

BDJ Clinician's Guides

Stephen Davies

# A Guide to Good Occlusal Practice

*Second Edition*

**BDA**  
British Dental Association

 Springer

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# A Guide to Good Occlusal Practice

Second Edition

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## Preface

There is a very long list of contributors to this work. Without their expertise this multi-disciplinary work on the provision of Good Occlusal Practice would not have been possible. I am very fortunate to have had the expertise, support and energy of such a loyal and kind group of professional friends. Special thanks go to Indika Weerapperuma who, in addition to having contributed to two chapters, has been my sounding board for ideas and has proofread the book. Each chapter has evolved from an initial discussion with the specialist(s), from which a first draft was created. Throughout the development, Occlusion has been kept as the central theme. After a lifetime of teaching the Occlusion, it is my experience that both undergraduate and postgraduate students approach the subject with the mistaken belief that it is somewhere between difficult and incomprehensible. It has been a privilege to experience a colleague's joyous realisation that the subject is not as difficult as they thought. It is my sincere hope that the reader's reaction will be the same.

At Springer/Nature: I would firstly like to thank James Sleight for the invitation to rewrite the 2002 BDJ book *A Clinical Guide to Occlusion*; my special thanks go to Alison Wolf who has consistently supported and guided me through the publication stage of this work.

I would like to thank Mrs Mandy Lynam, who as my dental nurse would not let me dismiss a patient with a poorly occluding restoration even if I had wanted. Gordon Lucas, my technician partner, has been the talented and reliable provider of all my indirect restorations for more than 40 years. Finally, I would like to acknowledge the clinical companionship and academic encouragement that the Manchester Dental School and Hospital provides; I am blessed to be part of that community.

Finally, and above all others, I want to thank my wife for her patience and understanding. When I qualified and we married in 1971, we both thought that Dentistry would just be my job.

2022, Manchester, UK

Stephen Davies

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# Contents

<b>1</b>	<b>What Is Occlusion?</b> .....	<b>1</b>
<b>2</b>	<b>The Examination and Recording of the Occlusion: Why and How</b> .....	<b>23</b>
<b>3</b>	<b>Good Occlusal Practice in Simple Restorative Dentistry</b> .....	<b>43</b>
<b>4</b>	<b>Good Occlusal Practice in Advanced Restorative Dentistry</b> .....	<b>79</b>
<b>5</b>	<b>Good Occlusal Practice in Removable Prosthodontics</b> .....	<b>119</b>
<b>6</b>	<b>Occlusion and Orthodontics</b> .....	<b>141</b>
<b>7</b>	<b>Occlusal Considerations in Periodontics</b> .....	<b>165</b>
<b>8</b>	<b>Good Occlusal Practice in Children’s Dentistry</b> .....	<b>191</b>
<b>9</b>	<b>Bruxism</b> .....	<b>207</b>
<b>10</b>	<b>Occlusion and Non-carious Tooth Surface Loss</b> .....	<b>219</b>
	Section 10.1: General Considerations on the Management of Non-carious Tooth Surface Loss. ....	220
	Section 10.2: Creating the Space for the Restoration of the Worn Teeth. . .	239
	Section 10.3: Case Histories to Illustrate Restorative Strategies .....	247
<b>11</b>	<b>Good Occlusal Practice in the Provision of Implant-Borne Prosthesis</b> .....	<b>279</b>

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## Readers' Voices

**Tara Bharadia 5th Yr Dental Student** Dr. Davies has always said that occlusion is easy, and this book is the proof! In the run up to finals, a once mystical and daunting topic now seems tame and manageable. All the terms are properly explained right at the start and there are chapters to refer to when you have specific questions further on in your career. You will come away being confident with the theory as well as comfortable with the practical elements of examination and treatment considerations. I would recommend this book to anyone who is confused by Occlusion!

**Don Jayawardena Dental Core Trainee** This book has easy to understand explanations regarding terminology and in taking occlusal records. Most important to me as a DCT it gives clear guidance on when to reorganise or to conform—a question I am often asked! The author suggests planning the occlusion using the EDEC principle, and he highlights useful techniques for taking pre-treatment records; these are useful in my current restorative DCT post.

**Chris Needham Experienced GDP, Pre PG qualification** Despite being an experienced GDP, Occlusion was a subject that I thought I might never fully comprehend. This book really does simplify Occlusion, explaining the common pitfalls and how to avoid them. I have picked up many techniques that I now use daily. This is essential reading for all General Dental Practitioners, because it will give them confidence to carry out Good Occlusal Practice in all of their treatments. I feel much more confident to pursue PG education in Advanced Restorative Dentistry.

**Amy Burns Post Graduate Student** A refreshing common-sense approach to dealing with clinical scenarios from simple cases up to more advanced dentistry. I have previously found the subject of occlusion daunting; however the step-by-step approach in this book has broken it down into easy to grasp concepts. I feel confident applying this to my clinical work, and it has given me a robust understanding which has been invaluable for studying for my MSc.

**April Scholey GDP with PG qualification** A brilliant summary of how occlusion affects our everyday dentistry. Postgraduate education has taught me that occlusion is that missing link that ties together all aspects of dentistry. It can be the cause of restoration failure and needs to be considered at the planning stage, not as an

afterthought. This book is an excellent, evidence-based summary that encompasses a long career of research and clinical practice from an inspiring practitioner—all condensed in one place!

**James Darcey Consultant in Restorative Dentistry** This book seeks to demystify Occlusion. It is logical in progression from basic to advanced aspects of Good Occlusal Practice in Restorative Dentistry. It outlines the key information and reinforces the most important messages, not least the EDEC principle. This update also discusses newer thinking on more flexible approaches to rehabilitation which introduces pragmatism into case planning and delivery of treatment. I would recommend all practitioners read and keep a copy of it on their shelves for reference.

**Nick Grey Professor of Dental Education, University of Manchester and National Teaching Fellow** This book is a 'must read'. It covers the management of clinical issues that confront the profession and does so in a reader-friendly way.

