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The Aetiology, Diagnosis and Management of Deep Overbite

Abstract: This article gives an account of the aetiology, diagnosis and contemporary treatment methods for the correction of anterior deep overbite, highlighting the appropriate methods depending on the type of malocclusion with which a patient may present.
Clinical Relevance: Correct diagnosis and treatment planning skills are important in the correction of anterior deep overbite. Up-to-date knowledge in this field is of relevance to orthodontists, prosthodontists and maxillofacial surgeons.
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Overbite may be defined as the degree of vertical overlap of the mandibular incisors by the maxillary incisors when the posterior teeth are in occlusion. Overbite depth is usually measured perpendicular to the occlusal plane, either in millimetres or as the amount/percentage of the total crown length of the mandibular incisors that is overlapped by the maxillary incisors. An average overbite occurs when the maxillary incisors overlap the incisal third of the mandibular incisor crowns. In a Class I incisor relationship, where the mandibular incisor tips occlude with the cingulum plateau of the maxillary incisors, the overbite depth is 2–4 mm, on average (Figure 1).

Overbite is described in terms of its depth and incisor contact. Therefore, overbite may be:

- Normal;
- Reduced (decreased) or
- Deep (increased);
- Complete to dentition or palatal mucosa or
- Incomplete.

In addition, a deep overbite complete to the mucosa palatal to the maxillary incisors, known as an impinging overbite (Figure 2a), when combined with poor oral hygiene, may become traumatic, causing irritation and discomfort, and occasionally leading to significant soft tissue damage. In some Class II division 2 malocclusions with minimal overjet, the retroclined maxillary incisors may impinge on the gingivae labial to the mandibular incisors (Figure 2b). Combined with poor oral hygiene, this may lead to traumatic gingival recession.

Aetiology

Anterior deep overbite problems may result either from an upward and forward rotation of the mandible during growth, or from excessive eruption of

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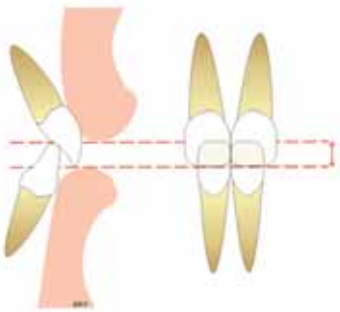

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Figure 1. (a) A Class I incisor relationship with a normal overbite. **(b)** The maxillary incisors overlap the incisal third of the mandibular incisor crowns. **(c)** A deep anterior overbite with the maxillary incisors covering 100% of the mandibular incisor crowns.

a

b

Figure 2. (a) Mandibular incisors impinging on the palatal mucosa. **(b)** Maxillary incisors impinging on the mandibular labial gingivae.

the incisor teeth, notably the mandibular incisors. Anterior teeth generally erupt until they make contact, either with opposing anterior teeth, palatal mucosa or the resting tongue. The factors that contribute to an anterior deep overbite may be classified as follows:

- Skeletal;
- Soft tissue;
- Dental.

Skeletal

Forward rotation of the mandible, in the direction of mouth closing, is due to increased posterior vertical facial growth compared to anterior vertical facial growth (Figure 3a).[1] Bjork[2] described seven structural signs found on a lateral cephalometric radiograph, which may give an indication to the pattern of mandibular growth. In forward growth rotators, which can give rise to an anterior deep overbite, the following signs may be evident (Figure 3b):

1. Forward inclination of the condylar head;
2. An increased curvature of the inferior alveolar canal;
3. Absence of an antegonial notch;
4. Forward inclination of the mental symphysis;
5. Increased interincisal angle;
6. Increased intermolar (and interpremolar) angle;
7. A reduced anterior lower facial height.

Soft tissue

An important aetiological factor in Class II division 2 malocclusion is a high lower lip line, which is thought to guide the maxillary and mandibular incisors to erupt in a more retroclined position.

Patients with a reduced anterior lower face height, often described as short face individuals, may have increased mentalis muscle activity. This is sometimes referred to as a strap-like lower lip. Depending on the vertical length of the lower lip, this may cause retroclination of the mandibular incisors, or if a high lower lip position is also present, bimaxillary retroclination of the maxillary and mandibular incisors.

