Journal of Chemical Health Risks
www.jchr.org
JCHR (2026) 16(1), 158-166 | ISSN:2251-6727

Role of Occlusion in Restorative Dentistry: A Review

Dr. Shreya Mundhada[1], Dr. Rahul Maria[2], Dr. Vinay M[3], Dr. Aditi Khatri[4], Dr. Swetalina Paul[5], Dr. Ansu Ann Alex[6]

[1]PG Resident, Department of Conservative Dentistry and Endodontics, Bhabha College of Dental Sciences, Bhopal, Madhya Pradesh, India (Corresponding Author)
[2]Professor, Department of Conservative Dentistry and Endodontics, Bhabha College of Dental Sciences, Bhopal, Madhya Pradesh, India
[3]PG Resident, Department of Conservative Dentistry and Endodontics, Bhabha College of Dental Sciences, Bhopal, Madhya Pradesh, India
[4]PG Resident, Department of Conservative Dentistry and Endodontics, Bhabha College of Dental Sciences, Bhopal, Madhya Pradesh, India
[5]PG Resident, Department of Conservative Dentistry and Endodontics, Bhabha College of Dental Sciences, Bhopal, Madhya Pradesh, India
[6]PG Resident, Department of Conservative Dentistry and Endodontics, Bhabha College of Dental Sciences, Bhopal, Madhya Pradesh, India
Corresponding Author: Dr. Shreya Mundhada

(Received: 25 November 2025 Revised: 27 December 2025 Accepted: 01 January 2026)

KEYWORDS

Occlusion, Restorative Dentistry, Temporomandibular Joint, Articulatory System, Cosmetic Dentistry, Full-Mouth Reconstruction

ABSTRACT:
The way our teeth come together, known as occlusion, is fundamental to proper oral function. Unfortunately, it is often overlooked or taken for granted during patient treatment. Achieving successful and long-lasting dental restorations hinges on maintaining occlusal harmony. The term "occlusion" refers to the contact between teeth in the upper and lower jaws, both when the jaws are closed (static occlusal relationships) and during various jaw movements (dynamic occlusal relationships). A thorough understanding and evaluation of the concepts and factors influencing occlusion are crucial in both prosthodontics (replacement of missing teeth) and restorative dentistry (repairing damaged teeth). Specifically, the shapes of cusps, fossae, grooves, and marginal ridges of teeth should properly support the mandible (lower jaw) during rest and function. Restored teeth should not interfere with normal mandibular movements. Restorations should not transmit excessive forces to the tooth's attachment apparatus (periodontal ligament and bone) or the temporomandibular joint (TMJ), whether the jaws are fully closed, in other positions, or during movement. When occlusion functions optimally, it allows proper operation of oral functions like chewing and speaking. It contributes to the best possible aesthetics. Helps prevent problems with oral function. The biting surfaces (occlusal surfaces) of teeth are frequently involved in dental restorations. The significance of this lies in: Its relationship within the entire chewing system (articulatory system).The potential impact of occlusal trauma (damage from improper bite forces) on the tooth and its supporting tissues. Successful occlusal management leads to Predictable fitting of restorations and prostheses.

Introduction

While materials used in restorative dentistry have seen significant advancements with detailed information on their physical properties, the impact of these materials on occlusion and the balance of forces on teeth have not always received equal attention. Furthermore, the rise of dental specialties like cosmetic dentistry, implantology, and TMJ disorder treatment has increased the demand for a comprehensive understanding of occlusion. Occlusion remains a highly debated topic in modern dentistry. Early concepts were primarily mechanical, focusing on achieving harmonious tooth alignment for effective chewing. However, the understanding of occlusion has evolved to encompass not only mechanical aspects but also the dynamic, functional, and neuromuscular interactions between teeth, muscles, and the TMJs during chewing, speaking, and at rest. This broader view significantly influences how dentists consider occlusion in treatment planning and restorations. Occlusion involves a multidisciplinary consideration of the scientific and clinical factors underlying our understanding of how the mandible functions and when it malfunctions. This aligns with the principle that the primary goal of dentistry is to maintain the functional health of the entire chewing

