Masterclass in Clinical Practice

Aesthetic Rehabilitation

with

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Part I : Systematic patient evaluation - integrating biology, function and aesthetics.

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Introduction

It is relatively common for a patient to present with the main complaint of dissatisfaction with the appearance of their anterior teeth. There are many reasons for poor aesthetics, such as staining (extrinsic or intrinsic), unaesthetic restorations/crowns, asymmetrical size/shape of teeth, crowding etc. These clinical findings may lead to a patient being self-conscious of their appearance, and in severe situations, even avoiding social interactions due to anticipated embarrassment.

Patients often present to the dental office with the request for the appearance of their anterior teeth to be improved. Dentists can then address this main complaint by means of several treatment approaches. Before deciding on an appropriate treatment plan for a patient, many factors should be considered, including, but not limited to:

- Patient factors (main complaint, expectations, affordability, physical and mental health),
- Clinician factors [scope of practice, resources available (technology, materials), training/ability/skill]
- Science (clinical evidence on treatment options to ensure practising evidence-based dentistry).

Unfortunately, too often we see patients who have recently received a "cosmetic treatment", present with symptoms of pain, discomfort, and sensitivity of the stomatognathic system.

Common complaints include: "I don't know where to position my lower jaw"; "The fillings/crowns keep chipping"; "My jaw muscles feel as if they are in spasm"; "My teeth are constantly painful".

Most often these negative post-operative symptoms occur when improper diagnosis and treatment planning was performed. This is often the case when the clinician focused too much on the main complaint of the patient and ignored, or failed to identify, other presenting clinical signs that required treatment/management prior to addressing the main complaint.

Regardless of the main complaint and the pre-operative presentation, which may be as simple as a single discoloured anterior tooth (Fig. 1) or as complex as generalized tooth wear (Fig. 2) and crowding (Fig. 3), the clinician should always follow a systematic approach to diagnose and plan the treatment.

A systematic approach ensures that the clinician follows an objective examination and diagnosis protocol, before individualizing the treatment plan to the patient's needs. Often the patient's treatment may require input from different disciplines to ensure not only an aesthetically pleasing outcome, but also a functionally stable and comfortable situation for the patient.

Orthodontic alignment of crowded teeth, for example, may enable more conservative preparation of teeth requiring indirect restorations. The conservation of tooth structure should always be

Figure 1: Patient presenting with the main complaint of a discoloured upper right central incisor tooth.

Figure 2: Patient presenting with generalized tooth wear of the Maxilla.

Figure 3: Patient presenting with crowding and rotations in the aesthetic zone.

Figure 4: Frontal photograph at rest (left), with lips slightly parted (middle) and smiling (right).

Figure 5: Profile photograph at rest (left) and smiling (right).

the principal consideration in all treatment plans, with the treatment of choice being the least invasive possible, which will satisfy the expected aesthetic and functional objectives.

This masterclass aims to provide a reproducible, systematic protocol to evaluate patients, ensuring integration of the biological, functional, and aesthetic aspects.

Following an in-depth interview with the patient, during which time information regarding their main complaint, expectations of treatment, relevant medical and dental history is obtained, the clinician should complete comprehensive record taking to facilitate diagnosis and treatment planning. This record taking should include:

- Extra- and intra-oral photographs
- Radiographs
- Dental charting
- Basic Periodontal Examination (BPE)
- Occlusal analysis
- Temporomandibular Joint (TMJ) examination
- Smile analysis.

Photographs

Photographs should be taken, not only for record keeping purposes, but also for the purpose of comprehensive case evaluation, diagnosis, and treatment planning. With the digital planning tools that we have available, these photographs also enable digital diagnostic wax-ups (designs) and previewing of intended treatments based on the photographs taken.

High quality photography enables the evaluation of aspects like the facial thirds, facial and dental midlines, smile lines etc. These aspects will all be discussed in more detail in Part II under "Smile Analysis".