If there is a forward resting

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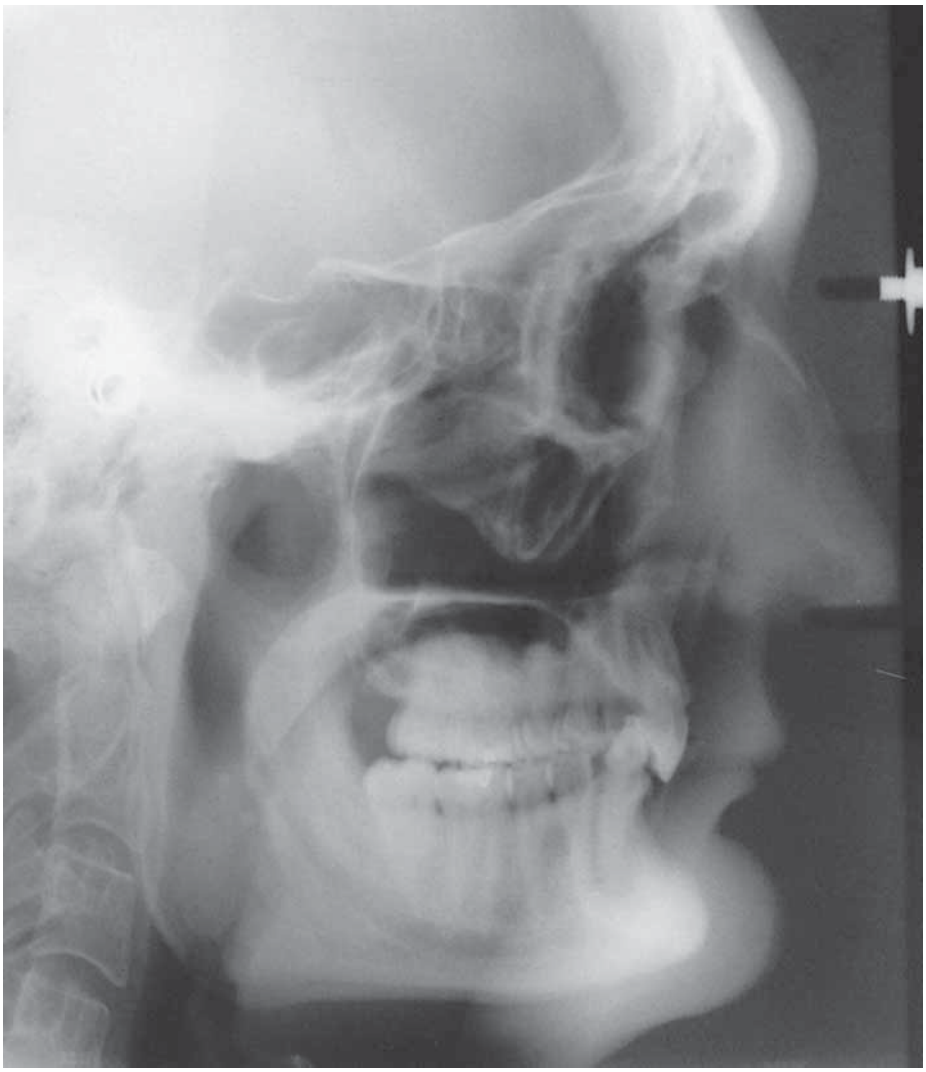

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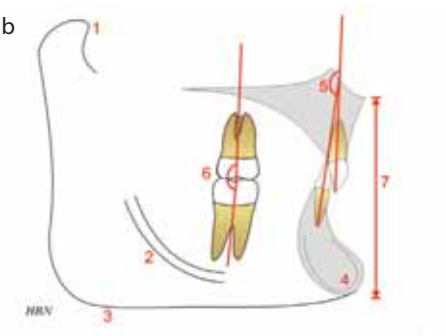

Figure 3. (a) Lateral cephalometric radiograph of a patient with a forward growth rotation of the mandible. **(b)** Bjork's seven structural signs indicating a forward mandibular growth rotation. Refer to numbered list in text.

Removable appliances	■ Anterior bite-plane (or clip over bite-plane with fixed appliances) ■ Dahl appliance (removable)
Functional appliances	■ Bite-plane effect, eg with activator type appliances, such as the Medium Opening Activator
Fixed appliances (continuous arch mechanics)	■ Pre-adjusted Edgewise (Straight Wire) appliance: ● Continuous heavy flat archwires, eg 0.019 x 0.025-inch stainless steel ● Treating on a non-extraction basis, if possible ● Banding second molars early in treatment ● Placing an increased curve in the upper archwire, and a reverse curve of Spee in the lower archwire ● 0.019 x 0.025-inch preformed counterforce nickel titanium archwires ■ Tip-edge appliance: ● Anchor bends ■ Lingual appliances ■ Dahl appliance (fixed)
Fixed appliances (segmented arch mechanics)	■ Ricketts utility arch ■ Burstone intrusion arch
Auxiliaries	■ Class II intermaxillary elastics ■ Fixed bite-planes: ● Turbo props ● Composite bite-planes (direct or indirect)
Headgear	■ Wedge effect with distal movement ■ Cervical pull headgear to maxillary first molars ■ J-hook headgear to the upper labial segment
Absolute anchorage	■ Implant anchorage ■ Micro-screw anchorage
Orthognathic surgery	■ Mandibular advancement to 3-point landing
Segmental surgery	■ Lower labial segment set-down ■ Mandibulotomy ■ Upper labial segment impaction

Table 1. Appliances and techniques for overbite reduction.

tongue position and/or an adaptive tongue to lower lip swallow pattern occurs, the overbite may be deep, but just incomplete to the palatal mucosa.