Journal of Chemical Health Risks
www.jchr.org
JCHR (2026) 16(1), 158-166 | ISSN:2251-6727

system.[1-4] The neural pathways involved in a functional bite, as well as the central nervous system mechanisms that respond to pain or changes in the bite due to tooth loss, alterations, or restorative procedures, are also important aspects of occlusion.[5] Dental occlusion is more than just the physical contact of opposing teeth or their replacements (dentures, crowns, bridges). A more comprehensive and biological definition describes occlusion as "the coordinated functional interaction between the various cell populations forming the masticatory system as they differentiate, model, remodel, fail and repair. Morphologic variations are very common and represent the normal.[1] Within the dental profession, there is a wide range of opinions regarding the importance of occlusion. It is crucial for all practicing dentists to have a balanced perspective on this topic. The study of occlusion is often characterized by extreme viewpoints, which can make it confusing and challenging for individual dentists to adopt an evidence-based approach consistent with current best practices.[2] The primary aim of restorative dentistry is to return teeth to their original form and function. Understanding the internal and external anatomy of a tooth and its relationship to neighboring teeth is paramount for maintaining the health of the supporting tissues and ensuring the success of restorative procedures. However, restorations often don't explicitly consider the occlusal forces and patterns under which they will function. This is a potentially problematic trend because occlusion significantly influences the outcome of most dental restorations.

Types of Occlusions: Static and Dynamic

Occlusion, the way upper and lower teeth meet, can be categorized into two main types: static (when the jaws are closed) and dynamic (during jaw movements).

1. Static Occlusion

Static occlusion refers to the contact between teeth when the jaw is not moving. When the mandible is stationary, typically observed when the teeth are brought together in the Intercuspal Position (ICP). It's essentially how your teeth fit together when you're not chewing or making any other jaw movements. This position is a key element in understanding how teeth interact and is often assessed during dental examinations. These contact points vary depending on the specific position of the mandible.

2. Dynamic Occlusion

Dynamic occlusion describes the tooth contacts that occur during mandibular movements. These gliding or sliding contacts are integral to functions like mastication (chewing) and other mandibular movements. The nature of these dynamic contacts can be either advantageous or disadvantageous depending on the specific teeth involved and the location of the contacts during movement.

Concepts of Occlusion in Dentistry (Wheelers 1988)

1. Balanced Occlusion (Vonspee and Monson)

Early ideas regarding occlusion were often based on complete dentures. The concept of balanced occlusion, which included the idea that the most posterior position of the condyles was the optimal functional position for restoring denture occlusion, was applied to restoration of natural dentition.

2. Orthodontic Concept of Static Occlusion

A norm for occlusion is standardized based on cusp–fossae relationship. Another relation between upper and lower teeth besides this norm is malocclusion. It is based on anterior- posterior arch relationships. The cusp interdigitation pattern of the first molar teeth is used to classify anterior-posterior arch relationships using a system developed by Edward H. Angle. The location of the mesio facial cusp of the maxillary first molar in relation to mandibular first molar is used as a marker in this classification (Graber 1978). This is when the mesio facial cusp of the maxillary first molar settles in to the disto-facial groove of mandibular first molar.

3. Dynamic Individual Occlusion

This concept is gaining wider acceptance recently. Emphasis is placed on functional stability rather than mathematical accuracy of static anatomical relation. It not only considers relation between the teeth but also between other associated structures like the investing tissues, the masticatory muscles, the curve of spee, the temporo-mandibular joint, etc. Several concepts of ideal or optimal occlusion of natural dentition have been suggested by Angle (1887).

Occlusal Schemes

Guichet 1969 - Three types of occlusal schemes from this position are accepted today:

1. The Mutual Protected Occlusion.
2. The Group Function and
3. The Balanced Occlusion.

The mutual protected occlusion is when the posterior teeth protect the anterior teeth in centric relation occlusion, and the anterior teeth protect the posterior teeth in all excursive movements. This is also known

Journal of Chemical Health Risks
www.jchr.org
JCHR (2026) 16(1), 158-166 | ISSN:2251-6727

as the canine-protected occlusion because; the maxillary canines act to guide the mandible so that the posterior teeth come into closure with minimum of horizontal forces.