# What Is Occlusion?

# 1

## Objective

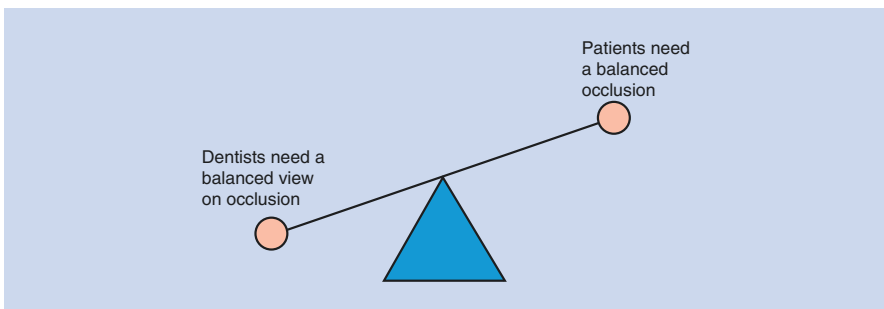
The aim of this book is to explore the role of Occlusion in Dental Practice.

There is an enormous range of opinion within the dental profession regarding the significance of Occlusion [1]. It is very important that the profession in general and practising dentists in particular have a balanced view of Occlusion.

To be controversial from the start, having a broad consensus within the profession on the importance of Occlusion is more important than every patient having a balanced occlusion.

The fact that the study of occlusion is characterised by extremes of opinion makes it confusing and difficult for individual dentists to subscribe to a philosophy which is in line with contemporary good practice supported by evidence from practice-based research. I hope that this book will make it easier for individual dentists to find a philosophy that helps them in their everyday practising life; and that some of the ideas expressed in this book will find favour with the profession. Above all, I hope that the reader will detect a ‘common-sense approach’, whilst still finding it supported by evidence.

There is some evidence that ‘Occlusion’ could be covered in undergraduate curriculums with a more ‘coordinated teaching strategy’. I will be pleased if this book can make a contribution to that aim [2].



In this chapter, we will discuss:

1. What is ‘Occlusion’.
2. Why Occlusion is important.
3. The significance of *Ideal Occlusion*.

## Range of Opinion

At one end of the spectrum there are dentists who believe that they can go through their working lives with scant regard for their patients’ occlusion. They seem to believe that they can conduct their practice ignoring the occlusal consequences of the treatments that they perform daily. Whereas all dentists know of the importance of the good marginal adaptation of their restoration to the health of the adjoining dental and periodontal tissues, some dentists do not appreciate the potential consequences of poor occlusal contact to the opposing teeth and their supporting structures. This is bizarre given the fact that very few dental treatments do not involve the occlusal surfaces of teeth.

Conversely there is a body of opinion that considers Occlusion to be of such systemic import to the well-being of our patients, that ‘Occlusion’ takes on an almost mystic importance and attracts a cult-like devotion (Table 1.1). This can lead some dentists to advocate occlusion as being the key to resolving or preventing a range of disorders far removed from the Masticatory System, for example prolapsed lumbar discs. Often such enthusiastic fervour is associated with a didactic prescription of ‘occlusal rules’, to which there must be slavish adherence in the treatment of every patient! It may be harsh to describe the devoted adherence to a particular Occlusal Philosophy as a ‘cult’, but sometimes characteristics like gurus and followers and an intolerance of any other belief can justify this perception.

There are several dangers in these extremes:

Both may lead to inappropriate levels of care for our patients.

- The ‘Occlusion doesn’t matter’ group may undertreat patients or provide treatments that can lead to iatrogenic damage.
- Whereas the ‘Correct Occlusion is the key to a whole body musculo-skeletal harmony’ group may overtreat patients by providing irreversible treatments without a solid evidence base.

**Table 1.1** It has been claimed without evidence that occlusion causes

Temporomandibular disorders	Poor posture
Excessive ear wax	Speech defects
Prolapse of lumbar disc	Negative influence on the craniosacral mechanism
Reduced strength in deltoid and rectus femoris muscles	Lack of beauty

The Confusion and Controversy that is generated by this wide range of opinion on the importance of Occlusion causes an anxiety in the minds of undergraduate and postgraduate students. It makes many of them feel that Occlusion must be very difficult.

It is not surprising that these two extreme views co-exist so easily within a thinking profession because the one appears to provide the justification for the other. The ‘occlusion doesn’t matter’ group probably justify their reluctance to become ‘involved in occlusion’ on what they perceive to be the exaggerated and unsubstantiated claims of the group who believe occlusion to be the central pillar of holistic care. This congregation of opinion in turn may be so frustrated by the apparent disregard of the study of occlusion that they are led to ‘gild the lily’ by overstating the importance of occlusion and then in the absence of what they perceive to be an inability ‘to see the obvious’ they go on to lay down rules, which they encourage all dentists to follow for every patient.

### ‘Occlusion’

#### There is no escape

Dentists cannot:

- Repair
  - Move
  - Remove
- } teeth

without being involved in occlusion

It is the objective of this book to explore the role of occlusion in dental practice in a manner based on reason, common sense and evidence. There is good and bad practice in occlusion as in other aspects of clinical dentistry. I hope, therefore, to establish the concept of *Good Occlusal Practice*, in all of the dental disciplines.

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## Guidelines of Good Occlusal Practice

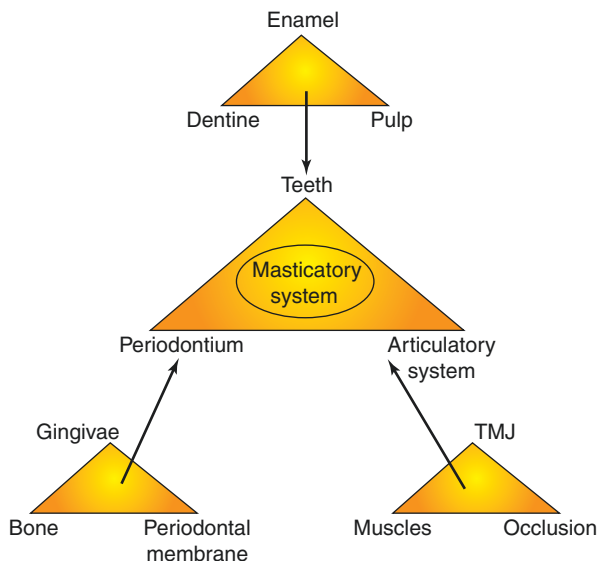
### These Must Be Guidelines Not Rules

All patients are different, reacting to similar stimuli in different ways. This is an accepted truth in medicine, so I do not see why it should not apply to Occlusion in dentistry. As a consequence, I believe that a patient’s individual needs can and should be left to the individual clinician.