Dental

Over-eruption of the mandibular incisors often accompanies a Class II malocclusion. In Class II division 1 malocclusion with an increased overjet, the mandibular incisors erupt until they contact the palatal mucosa, unless there is a forward resting tongue position and/or an adaptive tongue to lower lip swallow pattern, as discussed in the previous section.

In Class II division 2 malocclusion, the deep overbite is often the result of retroclination of the incisor teeth. The maxillary incisor cingulum plateau is often poorly defined. The maxillary incisors may also have a reduced crown/root angle (collum angle).

It is important to note that a deep overbite may be partly due to over-erupted maxillary incisor teeth.

Indications for treatment

Anterior deep bite may occur in the primary dentition. If so, it is often associated with a relatively short anterior lower face height, reduced mandibular planes angle and square gonial angles. That is, at this age it is primarily skeletal in nature. If the problem is treated in the primary dentition, it is likely to recur when the active treatment is discontinued. Therefore, at this stage of development, treatment is rarely indicated.

In the early permanent dentition, a deep overbite may need to be reduced if causing trauma to the soft tissues palatal to the maxillary incisors or labial to the mandibular incisors. It is important to note, however, that traumatic overbites are almost always associated with poor oral hygiene. The Index of Orthodontic Treatment Need (IOTN) is currently used in the hospital service to prioritize treatment by classifying malocclusions according to treatment need. Only patients with a deep overbite causing palatal or gingival trauma fall into the treatment need category (IOTN 4f).

Deep overbite is often associated with an increased overjet. During orthodontic treatment, an increased overjet often cannot be orthodontically corrected until the overbite has been reduced.

Methods of overbite reduction

The method most suitable for each patient depends on the treatment objectives, which include the achievement of a stable end result. The dental movements required to reduce a deep anterior overbite may include one or more of the following:

- Relative intrusion of the incisors;
- Absolute intrusion of the incisors;
- Proclination of the labial segments.

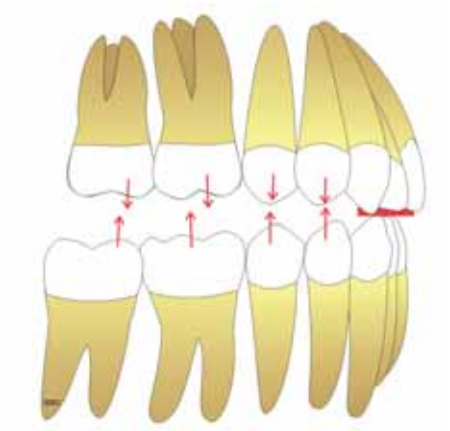

Figure 4. The anterior bite-plane works by allowing eruption of the posterior teeth.

Figure 5. The 'Nudger' appliance. Finger springs, in addition to headgear, aid in distalization of the maxillary first molars.

Figure 6. The Medium Opening Activator appliance. Free eruption of the mandibular buccal segments reduces the anterior overbite.

Relative intrusion of the incisors

This may be achieved by eruption, extrusion or uprighting (distal tipping) of the premolar and molar teeth. Vertical facial growth is required if the overbite reduction achieved in this way is to remain stable. Molar and premolar extrusion may either be passive (eg using an anterior bite plane) or active (eg using vertical elastics on fixed appliances).

Absolute intrusion of the incisors

This can be difficult to achieve, and requires complex orthodontic mechanics. The mechanics tend to pit incisor intrusion against molar extrusion, thereby inevitably leading to some extrusion of the buccal segments, as well as incisor intrusion. The only way to achieve true intrusion of incisors solely is with the use of implants or bone screws (absolute anchorage).

Proclination of the labial segments

Overbite depth reduces as the incisor teeth are proclined. A useful two-dimensional geometric model has been described, stating that there is approximately 0.2 mm change in overbite for every degree of incisal angular change, eg 10 degrees proclination leads to 2 mm reduction in overbite.[3] In clinical practice, the actual change in overbite depth cannot be accurately predicted by this method alone owing to other contributory factors, notably the intrusion or extrusion of the incisors and molars. It must be emphasized that, in most cases, the pre-treatment labio-lingual inclination of the incisors must be maintained for stability. Therefore, proclination of the incisors to reduce an overbite may only be used in select cases.