Mutually Protected Occlusion (Canine Protected)

This occlusal scheme was advocated by Stuart and Stallard (based on earlier work by D'Amico) during the early 1960's. In this arrangement centric relation coincides with intercuspal position. Optimum Occlusion (Mutually protected): In an ideal occlusal arrangement. This is facilitated when the tips of the centric cusps are located centrally over the roots and when loading of teeth occurs in the fossae of the occlusal surfaces rather than on the marginal ridge. Horizontal forces are also reduced if there is no posterior tooth contact during excursive movements. In addition, the chewing and grinding action is enhanced if opposing cusps on the laterotrusive side intercuspate at the end of the chewing stroke.

Fig 1: Deflection on the left. Mandibular guidance is provided by the canines alone

Fig 2:- The Canine Guided Occlusion

Group Function Occlusion or Unilateral Balanced Occlusion

There is a space of antero-posterior "freedom" between the position of centric relationship occlusion and maximum intercuspidation occlusion called "long centric". In the transverse direction, we speak of "wide centric". During mandibular movements, there are only sliding contacts on the working side during lateral movements; Called "group function occlusion", these contacts are based on: The external slopes of the mandibular vestibular cusps; against the internal slopes of the maxillary vestibular cusps

Fig 3: Group Function Occlusion

Fig 4: Group Function Occlusion

Balanced occlusion

For of balanced occlusion, we must have simultaneous contacts laterally on the working and non-working side: Working side: contact between the external slopes of the mandibular vestibular cusps and the internal slopes of the maxillary vestibular cusps.Non-working side: contact between the internal slopes of the maxillary palatal cusps and the internal slopes of the mandibular vestibular cusps.

Fig 5: Balanced Occlusion

Biologic Adaptation

Okeson 1995 stated-Once growth is complete; maintenance of the vertical dimension of occlusion is determined by the adaptive capacity of the biologic

Journal of Chemical Health Risks
www.jchr.org
JCHR (2026) 16(1), 158-166 | ISSN:2251-6727

system to insult or injury. Adaptive responses can occur within the Temperomandibular joint (TMJ), the periodontium, and the dental occlusion. In most cases, it is the soft tissues of the TMJ and periodontal ligament that initially respond to acute micro- and macro trauma. The fluid compartments that are maintained within the extra cellular matrix rapidly shift in response to variations in strain patterns. The first response within the TMJ to compressive forces is a shift in the fluids within the disc and retro-discal tissues. Once the strain is relieved, the fluid will return to its original position and the morphology of the tissues is maintained. However, prolonged strain with these tissues will result in an alteration of the architecture of the collagen and non-collagen proteins and ultimately a change in tissue morphology.

Occlusal Correction and Wear: A Restorative Dentistry Perspective

This section discusses how restorative dentistry can correct occlusal problems and addresses the issue of occlusal wear.

Occlusal Correction Through Restorative Dentistry

A. Objectives of Full-Mouth Reconstruction:

The main goals of a complete dental restoration are to: Repair or replace individual teeth. Establish or maintain a bite (occlusion) and tooth shapes that work well with the function and health of all parts of the chewing system (teeth, gums, jaw joints, muscles).Realigning the bite through restorative methods involves using crowns, onlays, fixed bridges, removable partial dentures, or combinations of these to create a healthy and functional occlusion. Often, this requires restoring all the back teeth and sometimes the front teeth as well.

B. The Importance of Gnathological Principles:

When performing extensive occlusal reconstruction, it's crucial to follow gnathological principles, which focus on the relationship between tooth shape, jaw movement, and overall function. This includes using proper instruments like a fully adjustable articulator and recording the patient's precise jaw movements from a stable reference point before starting treatment.

C. When is Extensive Reconstruction Necessary?

Fortunately, most patients don't need a full gnathological reconstruction. Often, a stable bite can be achieved with less extensive treatment, such as a few strategically placed crowns or a small bridge. The dentist's clinical judgment, based on a thorough bite analysis and diagnosis, is key in determining the necessary treatment.

D. Applying Gnathological Principles in Limited Restorations:

Even in less complex cases, applying gnathological principles helps ensure that the new tooth surfaces (ridges, grooves, and cusps) are compatible with the patient's jaw movements, preventing future bite problems.