It is my hope that the Guidelines of Good Occlusal Practice in this book will appeal to my colleagues. And that, upon reflection, the reader will agree that some are obvious, and hardly needed stating.

The fog of confusion and controversy must be cleared, because no practising dentist can care well for their patients without having regard for Good Occlusal Practice.

**Fig. 1.1** The Masticatory System



## The Importance of Occlusion in Dental Practice

Occlusion can be very simply defined: it means the contacts between teeth.

Before describing the significance of the different ways in which occlusal contacts are made Occlusion needs to be put into context.

The Masticatory (or stomatognathic) System (Fig. 1.1) is generally considered to be made up of three parts:

- Tooth Tissues.
- Periodontal Tissues.
- Articulatory System.

Many dentists feel that they qualified from their dental school with a very good knowledge of the first two parts of the Masticatory System, namely the Teeth and the Periodontal Structures, but they can feel vulnerable in their knowledge of the third part: the Articulatory System. It appears that some dentists feel that their time at university did not prepare them adequately in this area. Possibly Occlusion may be undertaught in the undergraduate curriculum.

‘Occlusion’ = Contacts between teeth

In my view, we should not be too hard on our Schools as the undergraduate dental education must, by necessity, concentrate initially on the first two parts of the Articulatory System. Dental Schools must produce newly qualified dentists who are

able to treat patients. Only once the dental undergraduate has an understanding of the diseases that affect the dental and periodontal tissues (parts 1 and 2 of the Masticatory System) can the schools start to allow the student to treat patients. There is consequently justification for the study of the Articulatory System being considered to be chronologically the third area of study. But because of the inescapable fact that almost all dental treatment has an occlusal consequence, it is wrong to consider the study of the Articulatory System to be less important than the first two parts of the Masticatory System.

The Articulatory System is the biomechanical environment in which dentists provide most of their treatments.

Given the increasing quantity of knowledge to be amassed in the modern undergraduate course, it may be that those responsible for setting the dental undergraduate curriculum will not be able to cover the Articulatory System as they would wish. Now that there is a universal acceptance of the need for continuing education, it may be more realistic to consider a comprehensive study of the Articulatory System as the first mandatory element of a postgraduate dental education. Although it may be, by necessity, the last to be learnt it is not less important than the other parts of the Masticatory System.

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## Is the Articulatory System a True System?

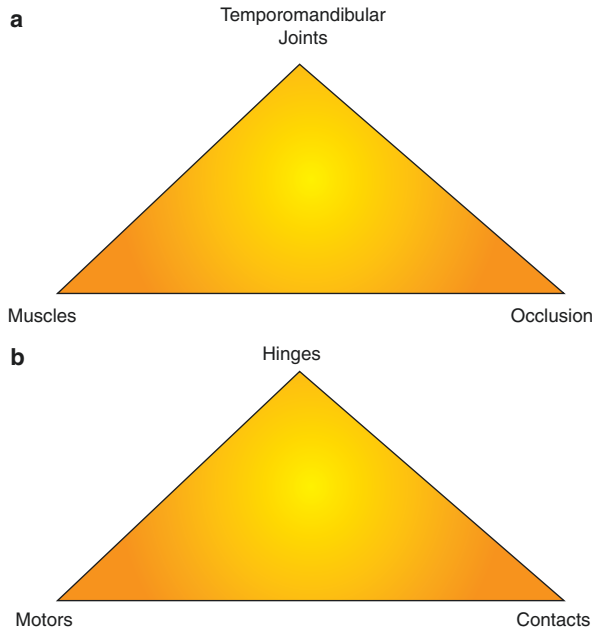
A system is defined as: ‘*A set or assemblage of things connected, associated, or interdependent, so as to form a complex unity*’ [3]. The Articulatory System meets these criteria, so the answer to this question is: Yes.

In this system one can imagine the temporomandibular joints as the hinges, the masticatory muscles as the motors and the dental occlusion as the contacts (Fig. 1.2b).

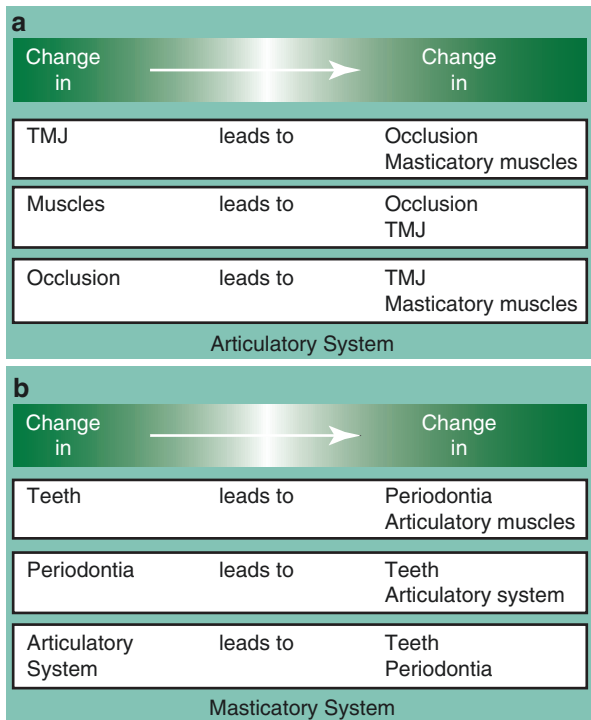
When viewed in these mechanical terms (Fig. 1.2b), it is clear that the elements of the Articulatory System are inescapably connected. Furthermore, it can be argued that they are obviously interdependent because a change in any part will clearly affect the other two parts (Fig. 1.3a). But it should be remembered that this effect will not necessarily be an adverse one. In fact, one must suppose that the system as a whole can, in the vast majority of cases, compensate for change. This phenomenon can be described as Adaptive Capability and is a feature of living systems. In contrast, a machine has been described as a ‘*System that is not the result of a fertilized egg*’, i.e. it is not capable of adaptation [4]. This is an important reassurance to clinicians, as it means that an intervention to or alteration of one element of a system, such as the dental occlusion, will not always have an adverse effect on another part of the system, for example, the masticatory muscles. Any dentist who believes that a change in the occlusion will always have an adverse effect on the muscles or the TMJs is treating the patient *mechanically*, which given the definition of a machine is a damning commentary of their clinical nous. This concept of adaptive capability is important when considering Ideal Occlusion, as will be discussed later.