The other option is a combination of orthodontics and orthognathic surgery, in order to reduce a deep overbite surgically.

Appliances and techniques for overbite reduction (Table 1)

Removable appliances

Anterior bite-plane

This may be used on a simple upper removable appliance as a preliminary stage of treatment, and is ideally fitted in a growing patient as the permanent dentition is establishing. Clip-over anterior bite-planes (Plint clip) may also be used with upper and lower fixed appliances, giving clearance for placement of lower anterior brackets in Class II division 2, deep bite cases. Overbite reduction occurs by preventing eruption of the mandibular incisor teeth, but allowing eruption of the posterior teeth (Figure 4). The anterior lower face height also increases. The addition of cold cure acrylic to the bite-plane allows further reduction of the overbite during treatment. A very useful appliance in a Class II, deep bite case is the Ten Hoeve appliance, also known as a 'Nudger' (Figure 5).[4] This appliance, used in combination with headgear, combines the benefits of an anterior bite plane with distal movement of the upper first molars to aid in Class II correction and bite opening.

Functional appliances

These appliances are primarily indicated for correction of antero-posterior arch discrepancies in growing patients. However, capping of the mandibular incisors reduces mandibular incisor eruption while permitting buccal segment tooth eruption (the bite-plane effect) (Figure 6), thereby flattening an increased curve of Spee and reducing a deep overbite. Furthermore, the use of functional appliances causes an increase in the anterior lower face height.

Fixed appliances (continuous arch mechanics)

Pre-adjusted Edgewise (Straight Wire) appliance

- Continuous archwires – heavy flat

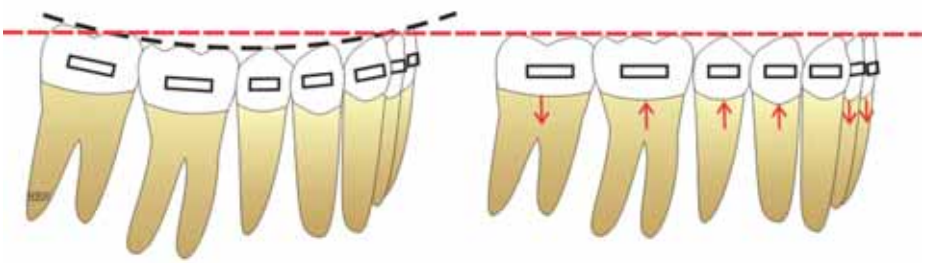

Figure 7. Banding the mandibular second molars to aid in arch levelling.

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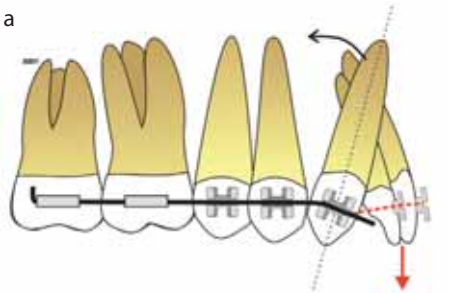

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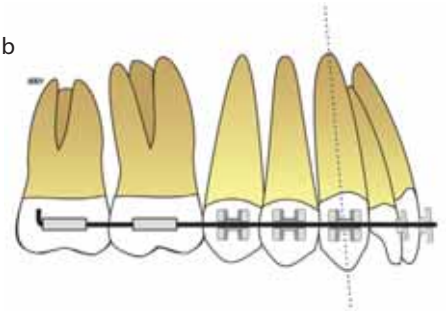

Figure 8. (a) If the canine teeth are distally angulated, engagement of the incisor brackets with the initial archwire (red dotted line) will extrude the incisors. **(b)** The arch will level as the canine angulation is corrected.

Figure 9. Counterforce nickel titanium archwires.

Figure 10. The use of 'anchor bends' in the Tip-edge appliance places an intrusive force on the incisor and canine teeth. The anchor bends may be seen in the archwires just mesial to the first molar bands.

stainless steel archwires may be used to level the occlusal plane, by a combination of mainly extrusion of posterior teeth and, to a lesser extent, intrusion of anterior teeth. The incorporation of the second molar teeth early in treatment will aid in arch levelling, but care must be taken to keep the tubes relatively occlusally positioned on the molar teeth for the maximum mechanical advantage (Figure 7). This allows for extrusion of the first molars and premolars, as well as aiding incisor intrusion. Some patience on the part of the operator is required in allowing adequate time for levelling to occur.

When using pre-adjusted edgewise bracket systems, it is also important to remember that the angulation (tip) built into the canine brackets, particularly distally angulated maxillary canines, will cause the initial archwires to extrude the incisors (Figure 8a). As the angulation or tip is expressed, the incisors will reintrude and the arch will level (Figure 8b). This is known as vertical 'round tripping'. To counter this phenomenon, it is possible to use reduced tip maxillary canine brackets, or to by-pass the incisors initially in patients with very distally angulated canine teeth.