Occlusion in Restorative Procedures: (Kearl F. Leinfelder 1995)

Before the restorative procedures are started the operator should determine if the patient's occlusal relationships are adequate ad merit perpetuation in the restorations or appliances. Caries, inadequate restorations, periodontal disease loss of teeth all predispose and often lead to disturbed occlusal relationship. The use of the best articulation or functionally recorded occlusal wax pattern is meaningless, if unharmonious occlusal relationship in the dentition is being reproduced by the use of these methods. In some instances, the functional part of a patient's occlusion may be free of occlusal interferences while other teeth not participating in occlusal function may have drifted into malposition because of the loss of antagonists or from other causes.

Cast Restorations Part of Quadrant

When cast restorations involve part of one quadrant they must be made to fit into the previous intercuspal relation unless initial occlusal adjustment is carried out. Ideal supporting cusp contact may be achieved with the cast restoration which should not introduce new centric relation premature contacts or non-working, working or protrusive interferences.

Single Quadrant

Centric occlusion is determined by the intercuspation of the opposite (contra lateral) side unless initial occlusal adjustment is performed. The occlusal plane is dictated by the position of the teeth in the opposing quadrant. The early loss of mandibular first molar has caused supra eruption of the opposing first molar and mesial tipping of the mandibular second molar. The
mandibular quadrant must be restored with an unfavorable occlusal plane. Centric occlusion contacts may be obtained but cusps must be flat in order to avoid introducing cuspal interference.

Opposing Quadrant

When opposing quadrant is restored the more favorable occlusal plane and curve of spee may be

Journal of Chemical Health Risks
www.jchr.org
JCHR (2026) 16(1), 158-166 | ISSN:2251-6727

restored with optimum intercuspal contact. Then intercuspal relation and occlusal vertical dimension are maintained by contact of contra lateral side. When the skeletal relation and anterior tooth position permit, immediate disclusion of posterior tooth contact may be achieved. In the absence of anterior guidance eccentric guidance may be included into the posterior restorations as necessary.

Four Quadrants Together

When all four quadrants are restored at once all the components of posterior segment of occlusion must be restored together. This includes the intercuspal relation, the occlusal vertical dimension, the occlusal plane, the curve of spee, and the elements of occlusal morphology that combine optimum supporting cusp contact in centric occlusion with immediate eccentric disclusion.

Posterior Restorations (Allan Schulman 1981)

Amalgam Restorations

Amalgam restorations are the most commonly used restorations for restoring carious or broken posterior teeth. Prior to cutting the preparation of a tooth its opposing occlusal surfaces should be examined. Plunger cusps and over erupted teeth may be reduced and any premature contacts or cuspal interferences may be eliminated in order to avoid their duplication in the new restoration.

Tooth Preparation

The depth of a cavity provides this bulk and should be at least 2 mm. Missing cusps may be restored in amalgam. An amalgam, cusp must be at least 2 mm high. The tooth structure of the remaining cusps should be strong enough to support occlusal forces. Retention for large amalgam restorations may be achieved with retention grooves and pins in addition to divergence cavity walls.

Carving Amalgam

Buccal and lingual surfaces may be contoured by following the contour of the remaining buccal and lingual walls.

Carving the Occlusal Surface

The restoration may be carved by passing a sharp carving instrument back and forth along the cavo-surface angle between enamel and amalgam. Buccal and lingual inner inclines the point at which the two surfaces join will be the central fossae and groove.

Marginal Ridge

The occluso buccal and the occlusolingual contours should be followed from both sides till they meet, thus formatting the contour of the marginal ridge. Checking the Occlusion: A piece of articulating paper will show points of contact on supporting cusps, marginal ridges and central fosse. These should all be carefully reduced until simultaneous supporting cusp contacts exists between the restoration and the other posterior teeth. Centric Relation Contacts: Premature contact in centric relation should be removed. These occur on the distal inclines of the mandibular teeth and on the mesial inclines of the maxillary teeth.

Cast Restoration (Greener 1972)

Planning of Cast Restorations

The position of the cusps, fossae and marginal ridge of the teeth opposing the proposed restoration should be examined. If these are in unfavorable relations due to over eruption or migration they should be re-contoured. Premature contacts or cuspal interferences from teeth opposite the required restoration should be removed in order to prevent their reintroduction in the final restoration.