**Fig. 1.2** The Articulatory System



**Fig. 1.3** (a) Interconnections of the articulatory system. (b) Interconnections of the masticatory system



This realisation that the Articulatory System has the potential to adapt does not, however, abrogate the clinician from responsibility. In fact, the possibility as opposed to the certainty of an adverse reaction (lack of adaptation) makes the challenge of preventing iatrogenic injury greater.

---

## Do No Harm

The most important elements of ‘doing no harm’ during our treatments is firstly the ability to carry out thorough examination and monitoring protocols, and secondly to provide treatment that will not change the occlusion or change it in a way that is most likely to be within the adaptive capabilities of the rest of the system.

These will be presented later in the text.

The same sort of analysis of the interconnection within the Masticatory System can be made (Fig. 1.3b).

The importance of ‘occlusion’ in dental practice is based primarily upon the relationships that it has within these interconnected biomechanical systems. When one considers how almost all forms of dental treatment have a potential for causing occlusal change, the need to establish what constitutes good occlusal practice is overwhelming and obvious.

## Analysis of Occlusion

Having stated that occlusion simply means the contact between teeth, the concept can be further simplified by defining those contacts between the teeth

- when the mandible is closed and stationary as the Static Occlusion,
- and those contacts between teeth, when the mandible is moving relative to the maxilla as the Dynamic Occlusion.

---

## Static Occlusion

The first essential question when considering a patient’s static occlusion is: ‘Does Centric Occlusion occur in Centric Relation?’

This question will be clarified after defining terminology. Terminology has been a ‘red herring’ and has been the cause of enormous and sometimes acrimonious debate. I have preferred terms, but do not feel that they are important; it is the concept behind the terms that matter.

*Centric Occlusion (CO)* can be described as the occlusion the patient makes when they fit their teeth together in maximum intercuspation. Common synonyms for this are Intercuspation Position (ICP), Bite of Convenience or Habitual Bite. It is the occlusion that the patient nearly always makes when asked to close their teeth together, and it is the ‘bite’ that is most easily recorded. It is, also, how unarticulated

models fit together. Finally, it should be remembered that it is the occlusion to which the patient is accustomed.

It is interesting, but not essential, for us to analyse how this position of the mandible to the maxilla [jaw relationship], in which the teeth fit together, is achieved.

The shape of the occlusal surfaces of the teeth determines this jaw relationship, and there is a centrally influenced neuromuscular control that guides the mandible into the relationship with the maxilla. Anything, therefore, that changes either the occlusal surfaces of the teeth or the ability of the muscles to guide the mandible to the habitual position can change this jaw relationship.

- A restoration to a single tooth can change the overall occlusion, and so the jaw relationship.
- Anaesthetising and/or fatiguing the masticatory muscles may prevent them articulating the mandible to the maxilla into the habitual position.

This sums up the challenge in Restorative Dentistry.

Of course, as already stated the Masticatory System will usually adapt, but not always. And the consequences can be grave.

The reason why this book will not give Rules is that Occlusal Change does not lead inevitably to adverse consequences. But we will give Guidelines, because when adverse reactions do occur, they can be severe; a situation that all dentists and patients wish to avoid.

*Centric Relation (CR)* [synonyms: Retruded Contact Position, Terminal Hinge Axis Position] is not an Occlusion. CR has nothing to do with teeth because it is the only 'centric' that is reproducible with or without teeth present [5].

Centric Relation is a jaw relationship: it describes a conceptual relationship between the maxilla and mandible. All attempts to lay down rigid definitions of centric relation are plagued by the fundamental difficulty that there is no sure or easy way of seeing where it is.

Centric Relation has been described in three different ways: anatomically, conceptionally and geometrically.

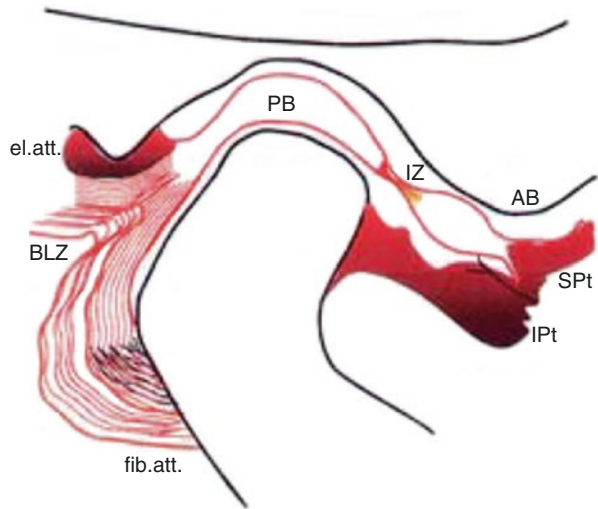
## Anatomical

Centric Relation can be described as the position of the mandible to the maxilla, with the intra-articular disc in place, when the head of the condyle is against the most superior part of the distal facing incline of the glenoid fossa. This can be paraphrased as *uppermost and foremost* (Fig. 1.4).