- Placing curves in archwires – it is possible to sweep a reverse curve of Spee into a lower stainless steel archwire and an exaggerated curve in an upper archwire. This allows extrusion of the buccal segments, especially the premolars, and some intrusion of the labial segments. However, as the area of force application in the brackets is anterior to the centre of resistance of the mandibular incisors, there will be an often-unwanted tendency for proclination of these teeth.
- Counterforce NiTi archwires – these rectangular nickel titanium archwires have built in pronounced curves of Spee (Figure 9). The disadvantage with these so-called 'rocking-chair' archwires is that they can cause distortion of the archform if used for extended periods. Therefore, their use requires close supervision.

Tip-edge appliance

So-called 'anchor' or 'anchorage' bends used in the first stage of the Tip-edge appliance system are extremely useful in overbite reduction (Figure 10). An intrusive force is applied to the labial segments, and an extrusive force to the molars. The premolar teeth are not incorporated at this stage of treatment. Therefore, the archwire acts as a lever arm, allowing light forces to be used over a relatively long range. The archwire of choice is a 0.016-inch round high-tensile stainless steel archwire. The use of Class II elastics in the Tip-edge system greatly facilitates the bite opening effect of the anchor bends.

Lingual appliance

The brackets in this appliance system are bonded to the lingual aspect of the teeth, making the appliance more aesthetic than conventional fixed appliances. The anterior brackets may have a flat surface that occludes with the mandibular incisors, acting as an anterior bite-plane in deep bite cases (Figure 11a). The point of force application is also different from conventional appliances. An intrusive force directed through a lingual bracket in a normally inclined tooth will pass closer to both the centre of resistance and the long axis of the tooth, thereby theoretically producing intrusion with less proclination than labially positioned brackets (Figure 11b).[5]

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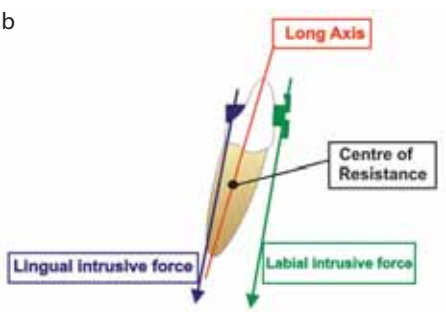

Figure 11. (a) Lingual brackets with (red arrows) and without bite-planes. **(b)** Diagram to illustrate the relationship between an intrusive force to the centre of resistance and long axis of a tooth (Blue = lingual force; Green = labial force).

Figure 12. Ricketts utility arch.

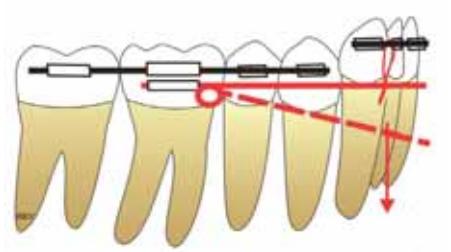

Figure 13. Burstone intrusion arch.

Figure 14. Turbo props (bite turbos) are bonded to the palatal aspect of the maxillary incisors.

Dahl appliance

Works along the same principle as the anterior bite-plane and is often used to give occlusal clearance for anterior restorations in prosthodontics.[6]

Fixed appliances (segmented arch mechanics)

A recent systematic review and meta-analysis of true incisor intrusion attained during orthodontic treatment concluded that, in non-growing patients, 1.5 mm of true maxillary incisor intrusion and 1.9 mm of true mandibular incisor intrusion was attainable with the segmented arch technique.[7]

Ricketts utility arch

This technique is very valuable in allowing true intrusion of the incisor segment. The 'utility' archwire only engages the molar and incisor teeth (Figure 12).[8] It is stepped away from the buccal segment teeth, allowing better load-deflection properties and reduced risk of archwire distortion during mastication. To reduce any extrusion of the molar teeth, double buccal tubes are used on the first molar bands, in order to allow use of a sectional archwire linking the buccal segments, as well as the utility arch. In order to limit proclination of the mandibular incisor teeth, lingual crown torque must be built into the rectangular archwires used. Once the overbite has been reduced, the canines are progressively ligated to the archwire and thereby intruded.

Burstone intrusion arch

This appliance has been said to produce four times more incisor intrusion than molar extrusion, and is therefore claimed to be the appliance of choice in adult patients where an increase in face height is not desired (Figure 13).[9] The anterior canine-to-canine region is aligned segmentally. The posterior molar and premolar teeth are also aligned as a segment, and rectangular archwires as well as rigid palatal and lingual arches are placed, providing stable posterior vertical anchor units. The accessory archwire is vertically activated for labial segment intrusion by placing tip-back bends mesial to the molar tubes. It is placed in the additional buccal tubes on the first molar teeth and ligated to the canine region of the anterior segment archwire.