Tooth Preparation

Inlay margins should not be placed at the occlusobuccal line angles of the mandibular teeth or at the occlusopalatal line angles of the maxillary teeth. Placement of margins in these areas will leave these cusps weak and liable to fracture. Onlay restorations employ the principle of overlying the supporting cusps. The minimum amount of occlusal reduction necessary to overlay a supporting cusp is 1 to 1½ millimeters. Occlusal reduction should be checked in centric occlusion, centric relation, working, non-working and protrusive movements.

Occlusal Adjustment by Selective Grinding

Selective grinding is not the same as spot grinding. Spot grinding employs the principles of grinding away all articulating paper markings until the patient feels that the tooth in no longer “high. As a result the restored tooth may be non functional and completely out of contact. It may feel “high” in centric relation, centric occlusion, working, non-working, and protrusive relations. By being able to distinguish between the terminal and eccentric contacts of the “high” filling, the undesirable premature contacts and occlusal interferences may be removed by selective grinding and the desirable contacts in centric occlusion left intact.

Journal of Chemical Health Risks
www.jchr.org
JCHR (2026) 16(1), 158-166 | ISSN:2251-6727

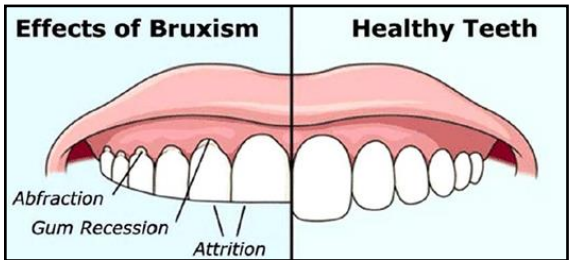

Fig 6: Effects of Bruxism

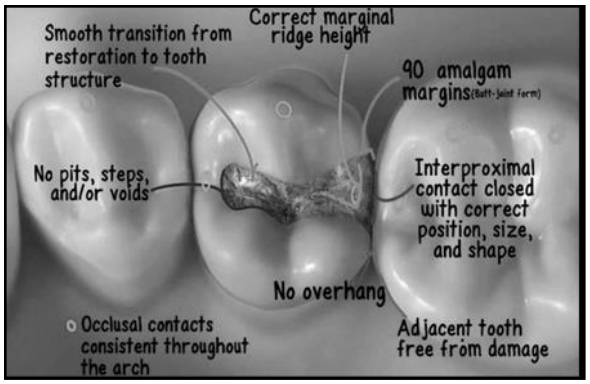

Fig 7: Cast Restoration

Occlusion and the Choice of Materials

Power and Denison in 1974 stated-A restorative material may have the ultimate bond strength, palatability, appearance and workability; but if it cannot withstand the forces of occlusion, if has limited value in the mouth. One fast developing group of materials namely composite resins are changing so fast that researches cannot report the results of long-term clinical studies before a new generation is on the market. Consequently, the appropriate choice for a given clinical situation has become increasingly complicated, considering the specificity of current bonded restorations. The concept proposed for dealing with this matter rests on distinguishing between different lateral segment of types and their corrected options.

Examination of Occlusion: (Anderson, J, M 1972)

There are several reasons for completing a thorough occlusal examination for developing an occlusal analysis and understanding of the patient's occlusion before initiating restorative care First, the patients presenting condition can be established prior to any alterations by the operator. This documentation includes the identification of the signs of occlusal trauma such as enamel cracks, or tooth mobility and occlusal abnormalities that contribute to pathological conditions such as bone joint disorders. Second, the potential effect of the proposed restorative treatment on the occlusion can be assessed. Third, the effect of the current occlusal scheme on proposed restorative treatment can be identified and existing occlusion altered if needed, prior to placement of restorations. Teeth are examined for abnormal wear patterns. If signs of abnormal wear are present the patient is questioned as to the presence of any contributing habits, such as nocturnal bruxism or parafunctional habits. The examination should disclose the possible uncomfortable occlusal relation which is a pointed cusp (plunger cusp) plunging deep into the occlusal plane of the opposing arch. This may result in food impaction or tooth restoration fracture.