This is subject to debate.

Some clinicians prefer the idea that Centric Relation occurs in an '*uppermost and midmost*' position within the glenoid fossa whereas others support the idea that it is in an '*uppermost and rearmost*' position; the so-called ligamentous position.

**Fig. 1.4** Functional anatomy of the temporomandibular joint



- fib.att. = fibrous attachment to posterior neck of condyle
- el.att. = elastic attachment to fossa
- BLZ = bilaminar zone
- PB = posterior band of meniscus
- IZ = intermediate zone of meniscus
- AB = anterior band of meniscus
- SPt = attachment to the superior pterygoid  
(superior head of lateral pterygoid)
- IPt = attachment to the inferior pterygoid  
(inferior head of lateral pterygoid)

The problem with the goal of placing the head of the condyle in the *uppermost and midmost position* is that the radiograph that commonly used to determine this position is not a reliable test [6].

Whereas the *uppermost and rearmost* [ligamentous position] offers the possibility of consistency because of the anatomical limitations of the glenoid fossa, many practitioners, including the author, find that asking patients to curl their tongue back and pushing on the mandible does not deliver a consistent position. This is probably due to the reaction of the lateral pterygoid to the pressure.

There is support for the *uppermost and foremost* hypothesis from a study of anatomy: the bone and fibrous articular surfaces are thickest in the anterior aspect of the head of the condyle and the most superior aspect of the articular eminence of the glenoid fossa.

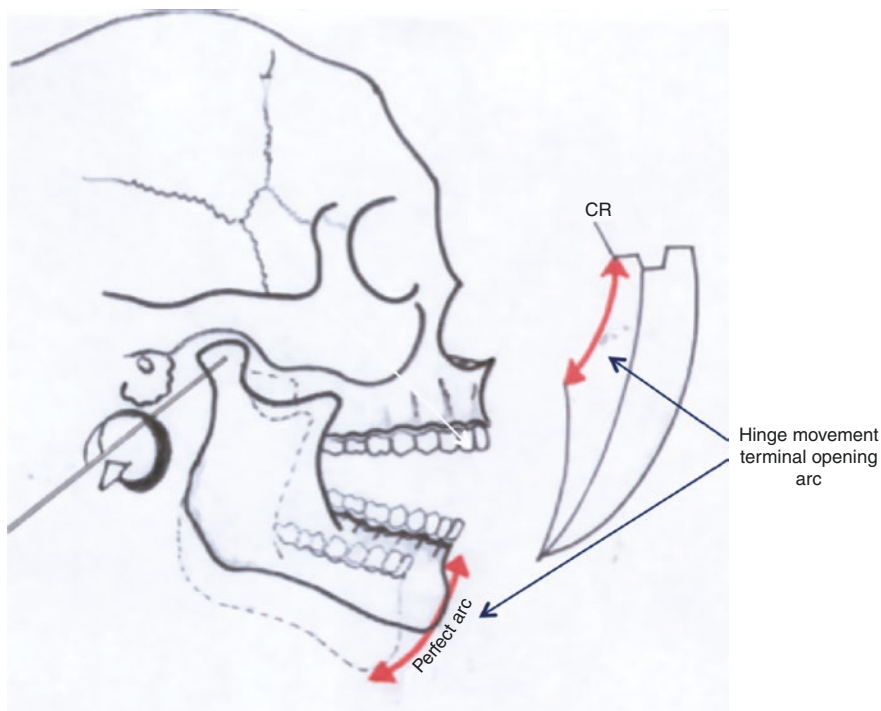
In any event, determining where exactly the head of the condyle is in the glenoid fossa is a futile exercise, with no clinical significance. This is because there is no reliable means of determining that relationship. To make any head of condyle/glenoid/fossa relationship a specific treatment goal is for this reason flawed.

## Geometrical

Centric Relation can be described ‘as the position of the mandible relative to the maxilla, with the intra-articular disc in place, when the head of the condyle is in ‘Terminal Hinge Axis’.

In order to understand what this frequently used term means, it is easier to initially think about only one side of the mandible, and to remind ourselves the movements of the head of the condyle when we open our mouths. The mandible opens by firstly a rotation of the condyle and then a downwards, forwards and medial translation occurs. Therefore, when the mandible starts to open and when it finishes its closure, the movement of the head of the condyle is purely rotational. If we look at Posselt’s Envelope of Motion [7], we can see that an imaginary point on the chin will describe a near perfect arch during the beginning of the opening cycle and the end of the closing cycles.

### Geometrical



***Mandible is in terminal hinge axis***

This provides the ‘terminal hinge point’ (of rotation) of one side of the mandible. Because the mandible is one bone with two connected sides, these two terminal hinge points are connected by an imaginary line: the terminal hinge axis. When the mandible rotates about this axis, it is in Centric Relation; simply because it is the start of opening or the end of closure. Another way of saying that it is in the rotational phase of mandibular movement.

It is the fact that the mandible is describing this simple arc, when the heads of condyle are in the terminal hinge axis that has an important clinical significance. This will be discussed later, when the techniques for finding Centric Relation are presented.

## Conceptual

Centric Relation can be described as that position of the mandible relative to the maxilla, with the articular disc in place, when the muscles that support the mandible are at their most relaxed and least strained position. This description is pertinent to an understanding of 'Ideal Occlusion', a concept that is discussed later. This definition of Centric Relation suggests that there could be a jaw relationship that is 'qualitatively better than others' for another element of the Articular System, namely the muscles.

---

## Significance of Centric Relation

Although there may be arguments about the exact definition of Centric Relation or how it is best found clinically, thankfully there is broad agreement between dentists that a *reproducible position* of the mandible relative to the maxilla exists. Dentists agree that this *reproducibility* is not provided by the occlusal surfaces of the teeth: patients with no teeth still have a Centric Relation. Furthermore, there is inter- and intra-operator reliability in finding it.