Auxiliaries

Class II intermaxillary elastics

These are used bilaterally from the anterior maxillary dental arch to the mandibular first molar teeth. They are used in the correction of Class II malocclusion and the reduction of overjet. An often-unwanted effect is the resultant vertical forces on the mandibular molar teeth. However, in low angle, deep bite malocclusion, the extrusion of the mandibular molars is beneficial in helping to reduce the anterior deep bite. An increased curve may be placed in the upper archwire to help reduce the unwanted maxillary incisor extrusion from the elastic force. However, the net effect of Class II elastics will be overbite reduction as the mandibular molars are closer to the condylar hinge axis than the maxillary incisors.

Turbo-props and composite bite-planes

Turbo props, also known as bite turbos, are bonded to the palatal aspect of the maxillary incisors. They have a bite-plane incorporated (Figure 14). These, as well as composite bite-planes, may be used with conventional fixed appliances, giving the advantage of allowing the placement of upper and lower fixed appliances from the start of treatment. Composite bite-planes may be made indirectly.[10]

Headgear

The direction of pull of the headgear largely depends on the patient's facial growth pattern. A combination-pull headgear or an Interlandi-type headgear may be used to provide straightforward distal movement of the maxillary molar teeth, causing the anterior bite to open. This is called the 'wedge' effect as the molar is moved distally and therefore closer to the condylar hinge axis. Cervical pull headgear has an additional extrusive force on the maxillary molars, and is therefore ideal for use in low angle, deep bite Class II malocclusion. In cases where the maxillary incisors have over-erupted, a J-hook headgear may be attached to the anterior aspect of the maxillary archwire to provide an intrusive force. This has the benefit of helping to reduce excessive gingival exposure; however, there are no safety features with this type of headgear and it may also place undesirably high intrusive forces on the maxillary incisor teeth.

Absolute anchorage

Absolute vertical anchorage may be used to produce true intrusion of incisor teeth. If rigid endosseous dental implants have been placed for future restoration of missing teeth, they can be incorporated into a fixed appliance to allow intrusive forces to be placed on surrounding teeth. However, these implants cannot be placed until the end of active facial growth. They also need to be placed in exactly the correct position for the placement of future prostheses. Therefore their use is restricted to skeletally mature adult patients and requires very precise joint planning between the orthodontist and prosthodontist.

Micro-screw anchorage on the other hand has a number of advantages

Figure 15. Microscrew anchorage. A microscrew placed in the maxillary left first premolar region is used to provide absolute anchorage to intrude the over-erupted maxillary canine and incisors: **(a)** pre-treatment; **(b)** start of treatment; **(c)** end of treatment.

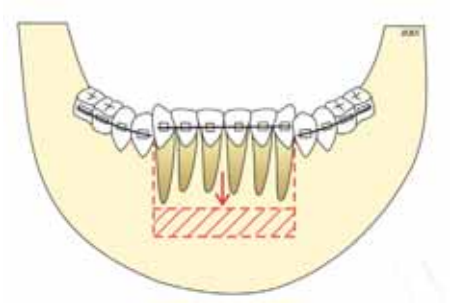

Figure 16. Lower labial segment subapical setdown osteotomy.

Figure 17. Mandibulotomy.

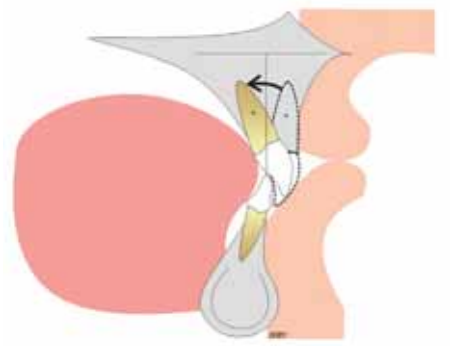

Figure 18. Incisor edge-centroid relationship. The dot in the maxillary incisor root is the centroid (centre of resistance).

over dental implants in that they are easier to place, cause minimal patient trauma and may be loaded immediately.[11] Owing to their small size, they may be inserted into a number of locations, allowing forces to be used in the required directions. Segments of teeth may therefore be intruded (Figure 15).