Occlusion of Restoration for Class I Preparation

After completion of carving and during the removal of rubber dam or cotton rolls the patient is advised not to bite because of the danger of fracturing the restoration, which is weak at this stage. Whenever possible normally inspect the contact potential of the restored tooth and assess the extent of closure. To ensure that the occlusion is correct, place a piece of articulating paper over the restoration and instruct the patient to close very lightly. High-spots will be marked, which can be removed by the additional carving. If anesthesia is still evident, it maybe difficult for the patient to indicate when the teeth are in contact.

Occlusal Analysis during Class II Amalgam Restoration

After the indentation and carving of amalgam one should look for features of occlusal relationship that offer clues suggesting the restoration is high. Cusp tips of adjacent teeth are not in occlusal relationship that suggests the restoration is high. Cusp that occludes with a marginal ridge of the restoration is prematurely high. Now with the aid of articulating paper, evaluate the 'O' and make any indicated adjustments. Yet objectively for any high points using the articulating paper even if the patient does not testify to a sense of highness. Any interference can be recognized on the restoration by the depth of color imprinted by the paper, and especially if the colored area has a shiny center. Adjust (reduce) the deeper colored or shiny centered area until all markings are uniformly of a light hue with no shiny centers. Caution the patient not to apply the new restoration for biting or chewing for few days.

Cast Metal Restorations for Class II Preparations

When the proximal contacts have been adjusted and casting is satisfactorily seated on the tooth, have the patient close into maximum inter cuspal position and inspect the unprepared adjacent teeth to see if there is any space between opposing wear facets. After drying

Journal of Chemical Health Risks
www.jchr.org
JCHR (2026) 16(1), 158-166 | ISSN:2251-6727

the teeth of saliva insert a strip of articulating paper and request the patient to close and tap the teeth together several times. Remove the paper and examine it by holding it up towards the light for evidence of any areas of penetration caused by restoration seen as heavy markings on the casting. Such heavy contacts should be reduced with suitable abrasive stones, while carefully observing the hold composed of supporting cusp tips placed against flat or smoothly concave surface for stability.

Conclusion

After the detailed discussion about the principles of occlusion and how every principle influences the morphology of teeth and their effect on the overall masticatory system of the patient, it can be said that we cannot ignore the important role it plays in deciding the outcome of the restored dentition. The occlusal scheme of the patients should be evaluated before any treatment plan that will involve a small or major alteration on the occlusal surfaces of the teeth. The occlusal forces also play a decisive role in the selection of the materials being used and the design features of the restorative work. Applying these principles in routine restorative care of the patient will ensure that the patients have the highest standard of care and long-term oral health. However, the restorations should not be provided to fit into this ideal occlusion scenario. The patient's occlusion may not meet all the criteria of an ideal occlusion, but it may have developed a stable, functional, healthy, and comfortable equilibrium with the rest of the masticatory system. In such cases causing any changes in the existing occlusion may change this equilibrium. Sometimes patient's stomatognathic system may adapt to these changes, whereas in other situations may have a more detrimental effect