### 'Freedom in Centric'

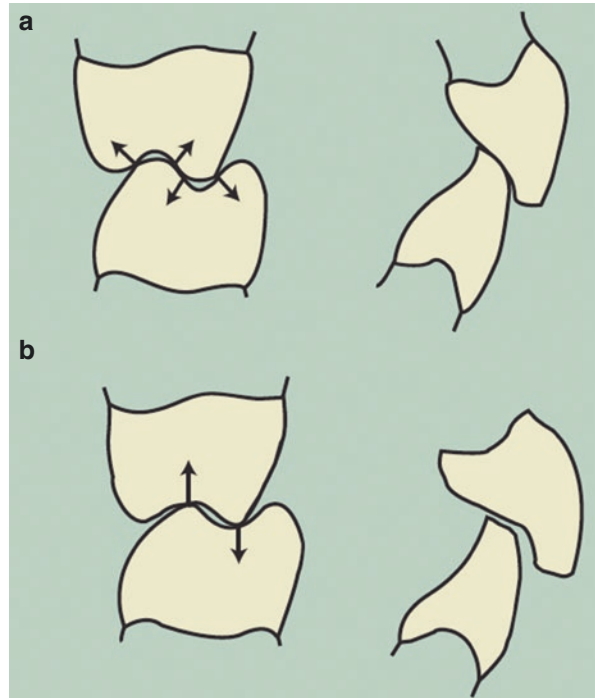
Another aspect of the static occlusion is the presence or absence of 'Freedom in Centric', this is also known as 'Long Centric'.

The word 'centric' is adjective and so strictly it should never be used without a noun. Consequently, this long-established term would better read: Freedom in Centric Occlusion or Long Centric Occlusion. I hope that the reader will forgive this mild pedantry.

Freedom in Centric Occlusion is present when the mandible is able to move slightly anteriorly in the same horizontal and sagittal plane while maintaining tooth contact (Fig. 1.5b). Alternatively, there will be no Freedom in Centric Occlusion if either the front teeth or the posterior occlusion does not allow this horizontal movement (Fig. 1.5a).

An easier way of imagining Freedom in Centric Occlusion is to consider whether the front teeth occlude harder or sooner than the back teeth. If they do hit together harder or sooner then there is no Freedom in that Centric Occlusion. Two common examples of occlusions that may not have this freedom are firstly those Angles CI II div (ii) incisor relationship and when anterior crowns have been provided with palatal surfaces that are too thick.

**Fig. 1.5** (a) No freedom in centric occlusion. (b) Freedom in centric occlusion



In Fig. 1.5a, there is no Freedom in Centric Occlusion. Another way of thinking about this phenomenon is to consider that the occlusal contacts have ‘locked in’ the mandible to the maxilla. In contrast Fig. 1.5b demonstrates a situation where the mandible can move anteriorly, for a short distance, in the same sagittal and horizontal planes.

Other aspects of the Static Occlusion that can be described are

- the extent of the posterior support,
- the Angle’s classification of the incisor relationship together with measurement of the overbite and overjet,
- the existence of any crossbites.

The answer to the question ‘Does Centric Occlusion occur in Centric Relation?’ is a useful one, because it describes the relationship of the mandible to the maxilla when the teeth fit together. In some ways the answer to the question ‘what is the Jaw Relationship when the teeth fit together’ would be more useful. But given that there is no way of reliably imaging the position of the head of the condyle in the glenoid fossa [6], this is a question to which there is no answer.

The word ‘**Centric**’ is an adjective.  
It should only be used to qualify a noun.  
**Centric** *what?*

## Dynamic Occlusion

The dynamic occlusion refers to the occlusal contacts that are made whilst the mandible is moving relative to the maxilla.

The mandible is moved by neuromuscular influences. But the pathways along which it moves are determined not only by the muscles controlled by CNS, via the nerves, but also by two guidance systems.

The *posterior guidance system* [synonym: posterior determinate of mandibular movement] of the mandible is the temporomandibular joints. As the head of the condyle moves downwards, medially and forwards the mandible is moving along a guidance pathway which is determined by the intra-articular disc and the articulatory surfaces of the glenoid fossa, all of which is enclosed in the joint capsule.

When teeth are touching during a protrusive or lateral movement of the mandible then those touching teeth are also providing guidance to mandibular movement. This is the *anterior guidance* [anterior determinate of mandibular movement].

Based upon this analysis, it is the author's belief that whichever teeth touch during eccentric movements of the mandible, that those teeth provide the Anterior Guidance.

Because no matter how far back these guiding teeth are, they are anterior to the Temporomandibular Joints [the Posterior Guidance of the Mandible].

This means that a patient with a severe anterior open bite would still have Anterior Guidance of their mandible; it could, for instance, be on the second molars. The guidance might be on back teeth but because those teeth are still in front of the TMJs, they are the teeth that provide the *Anterior* Guidance of the mandible. Therefore, despite the ambiguity of the word 'anterior' in the term anterior guidance, it does not mean that the *anterior guidance* of the mandible is always on the front teeth.

So logically, because all teeth are in front of the posterior guidance system of the mandible, whichever teeth touch during an excursive movement of the mandible are providing the anterior guidance.

This definition differs from that given in some restorative textbooks, when the term anterior guidance is used to describe only the guidance, which involves the front teeth. I think this definition does not stand up to critical analysis, and I think those who subscribe to it are describing what they consider to be *ideal* dynamic occlusion [see below].

There are other terms that are used to describe a patient's Dynamic Occlusion:

- 'Canine Guidance' refers to a dynamic occlusion that occurs between the canines during a lateral excursion of the mandible. A canine-protected occlusion refers to the fact that the canine guidance is the only dynamic occlusal contact during this excursive movement.
- Group Function. In this type of anterior guidance, the contacts are shared between several teeth on the working side during a lateral excursion. To qualify for the term 'group function', the contacts within the group that are towards the front of the mouth should be the earliest and/or hardest contacts.
- This contrasts with the term 'Working Side Interference', which infers a heavy or early occlusal contact towards the back of the mouth during an excursive movement.