Orthognathic surgery

Patients with a Class II division 1 malocclusion often have an excessive curve of Spee. In patients with short faces, where an increase in the anterior lower face height is desired, the curve of Spee must be maintained prior to surgery by placing an increased curve of Spee in the mandibular archwires. When the mandible is advanced at surgery, there will be a three-point contact with the maxillary arch, in the incisor region, and bilaterally in the terminal molar region. This is known as a three-point landing. The lower arch is then levelled post-surgery by extrusion of the premolars. It is important to note that additional arch length is required for post-surgical levelling. This may be obtained by either maintaining some space in the lower arch pre-surgery, or allowing for some proclination of the lower incisors post-surgery.

Segmental surgery

This may be considered for adult patients where levelling the curve of Spee by orthodontic mechanics is not achievable. In cases where a natural step exists in the mandibular arch, the arch may be aligned and levelled in segments, usually with an anterior segment from canine-to-canine and two posterior segments. The arch may then be levelled surgically.[12] This has the advantage that no increase in arch length is required. However, care must be taken to diverge the roots of the teeth where the surgical cuts are to be made. If the anterior lower face height is to be maintained, a subapical osteotomy is undertaken to set down the lower labial segment (Figure 16). If the face height is to be increased, a segmental osteotomy, including the lower border, is undertaken, often referred to as a mandibulotomy (Figure 17).

An anterior subapical maxillary segmental osteotomy may be undertaken to reposition the upper labial segment superiorly, particularly in cases of anterior vertical maxillary excess.

Conservative management

Some older patients presenting with deep overbites and recurrent palatal trauma may not be good candidates for orthodontics or orthognathic surgery. These patients may be managed conservatively by improvement of their oral hygiene, particularly palatal to the maxillary incisors, and possibly the provision of a baseplate which they can wear as needed, usually at night.

Considerations in treatment planning

Age

A patient with a deep traumatic overbite is best treated while still growing, when correction may be relatively straightforward and before any long-term periodontal damage occurs. Growth modification using various functional appliances, with capping of the mandibular

incisors, or a simple upper removable appliance with an anterior bite-plane, may be used.

In non-growing patients, any extrusion of the buccal segments tends to be unstable as a result of stretching of the pterygo-masseteric sling. Therefore, true intrusion of the incisor teeth is required, and possibly surgical correction using a combined orthodontic and orthognathic approach.

Upper lip to maxillary incisor relationship

The amount of maxillary incisor exposure in relation to the upper lip at rest should be about 2–4 mm. In patients with reduced incisor show at rest, it may be prudent to intrude the mandibular incisors rather than the maxillary in order to prevent an aged appearance to the smile. Conversely, in patients with increased gingival exposure ('gummy smile'), it is better to intrude the maxillary incisors.

Incisor relationship

- Class II division 1 malocclusion: a significant Class II skeletal pattern, depending on age, requires growth modification or mandibular advancement surgery. However, if the Class II division 1 incisor relationship is on a Class I or mild Class II skeletal pattern, then treatment will involve orthodontic mechanics to correct the inclinations and vertical position of the incisor teeth.
- Class II division 2 malocclusion: if the skeletal pattern is Class I or mild Class II, as is often the case, treatment will centre on levelling the lower arch and intrusion and palatal root torque of the maxillary incisors. If the skeletal pattern is a moderate to severe Class II, the incisor relationship may be converted to a Class II division 1 malocclusion by proclining the upper labial segment and then, depending on age, requires growth modification or surgery.
- Class III malocclusion: sufficient overbite is required at the end of treatment to maintain a stable incisor relationship. Examples include compensating for an underlying mild Class III malocclusion by retroclining the mandibular incisors and proclining the maxillary incisors, and also in cases where a maxillary incisor is to be moved labially to correct an anterior crossbite. It is the presence of a positive overbite that will prevent relapse at the end of treatment.

Vertical skeletal discrepancy

- Short face, low angle cases: in growing patients, attempt to encourage extrusion of the buccal segments, using anterior bite-planes, functional appliances, cervical pull headgear or the Tip-edge appliance. In this way, the increase in anterior lower face height will improve the facial profile as well as helping to reduce the overbite.
- Long face, high angle cases with deep bite: it is important to avoid extrusive mechanics to the posterior teeth, in order to avoid any further increase in face height.