References

1. Sinha D, Venugopalan S, Anand V. Assessment of the success and survival of full mouth rehabilitations: a 3 year follow up study. J Oral Biol Craniofac Res. 2025 Nov- Dec;15(6):1710-1714.
2. Stuart CE, Golden IB. Michigan: University of Michigan; 1984. The history of gnathology.
3. Pattern of occlusal contacts in lateral positions: canine protection and group function validity in classifying guidance patterns. Ogawa T, Ogimoto T, Koyano K. J Prosthet Dent. 1998;80:67–74.
4. D'Amico A. Northwestern University; 1957. The canine teeth: normal functional relation of the natural teeth of man.
5. Relationship between balancing-side occlusal contact patterns and temporomandibular joint sounds in humans: proposition of the concept of balancing-side protection. Minagi S, Watanabe H, Sato T, Tsuru H. J Craniomandib Disord. 1990;4:251–256.
6. Glossary of prosthodontic terms 2023: tenth edition. Layton DM, Morgano SM, Muller F, et al. J Prosthet Dent . 2023;130:0–26.
7. Orthodontics and occlusion. Davies SJ, Gray RM, Sandler PJ, O'Brien KD. Br Dent J. 2001;191:539-42, 545-9.
8. Dawson PE. St. Louis, MO: Elsevier Health Sciences; 2006. Functional occlusion: from TMJ to smile design.
9. The longevity of direct and indirect posterior restorations is uncertain and may be affected by a number of dentist-, patient-, and material-related factors. Goldstein GR. J Evid Based Dent Pract. 2010;10:30–31.
10. Repair or replacement of restorations: a prospective cohort study by dentists in The National Dental Practice-Based Research Network. Gordan VV, Riley JL 3rd, Rindal DB, et al. J Am Dent Assoc. 2015;146:895–903.
11. Occlusal concepts and considerations in fixed prosthodontics. Amin K, Vere J, Thanabalan N, Elmougy A. Prim Dent J. 2019;8:20–27.
12. Biomechanics in restorative dentistry. Kaladevi M, Balasubramaniam R. Int J Appl Dent Sci. 2020;6:251–256.
13. A comparison of traditional occlusal equilibration and immediate complete anterior guidance development. Kerstein RB. Cranio. 1993;11:126–139.
14. Temporomandibular joint pain-dysfunction problems can be solved. Dawson PE. J Prosthet Dent. 1973;29:100–112.
15. Okeson JP. St. Louis: Mosby. St. Louis, MO: Elsevier Mosby; 2019. Management of temporomandibular disorders and occlusion, eight edition; p. 512.
16. Making occlusion work: I. Terminology, occlusal assessment and recording. McCullock AJ. Dent Update. 2003;30:150–157.
17. Crowns and other extra-coronal restorations: occlusal considerations and articulator selection. Steele JG, Nohl FS, Wassell RW. Br Dent J. 2002;192:377-80, 383-7.
18. Clinical issues in occlusion - part II. Patel M, Alani A. Singapore Dent J. 2015;36:2–11.
19. An appraisal of the literature on centric relation. Part I. Keshvad A, Winstanley RB. J Oral Rehabil. 2000;27:823–833.
20. Rehabilitation of occlusion - science or art? Koyano K, Tsukiyama Y, Kuwatsuru R. J Oral

Journal of Chemical Health Risks
www.jchr.org
JCHR (2026) 16(1), 158-166 | ISSN:2251-6727