- A ‘Non-Working Side Interference’ is an anterior guidance on the back teeth on the non-working side during lateral excursion.

### ***During a Lateral Excursion***

#### **Non-Working Side:**

The side on which the head of the condyle **does** translate downwards, forwards and medially.

#### **Working Side:**

The side on which the head of the condyle **does not** translate downwards, forwards and medially

## **Note**

The Working Side [WS] is the side of the mandible towards which the mandible is moving during a lateral excursion.

The Non-Working Side [NWS] is the side of the mandible away from which the mandible is moving. These terms can be confusing when considering the temporomandibular joints, because it is the TMJ on the Non-Working Side which is moving the most.

## **Ideal Occlusion**

One reason why some restorative textbooks define anterior guidance as being solely the dynamic occlusal contacts between the front teeth is that it is generally considered to be more *ideal* if the anterior guidance is on those front teeth. Furthermore, the fact that the pejorative word ‘interference’ is used to describe an occlusal contact between back teeth infers that anterior guidance on back teeth is less than ideal.

This introduces the concept of ‘ideal occlusion’ and this raises three important considerations:

1. Which jaw relationship might be considered the most ideal for the muscles of mastication?
2. If a dynamic occlusal contact that is between back teeth is deemed ‘a posterior interference’, with what is it interfering?
3. If some occlusions are ideal, for what or for whom are they ideal?

### **Ideal Occlusion**

Q. Who or what is it ideal for?

### **Posterior Interference**

Q. Who or what is it interfering with?

Let us examine this concept of Ideal Occlusion by firstly answering the questions posed above. Then we can determine whether the concept of Ideal Occlusion has a useful function in routine clinical dentistry.

### Answer to Q.1

It is potentially more ideal if the teeth fit together (Centric Occlusion), in a '*position of the mandible to the maxilla, with the disc in place, where the muscles supporting the mandible are at their most relaxed and least strained*' (the conceptual description of Centric Relation given above). This establishes the concept that in the realm of the Static Occlusion the occlusion might be considered ideal or not ideal for another part of the Articulatory System, namely the muscles of mastication (Fig. 1.6b).

### Answer to Q.2

If two molars on the side from which the mandible is moving during an excursive movement can be described as a Non-Working Side Interference, then with what are they interfering?

The posterior guidance of the mandible is provided by the temporomandibular joints. As the head of the condyle translates down the articular eminence on the Non-Working Side (which, paradoxically, is the side that is moving the furthest), then the mandible is being guided by this joint.

If, as this is happening, two posterior teeth hit against each other on the same [NW] side, then for the simple reason that these two posterior teeth are close to the joint, there is potential for that contact to influence or 'interfere' with the movement of the condyle within that joint.

Contrast this with the situation, where the anterior guidance is provided not by those posterior teeth [which are close to the joint] but by front teeth which are further away. Then the likelihood of 'interference' of condylar movement within the non-working side temporomandibular joint is less.

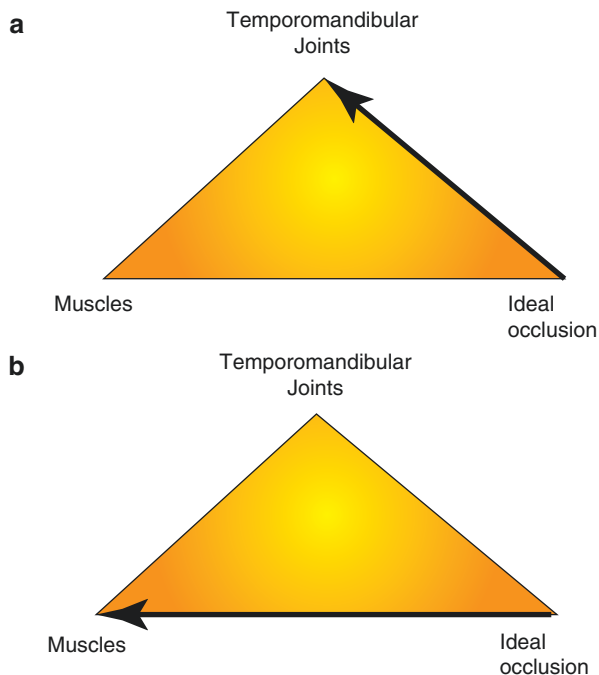
Anterior guidance, therefore, on back teeth [whilst still providing anterior guidance to the mandible] is described as a Posterior Interference because it may interfere with the posterior guidance system of the mandible, namely the temporomandibular joints. Posterior interferences are, therefore, considered to be a less ideal type of dynamic occlusion.

The term 'ideal' relates to whether or not it is ideal for another part of the Articulatory System: the temporomandibular joints (Fig. 1.6a).

### Answer to Q.3

An occlusion may be qualified by the terms *ideal* or *less than ideal* by the effect it potentially can have on the other parts of the Articulatory System.

**Fig. 1.6** Occlusion is ideal for another part of the articulatory system



## Definition of Ideal Occlusion

This is given in established texts [8] as:

- The coincidence of Centric Occlusion in Centric Relation (CO = CR).
- When there is freedom for the mandible to move slightly forwards from that occlusion, in the same sagittal and horizontal plane (Freedom in Centric Occlusion).
- When the mandible moves there is immediate and lasting posterior disocclusion (or anterior guidance is on the front teeth).

There is no such thing as an intrinsically bad occlusal contact, only an **intolerable number of times** for that patient at that time in their life to function or parafunction on it.

This historical definition of Ideal Occlusion is presented only after having considered for what or whom this type of occlusion is ideal and gives the justification of why a particular type of occlusion could be considered as being potentially ideal for other parts of the Articulatory System.

It is of paramount importance to appreciate that the term '*ideal occlusion*' means something quite different from the term '*correct occlusion*'.

To state that an occlusion is correct or wrong betrays a mechanistic approach to the subject. Patients are not machines and an occlusion can only be judged on the reaction that it produces in the tissues of the system in which it inter-reacts. That reaction will be infinitely variable between individuals and will in some contexts vary within an individual with time.