The standard extra-oral photographs taken should include the following:

- Frontal at rest with lips together and slightly parted (Fig. 4)
- Frontal smiling (Fig. 4)
- Profile at rest and smiling (Fig. 5)
- Oblique (45^0) at rest and smiling (Fig. 6)
- Close-up of the mouth at rest and with lips slightly parted (Fig. 7)
- Close-up frontal and oblique (45^0) of the smile (Fig. 8)

The standard intra-oral photographs taken should include the following:

- Frontal in occlusion and with teeth slightly parted (Fig. 9)
- Left lateral and right lateral in occlusion (Fig. 10)
- Occlusal view of the Maxilla and the Mandible (Fig. 11)

Figure 6: Oblique (45-degree) views at rest (left) and smiling (right).


Figure 7: Close up of mouth at rest (left) and with lips slightly parted (right).



Figure 8: Close up frontal (middle) and oblique of the smile (left and right).

Radiographs

As clinicians we have many different types of radiographs available to ensure a proper radiographic assessment and diagnosis.

A panoramic radiograph allows the evaluation of, not only the dentition (impactions, supernumerary teeth, etc.) and the supporting bone, but also the maxillary sinuses and temporomandibular joints (TMJ's). A good quality panoramic radiograph, such as in Fig. 12, allows the accurate radiographic assessment of the TMJ's, whereas a panoramic radiograph taken using the incorrect technique, such as in Fig. 13, will hinder accurate assessment and diagnosis of potential TMJ and sinus-related pathologies.

Panoramic radiographs should, however, never be used to diagnose dental caries or leaking crowns and restorations. Peri-apical radiographs taken using the correct positioning technique should capture the entire tooth crown, the length of the root, the peri-apical region, and the adjacent periodontium (see Fig. 14). These radiographs can then be used to diagnose caries, possible periodontal disease, peri-apical pathology etc.

Further investigations with cone-beam computed tomography (CBCT) and TMJ views can be requested if the individual case requires additional information.


Figure 9: Frontal in occlusion (left) and with teeth slightly parted (right).


Figure 10: Left lateral (left) and right lateral (right) in occlusion.


Figure 11: Occlusal view of the Maxilla (left) and the Mandible (right).

Dental charting

A comprehensive dental charting, such as in Fig. 15, recording all clinically relevant pre-operative findings should be done. These findings include, but are not limited to the recording of missing, extracted, or impacted teeth, restorations present, fractures, tooth wear (attrition, abrasion, erosion, abfraction), caries, implants, pontics etc.

Basic Periodontal Examination (BPE)[1]

During the examination the clinician should perform a Basic Periodontal Examination (BPE) to assess the periodontal health and treatment needs of the individual patient.

BPE is a rapid screening tool that indicates the degree of further examination and treatment needed. It represents a minimum standard of care for all patients, regardless of the presenting complaint.

To perform a BPE, the dentition should be divided into 6 sextants, and the highest score in each sextant should be recorded.

According to The British Society of Periodontology, a WHO BPE probe should be used with light probing force (20-25 grams).

BPE Scoring Codes[1]

- Code 0: Pockets <3.5mm, no calculus/bleeding.
- Code 1: Pockets <3.5mm, bleeding present.
- Code 2: Pockets <3.5mm, calculus present.
- Code 3: Probing depth 3.5-5.5mm.
- Code 4: Probing depth >5.5mm.
- Furcation involvement indicated by an asterisk (*).

When considering the codes recorded, it is important to note that Codes 0, 1, or 2 require recording at every routine examination, while Codes 3 or 4 necessitate a further detailed periodontal charting.

BPE should not be used around implants, where a 4 or 6-point charting is instead required.

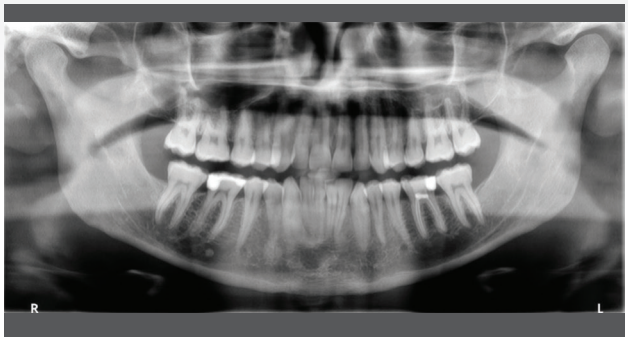

Figure 12: Clear, good quality panoramic radiograph.