Rehabil. 2012;39:513–521.
21. The influence of altered working-side occlusal guidance on masticatory muscles and related jaw movement. Belser UC, Hannam AG. J Prosthet Dent. 1985;53:406–413.
22. Changes in chewing patterns of patients with complete dentures after placement of osseointegrated implants in the mandible. Jemt T, Lindquist L, Hedegard B. J Prosthet Dent. 1985;53:578–583.
23. Relationship between duration of unilateral masticatory cycles and the type of lateral dental guidance: a preliminary study. Salsench J, Martínez-Gomis J, Torrent J, Bizar J, Samsó J, Peraire M. Int J Prosthodont. 2005;18:339–346.
24. Canine-guide occlusion and group function occlusion are equally acceptable when restoring the dentition. Miralles R. J Evid Based Dent Pract. 2016;16:41–43.
25. Making occlusion work: 2. Practical considerations. McCullock AJ. Dent Update. 2003;30:211-6, 218-9.
26. Good occlusal practice in simple restorative dentistry. Davies SJ, Gray RM, Smith PW. Br Dent J. 2001;191:365-368, 371-4, 377-81.
27. Recording the retruded contact position: a review of clinical techniques. Wilson PH, Banerjee A. Br Dent J. 2004;196:395–402.
28. A technique for recording centric relation. Lucia VO. J Prosthet Dent. 1964;14:492–505.
29. Prevalence of loss of all teeth (edentulism) and associated factors in older adults in China, Ghana, India, Mexico, Russia and South Africa. Peltzer K, Hewlett S, Yawson AE, et al. Int J Environ Res Public Health. 2014;11:11308–11324.
30. Complication rates and patient satisfaction with removable dentures. Bilhan H, Erdogan O, Ergin S, Celik M, Ates G, Geckili O. J Adv Prosthodont. 2012;4:109–115.
31. Maintaining occlusal stability by selecting the most appropriate occlusal scheme in complete removable prosthesis. Sabir S, Regragui A, Merzouk N. Jpn Dent Sci Rev. 2019;55:145–150.
32. The concept of neutrocentric occlusion as related to denture stability. DE MM. J Am Dent Assoc. 1954;48:165–169.
33. An alternative approach for the rehabilitation of a complete denture patient with Parkinson's disease. Priya M, Dubey SA, Gorripati JP. Cureus. 2024;16:0.
34. Creativity in therapeutic dietetics. Payne A. J Am Diet Assoc. 1965;47:20–24.
35. Quest for ideal occlusal patterns for complete dentures. Koyama M, Inaba S, Yokoyama K. J Prosthet Dent. 1976;35:620–623.
36. Owen CP, MacEntee MI. Prosthodontic treatment for edentulous patients, 13th edition. St. Louis, MO: Mosby; 2012. Additional considerations in the management of edentulous patients: the impact of socioeconomic, cultural, and technological changes and the notion of standards of care and alternative protocols; pp. 409–420.
37. Pohl TDP, Harhoff AC, Ries J, Wichmann M, Matta RE. Changes of the Occlusal Relationship in Patients With Temporomandibular Disorders (TMD) After Manual Therapy: A Pilot Study. Clin Exp Dent Res. 2025 Jun;11(3):e70147.
38. A systematic review of post-extractional alveolar hard and soft tissue dimensional changes in humans. Tan WL, Wong TL, Wong MC, Lang NP. Clin Oral Implants Res. 2012;23 Suppl 5:1–21.
39. Influence of mandibular residual ridge resorption on objective masticatory measures of lingualized and fully bilateral balanced denture articulation. Matsumaru Y. J Prosthodont Res. 2010;54:112–118.
40. Removable partial denture occlusion. Ivanhoe JR, Plummer KD. Dent Clin North Am. 2004;48:667-83.
41. Benalcazar-Jalkh EB, de Carvalho LF, Zahoui A, Pucciarelli MGR, Soares S, Celestrino M, Bonfante EA. Digital Workflow for the Restoration of the Vertical Dimension of Occlusion Evaluated by 3D Stereophotogrammetry. J Esthet Restor Dent. 2025 Dec;37(12):2493-2509.
42. Principles of smile design. Bhuvaneswaran M. J Conserv Dent. 2010;13:225–232.
43. Let /S/ be your guide. Pound E. J Prosthet Dent. 1977;38:482–489.
44. Functional balancing in complete dentures: revisiting the paterson's technique- a case report. Pathiyil V, Irfanul Huda R, Anand S, Preeti Preeti. IP Ann Prosthodont Restor Dent. 2023;9:228–234.
45. Osseointegrated titanium implants. Requirements for ensuring a long-lasting, direct bone- to-implant anchorage in man. Albrektsson T, Brånemark PI, Hansson HA, Lindström J. Acta Orthop Scand. 1981;52:155–170.
46. Influence of forces on peri-implant bone. Isidor F. Clin Oral Implants Res. 2006;17:8–18.
47. Alaida WS, Gadi SA, Al-Ghannam RE, Alamri MF, Mirdad FI, Argaibeh RM, Alqahtani BA, Alqahtani AM, Al Jaban AA, Alkuraydimi TM, Alamari AS. Biomechanical and Occlusal

Factors Influencing the Longevity of Single-Unit Restorations: A Comprehensive Review. Cureus. 2025 Jun 14;17(6):e85998.
48. Cao H, Lopez D, Lee JD, Lee SJ. Quantitative analysis of occlusion in posterior single- implant supported restorations: A clinical study. J Dent. 2025 Nov 14;164:106233.
49. Occlusal considerations in implant therapy: clinical guidelines with biomechanical rationale. Kim Y, Oh TJ, Misch CE, Wang HL. Clin Oral Implants Res. 2005;16:26–35.
50. Implants and the periodontium. Schulte W. Int Dent J. 1995;45:16–26.
51. Occlusal considerations in maintaining health of implants and their restorations. Stilwell C. Br Dent J. 2024;236:773–779.
52. Lassmann Ł, Calamita MA, Manfredini D. Myths surrounding vertical dimension of occlusion in restorative dentistry: A scoping review. J Esthet Restor Dent. 2025 Jan;37(1):94-105.