Stability of overbite correction

The stability of overbite reduction depends on a number of factors, which must be taken into account from the treatment planning stage:

- Good inter-incisal angle – the inter-incisal angle must be corrected (average 135 degrees) in addition to the overbite being reduced in order to prevent re-eruption of the incisors post-treatment.[13]
- Correct mandibular incisor edge-centroid relationship – possibly the most important factor in overbite stability in all treated cases is correction of the relationship between the mandibular incisor edge and the maxillary incisor root centroid (Figure 18).[14] This is measured as the distance between the perpendicular projections of these two points on the maxillary plane (0-2 mm). This may be achieved by either retraction of the maxillary incisor root centroid using fixed appliances with palatal root torque, or proclination of the mandibular incisors to advance their edges. The decision depends on a number of factors, including the facial profile and growth potential. If a patient has a retrognathic mandible, it is possible to procline the maxillary incisors and either to advance the mandible surgically or, in a growing patient, to use a functional appliance to help advance the mandibular incisors. In a patient with good facial balance, the treatment may be carried out with fixed appliances alone, so long as the palatal alveolar process is thick enough to allow retraction of the maxillary incisor root centroid. The crowns of the incisor teeth should also be maintained within the zone of soft tissue equilibrium between the musculature of the tongue and the lips.[15] An interesting proposition is that, in Class II division 2 malocclusions, it may be possible to intrude and torque the maxillary incisor roots palatally, allowing the mandibular incisor crowns to be proclined and hence occupy the position previously occupied by the maxillary incisor crowns, thus maintaining the incisor complex within the zone of soft tissue equilibrium.[16]
- Avoid change in intermaxillary height in non-growing patients. The extrusion of molars in non-growing patients is unstable as the muscular forces from the pterygo-masseteric sling will re-intrude the molars if the posterior vertical face height has not accommodated their extrusion.
- Proclination of the lower labial segment in Class II cases may still be unstable long term owing to pressure from the lower lip.[17] Therefore, long-term retention may be required in such cases and must be discussed with the patient prior to treatment.
- Vertical facial growth continues well into the late teenage years. As the pattern of facial growth does not tend to change following treatment, it is prudent to place a bite plane on the maxillary removable retainer after the completion of orthodontic treatment. This may be worn on a part-time basis in order to maintain the corrected overbite until vertical facial growth has subsided.[18]

Conclusion

When faced with the correction of an anterior deep overbite, the clinician must follow a thorough diagnostic process, which must be worked through in order to reach the correct treatment goal. The patient's age, pattern of facial growth, type of malocclusion and the respective clinician's skill are all factors that must be taken into account. Knowledge of the skills of the orthodontist's prosthodontic and surgical colleagues is also vital if patients are to receive optimum treatment.

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Book Review

Treatment Planning for the Developing Dentition. By Helen Rodd and Alyson Wray. London: Quintessence Publishing Co. Ltd, 2006 (150pp, £28 h/b). ISBN 1-85097-081-5.

Treatment Planning for the Developing Dentition is a recent addition to the QuintEssentials Paediatric Dentistry/Orthodontics series. This hardback publication is 150 pages long; containing 102 colour photographs, 19 radiographic images and 24 tables and diagrams. In true QuintEssential style, this book is easy on the eye, very 'readable' and yet replete with current information and practical guidance on its subject.

From the outset, *Treatment Planning for the Developing Dentition* endeavours not to lay down rigid and detailed instruction to encompass every clinical scenario and condition. It instead was written to provide a basic, yet sound, guidance to paediatric dental treatment planning, which it has done successfully.

For those readers unaccustomed to the style of the volumes within the QuintEssentials series, each book uses short paragraphs, bold text, bullet points, figures and tables to convey information to the reader concisely yet effectively in a very 'digestable' manner. Chapters all outline an aim, learning outcomes/objectives and introduction, closing with a list of further recommended reading to complement the text. Moreover, key points and practical tips are presented in highlighted boxes for the utmost clarity. *Treatment Planning for the Developing Dentition* remains true to the QuintEssentials format and additionally provides sample scenarios to reinforce the principles covered within its text.

This particular volume contains six chapters: the first visit and information gathering; interceptive orthodontics; prevention; the restorative phase; management of the dental emergency and patient recall.

Chapter one covers a broad range of topics related to 'first contact' and patient examination. Commonly overlooked points like the practice environment and family dynamics are included, along with history, examination and risk assessment.

The second chapter on interceptive orthodontic treatment is kept simple, yet manages to illustrate the importance of orthodontic timing and intervention effectively, and provides a basic screening tool to identify developing occlusal problems. Prevention, LA administration, dental restoration and prostheses, bleaching and pulp therapy are discussed in subsequent chapters. Treatment principles, materials/medicaments and modes of patient delivery are thoughtfully explained and interrelated.

The final chapters encompass the assessment and management of acute dental emergencies and explain a basis to paediatric recall schedules in general dental practice. The approach to these areas in particular varies between practitioners, thus the evidence-based guidelines outlined within this book should prove to be of value.

Treatment Planning for the Developing Dentition was composed to 'explain the basic principles behind good decision-making'. It has done so in a balanced and informative manner, without undervaluing the experience so necessary for a versatile and effective clinician. This publication is ideal for the undergraduate dentist/therapist or general dental practitioner wishing to consolidate his/her knowledge and promotes an understanding in paediatric dental treatment planning. It comes highly recommended.

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