Figure 13: Poor quality panoramic radiograph taken using the incorrect positioning technique.

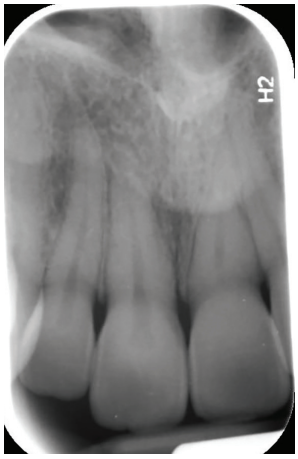

Figure 14: Peri-apical radiographs should include the clinical crown, entire root length, peri-apical region of the imaged tooth and adjacent periodontium.

Interpretation of BPE Scores [1]

- Code 0: No treatment needed.
- Code 1: Oral hygiene instruction (OHI).
- Code 2: OHI plus removal of plaque retentive factors.
- Code 3: Root surface debridement (RSD) if required.
- Code 4: OHI, RSD, and possible referral to a specialist.

Completing cosmetic treatment on a patient presenting with an untreated underlying periodontal condition is unethical, and the clinician will be held responsible for the inevitable worsening of the periodontal condition due to lack of patient information/education and clinical intervention.

Occlusal examination

A crucial step in the initial examination is the assessment and diagnosis of the patient's occlusion.

Categories of occlusion:

In broad, occlusion can be divided into static and dynamic occlusion. Static occlusion is the contact and interdigitation of the dentition when the patient occludes in the "habitual bite" position, whereas dynamic occlusion is the contact between the opposing arches during function.

Dynamic occlusion is influenced by three aspects, namely:

1. Neuromuscular control
2. The temporomandibular joints (the posterior determinants)
3. The occlusal/incisal surfaces of the teeth (the anterior determinants).[2]

An occlusal assessment should include the evaluation of the occluding surfaces of the teeth[3] to record any wear facets and note whether the wear patterns are physiological or pathological in nature; and whether they are generalized or localized, as the management thereof vastly differs. The specific teeth surfaces affected by the wear also need to be noted as the aetiology of the tooth wear may not only be bruxism, but there may also be an erosive aetiology which should not be overlooked when treating the patient.

Patel et al. (2015) suggest that a dynamic assessment of the incisal angle and molar relationships, as well as the tooth-related guidance during lateral excursive and protrusive mandibular movements need to be done.[3] The clinician needs to ensure that there are no premature contacts and no interferences during dynamic occlusion as these findings require management to ensure harmony of the occlusion. A thorough assessment of the excursive movements, including protrusion, left and right lateral excursions, should be done and all working side and non-working side contacts should be recorded.

It is important to determine whether the patient has a mutually protected occlusion, which consists of anterior/incisal guidance on protrusion and canine guidance on lateral excursive movements, as recreating this should be the objective of any treatment considered. The clinician needs to understand the role that the palatal and incisal surfaces of the anterior teeth play in the excursive movements as failure to recreate correct guidance may set the patient up

