots, or soft tissue lesions such as epulis fissuratum and inflammatory papillary hyperplasia[1,5,16].

The Coble device helps to address and preempt these potential complications. At denture delivery, the complete denture with properly affixed Coble components is inserted. The central bearing screw is shortened and the patient is asked to move into excursive and protrusive movements to locate any premature contacts that may compromise denture stability. If prematurities are encountered, they are spot ground until eliminated. In subsequent adjustments, the optimal occlusion may be exactly reproduced and verified, thereby eliminating occlusal discrepancy from the list of diagnostic differentials causing sore spots. This method aids the dentist in the development of a complete denture prosthesis that is stable, functional and more easily adapted to by patients.

Case Report

In this treatment, the Coble Balancer was utilized to adjust the occlusion of a removable maxillary complete denture and a removable mandibular complete denture at delivery. The patient was a 69-year-old female whose prostheses were constructed via traditional clinical and laboratory methods.

Using modeling compound, the Balancer plates were fixed to the mandibular and maxillary prostheses so that they were centered at the level of the molar/premolar regions (Fig. 1). The prostheses were then placed in the mouth and the maxillary pin assembly unscrewed so that pin and mandibular plate contact before the acrylic dentition. This disallows intercuspation or contact in any excursions (Fig. 2). The pin was screwed incrementally by

one-quarter turns and the patient asked to tap and grind on articulating paper on the occlusal surface. Premature contacts were detected (Fig. 3A-B), transferred (Fig. 4) and then relieved with selective grinding. Successive adjustments were completed until a fully balanced contact was achieved (Fig. 5, 6).

Discussion

Unilateral or bilateral soreness of an edentulous ridge is a sign of an occlusal discrepancy. These occlusal interferences cause the denture to rock on the basal seat and create friction on the bony ridges. The movable tissues of the basal seat often make this difficult to detect when delivering dentures in the conventional manner. The Coble Balancer's central bearing point sustains a fully seated denture base plate, an advantage allowing for a more accurate occlusal diagnostic evaluation. Indeed, Utz et al. reported in a 1995 study that patients whose dentures were equilibrated with the central-bearing-point method tended to cope better with their dentures and suffered from fewer pressure spots[17].

While the Coble Balancer has many advantages, its use may not be appropriate in all clinical situations. Trapozzano has stated that intra-oral central bearing point devices may only provide equalization of pressure "if two conditions are present: 1) if normal ridge relations exist and the central point of bearing can be placed in the center of the maxillary and mandibular foundational bases; and 2) if mucosal resiliency is extremely slight[18]." This observation was an expansion on Hanau's concept of "resilient and like effect" or Realeff where mucosal resiliency could lead to an uneven distribution of rebounding tissue pressure. This 'Realeff' can produce new discrepancies, that when corrected for, (via spot grinding) will provide a disharmonious occlusion and cause further masticatory dysfunction. Yurkstas also found that the position and inclination of the central bearing point and the relative tilt of the tracing plate affect the duplicability of the intra-oral tracing[19]. Therefore, great care must be taken in patient selection and procedural execution in order to use the Coble Balancer effectively.

Conclusion

Perhaps the effort required in the process is the factor most responsible for the technique's unpopularity in the general market. Without the requisite knowledge and experience in its manipulation, the extensive investment of time and energy to traverse the learning curve may be a deterrent for most practitioners. Some dentists prefer an alternative clinical remount procedure. Firtell et. al. reported that clinical remounting significantly reduced the incidence of soreness, preserved occlusal forces, and reduced the changes in occlusal patterns of the dentures[20]. Ansari described a simplified clinical remount procedure

Figure 4
Prematurities transferred with articulating paper

Figure 5
Prematurities relieved with successive spot grinding

Figure 6
Completed balanced occlusion

using high viscosity elastomer putty[21]. Surprisingly, no current studies have made direct comparisons between clinical remount and central bearing point methods. This represents an area of opportunity for further investigation.

References

1. Douglass CW, Shih A, Ostry L (2002). Will there be a need for complete dentures in the United States in 2020? *J Prosthet Dent* 87(1):5-8.

2. Allen PF, McMillan AS (2003). A review of the functional and psychosocial outcomes of edentulousness treated with complete replacement dentures. *J Can Dent Assoc* 69(10):662.

3. Zarb GA, Schmitt A (1990). The longitudinal clinical effectiveness of osseointegrated dental implants: the Toronto Study. Part II: The prosthetic results. *J Prosthet Dent* 64(1):53-61.

4. Psillakis JJ, Wright RF, Grbic JT, Lamster IB (2004). In practice evaluation of a denture adhesive using a gnathometer. *J Prosthodont* 13(4):244-50.

5. Kalk W, de Baat C (1990). Patients' complaints and satisfaction 5 years after complete denture treatment. *Community Dent Oral Epidemiol* 18(1):27-31.

6. Diehl RL, Foerster U, Sposetti VJ, Dolan TA (1996). Factors associated with successful denture therapy. *J Prosthodont* 5(2):84-90.

7. Coble LG (1951). Correct Centric Position must be established for good denture fit and function. *Dent Surv* 27:1391-1393.

8. Medwedeff FM (1983). Oral Reconstruction: an Instrument to establish vertical and Physiologic Occlusion. *J Am Dent Assoc* 107(3):443-5.

9. Kapur KK, Yurkstas AA (1957). An Evaluation of Centric Relation Records Obtained by Various Techniques. *J Pros Dent* 10:312-8.

10. Phillips GP (1927). Fundamentals in the Reproduction of Mandibular Movements in Edentulous Mouths. *J Am Dent Assoc* 14:409-415.

11. Medwedeff FM (1979). An Instrumented Technique of Occlusal Adjustment. *J Am Dent Assoc* 98:417-418.

12. Dubojska AM, White GE, Pasiek S (1998). The importance of occlusal balance in the control of complete dentures. *Quintessence Int* 29(6):389-94.

13. Lamb DJ, Semara R, Johnson A (2005). Palatal discrepancies and postdams. *J Oral Rehabil* 32(3):188-92.

14. McCartney JW (1984). Flange adaptation discrepancy, palatal base distortion, and induced malocclusion caused by processing acrylic resin maxillary complete dentures. *J Prosthet Dent* 52(4):545-53.

15. Buchner A, Helft M (1979). Pathologic conditions of the oral mucosa associated with ill-fitting dentures: II: Inflammatory papillary hyperplasia of the palate. *Refuat Hapeh Vehashinayim* 28(1):11-6, 9-13.

16. Buchner A, Helft M (1979). Pathologic conditions of the oral mucosa associated with ill-fitting dentures: III. Epulis fissuratum and flabby ridge. *Refuat Hapeh Vehashinayim* 28(2):7-13, 7-11.

17. Utz KH, Muller F, Bernard N, Hultenschmidt R, Kurbel R (1995). Comparative studies on check-bite and central-bearing-point method for the remounting of complete dentures. *J Oral Rehabil* 22(9):717-26.

18. Trapozzano VR (1955). Occlusal Records. *J Pros Dent* 5: 325-332.

19. Yurkstas AA, Kapur KK (1964). Factors influencing centric relation records in edentulous mouths. *J Prosthet Dent* 93(4):305-10.

20. Firtell DN, Finzen FC, Holmes JB (1987). The effect of clinical remount procedures on the comfort and success of complete dentures. *J Prosthet Dent* 57(1):53-7.

21. Ansari IH (1996). Simplified clinical remount for complete dentures. *J Prosthet Dent* 76(3):321-4.