That is why the more recent definition of Ideal Occlusion in a later edition of the same textbook [9] moved away from this mechanistic description [‘A machine is a System that is not the result of a fertilized egg’ [4]] to a physiological description. This essentially states that an occlusion is *ideal*

- for that patient,
- at that time in their life,
- if there are no adverse reactions to it.

This is a major change in the way that dentists are asked to consider Occlusion. It essentially suggests:

- Dentists should examine the Occlusion before starting treatment,
- to determine whether there are any adverse reactions to that Occlusion.
- If there are none, there is no need to change anything, because that patient has an *Ideal Occlusion*—for them—at that time.

By virtue of the frequently observed fact that most patients seem to adjust to some strange looking occlusions without any adverse reaction most dentists will welcome this approach.

*‘If it is not broken don’t fix it’* is a longstanding piece of excellent advice. It is the definition of *broken* that has changed in the field of dental occlusion. By *broken* we now mean that there are no adverse reactions; it does not mean that the occlusion does not conform to the mechanical definition as given above.

This is also why the term ‘Malocclusion’ can be challenged [10], and is certainly not as descriptive as the term ‘MalAdaptive Occlusion’ [11].

We will return to these considerations, when discussing Good Occlusal Practice in Simple Restorative Dentistry.

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## The Importance of Ideal Occlusion as a Concept

### 1. Pre-treatment Examination and Records

The first and most important reason for defining ideal occlusion is that it gives a benchmark against which patients’ occlusion can be measured. This needs to be done before, during and after dental treatment. This is of paramount importance to the health of our patients, especially in the increasingly litigious environment in

which we work. It cannot be overstated how important it is for a dentist to be able to demonstrate that their treatments did not result in a change in Occlusion, Jaw Relationship and/or Muscle Health and Function. This is especially true if it is being claimed the changes were beyond the patient's adaptive capability and so resulted in harm. The key to this is the ability to examine all parts of the Stomatognathic or Masticatory System. If the reader takes only one message from this book, the author hopes that it will be this one.

It is of paramount importance that dentists examine and record the pre-existing occlusion before providing any treatment which might involve a change to the occlusion. Mounted study models are a good way of examining and recording a pre-treatment occlusion. This is not needed or practicable for the vast majority of dentists, treating the vast majority of their cases. Alternatively, and infinitely easier, notes can be made, which describe the patient's occlusion. These notes use the criteria of Ideal Occlusion as a benchmark. To record an occlusion using only the criteria of Angle's classification is of limited value, whereas to use the benchmark of ideal occlusion is considerably more informative (see Fig. 1.7). This concept of a pre-treatment occlusal analysis will be discussed in much greater detail in the chapter on Simple Restorative Dentistry.

## **2. Management of Myofascial Pain**

The second reason why ideal occlusion is an important concept is found in the long-held view that an important factor in the development of Myofascial Pain [MP] is 'the individual patient's lack of adaptation to a less than ideal occlusion' [5]. This statement does not attribute an exclusively causal relationship between a less than ideal occlusion and MP. Different patients will have different thresholds of tolerances to occlusion; furthermore the same patient can have a different tolerance to their occlusion at different times.

For these patients the provision of an ideal occlusion is, therefore, one but by no means the only way of treating the condition. When an ideal occlusion is provided this should always be initially in a temporary and reversible way: that is a Stabilisation Splint [12].

## **3. Provision of Treatments That Affects the Occlusion [and Jaw Relationship]: Conformative Versus Re-Organised Approaches**

[These concepts and the techniques needed to follow them will be covered in much greater detail in the chapters on Restorative Dentistry.]

In providing treatment with an occlusal element, one of the first questions to be decided in the treatment planning stage is whether the aim is to maintain the same occlusion during treatment. If the pre-treatment occlusion is to be preserved, then it is described as 'Conformative Approach' [13, 14].

Before deciding to conform to the pre-existing occlusion, not only does that occlusion need to be examined but, in addition, any signs of existing adverse reactions to that occlusion must be noted. If there are signs, then there may be a

**Fig. 1.7** Example of a record of a patient’s occlusion, using ideal occlusion as the benchmark

<b>Date</b> 19/3/19	<b>Occlusal record for</b>	Robert Black 1 New St Old Town
	<b>Skeletal 1 Angles 1</b>	
<b>Static occlusion</b>		
<b>Does CO occur in CR?</b> No		
<b>If not.. prem contact in CR?</b> <b>Roughly:</b> Left molar <b>Exactly:</b> Disto buccal cusp of lower left 8 against mesial marginal ridge of upper 7 and distal of upper left 6		
<b>Direction of slide from CR to CO:</b> 3 mm Anterior slightly vertical and slightly to the left		
<b>Freedom in Centric Occlusion?</b> No		
<b>Dynamic occlusion</b>		
		<b>RHS</b> <b>LHS</b>
<b>Non-working side interferences</b>	17 (FGC) v 48	No
<b>Working side interferences</b>	No	No
<b>Crossover position</b>	<b>NWS Int</b> 17 v 48	No
	<b>WS Int</b> No	No
<b>Canine guidance</b>	Yes (bridge 13)	No
<b>Group function</b>	No	No
<b>Notes</b> No tongue scalloping or cheek ridging Tooth surface loss (anterior) and history of cuspal fracture at tooth 17		

case for occlusal adjustment; otherwise ‘trauma from occlusion’ may be replicated.

Some dental treatment, such as most major restorative, will, however, inevitably change the patient’s occlusion and usually it will, as a consequence, change the relationship between the upper and lower jaws.

In the past, this has been known solely as the ‘Re-Organised Approach’. It will be described in some detail later in this book. For now, let us define the ‘Re-Organised Approach’ as a different Occlusion (and Jaw Relationship) from the ones that the patient had before treatment.

Because it is *ideal, as defined mechanically* [see below †], it is considered to potentially be better tolerated by the patient’s Articulatory System, than a random change in occlusion and jaw relationship would be.

The starting point of designing an Occlusal Prescription in the Re-Organised Approach is to find and record Centric Relation.