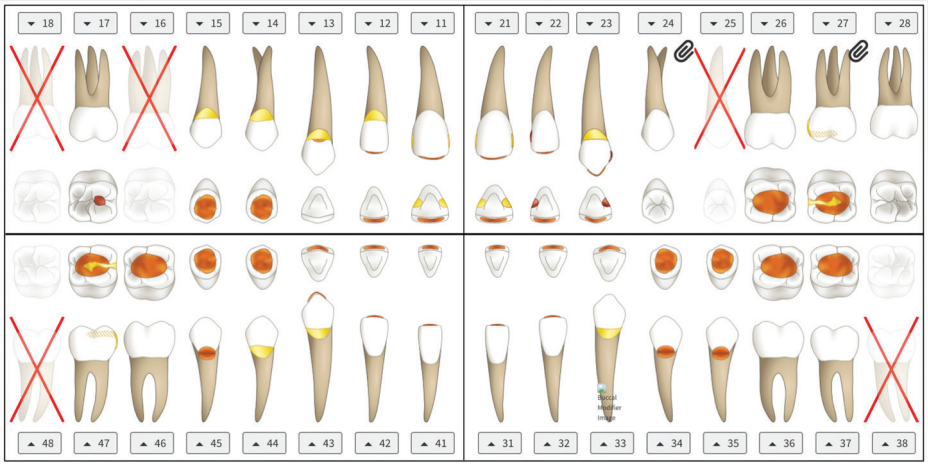

Figure 15: An example of a digital dental charting.

for occlusal disharmony and possibly temporomandibular dysfunction in the future.

Conformative versus reorganized approach:

When planning the occlusion for the treatment required, the clinician needs to have a thorough understanding of the conformative approach (preservation of patient occlusal contacts) and the reorganized approach (creation of a new functional occlusion) when it comes to occlusal design.

Even though the restoration of a limited number of occluding surfaces may appear simple to most clinicians (often a conformative approach), the clinician needs to undertake an appropriate appraisal of the pre-operative dynamic occlusal relationships.[4] This assists with the identification of the working and non-working side occlusal contacts.

According to Mehta et al. (2022), an overview of the factors that may influence the prescription of a conformative approach, or when this may not be appropriate, as well as the decision of how and when to reorganize the occlusion, has been documented in the literature.[5] The success of the reorganized approach is also reliant on the accurate assessment of the centric relation position and the available freeway space.

Reorganizing the occlusion should not be done without a clear understanding of the principles of occlusion, and the application thereof, to enable the appropriate restoration, repositioning, and replacement of teeth.[6] Should the clinician not have sufficient understanding, or the relevant experience to treat such a patient, a specialist referral would be indicated to the benefit of the patient.

The use of articulators:

The use of semi- or fully-adjustable articulators provides a more accurate representation of the condylar angle and the relationship between the plane of the maxilla and the terminal hinge, when compared with either average value articulators or simple hinge articulators.[5] The appropriate use of some articulators may necessitate the taking of a facebow record and/or the taking of a jaw registration record.[7]

Digital articulators are also available, but the clinician should not simply rely on the information generated by the technologies available. The clinician should have a thorough understanding of the principles of occlusion, and the ability to identify inaccuracies with regards to the generated occlusal designs of restorations and the created tooth surface guidance.

Summary of Part I:

The clinician needs to follow a systematic approach to patient evaluation, regardless of the patient's main complaint.

This evaluation includes high quality photography, radiography, thorough dental charting, a basic periodontal examination, and a detailed occlusal analysis.

In Part II the required TMJ examination and detailed smile analysis will be elaborated on.

References

1. "BPE Guidelines" British Society of Periodontology – 2011

2. Peck CC. Biomechanics of occlusion – implications for oral rehabilitation. J Oral Rehabil. 2016; 43: 205–214

3. Patel M, Alani A. Clinical issues in occlusion - part II. Singapore Dent J. 2015; 36: 2- 11

4. Davies S, Gray RM. What is occlusion? Br Dent J 2001;191(5):235–8, 241 – 5.

5. Mehta SB, Rizzo D, Paulose B, Botbol A, Vijay S, Arjuna A, Banerji S. Evaluation of dental practitioner habits with occlusal assessment and the clinical application of practical techniques in occlusion, amongst a cohort of participants based in the UK, South Africa, Malta and Malaysia. J Oral Rehabil. 2022; 49: 944–953

6. O'Carroll E, Leung A, Fine PD, Boniface D, Louca C. The teaching of occlusion in undergraduate dental schools in the UK and Ireland. Br Dent J. 2019; 227(6): 512- 517

7. Ibbetson R, Hemmings K, Harris I. Crowns, Fixed Bridges and Dental Implants: Guidelines. British Society for Restorative Dentistry; 2013