PROL:GNER

Diagnosis Type Treatment Guide

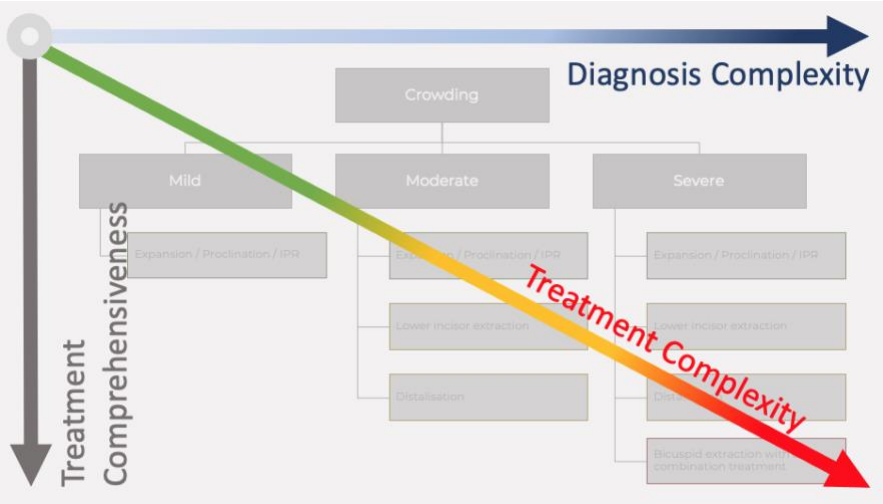
This document is a treatment planning tool designed to assist you on how to treat particular conditions. Treatments are graded by complexity and by orthodontic technique required, and graded by the expected experience required. The goal is to provide guidance on the efficacy of treatment for a particular condition and to aid providers to select cases that best matches their ability.

Note**,** when applying this guide only general, high-level information on how each isolated condition might be treated is provided. The relationships between different conditions that exist in most patients are not addressed. In this regard, always consider each patient's individual dental and periodontal condition, restorative needs, facial proportions, and age when you are considering treatment options.

As doctors are solely responsible for the treatment they're providing their patients, they should understand their limits and not hesitate to consult a specialist for further guidance when required.

Complexity of treatment options and their suggested experience level are graded as follows, and are ordered diagrammatically by diagnosis complexity and treatment comprehensiveness:

- Novice (0-15 cases)
- Experienced (16-50 cases)
- Advanced (>50 cases)

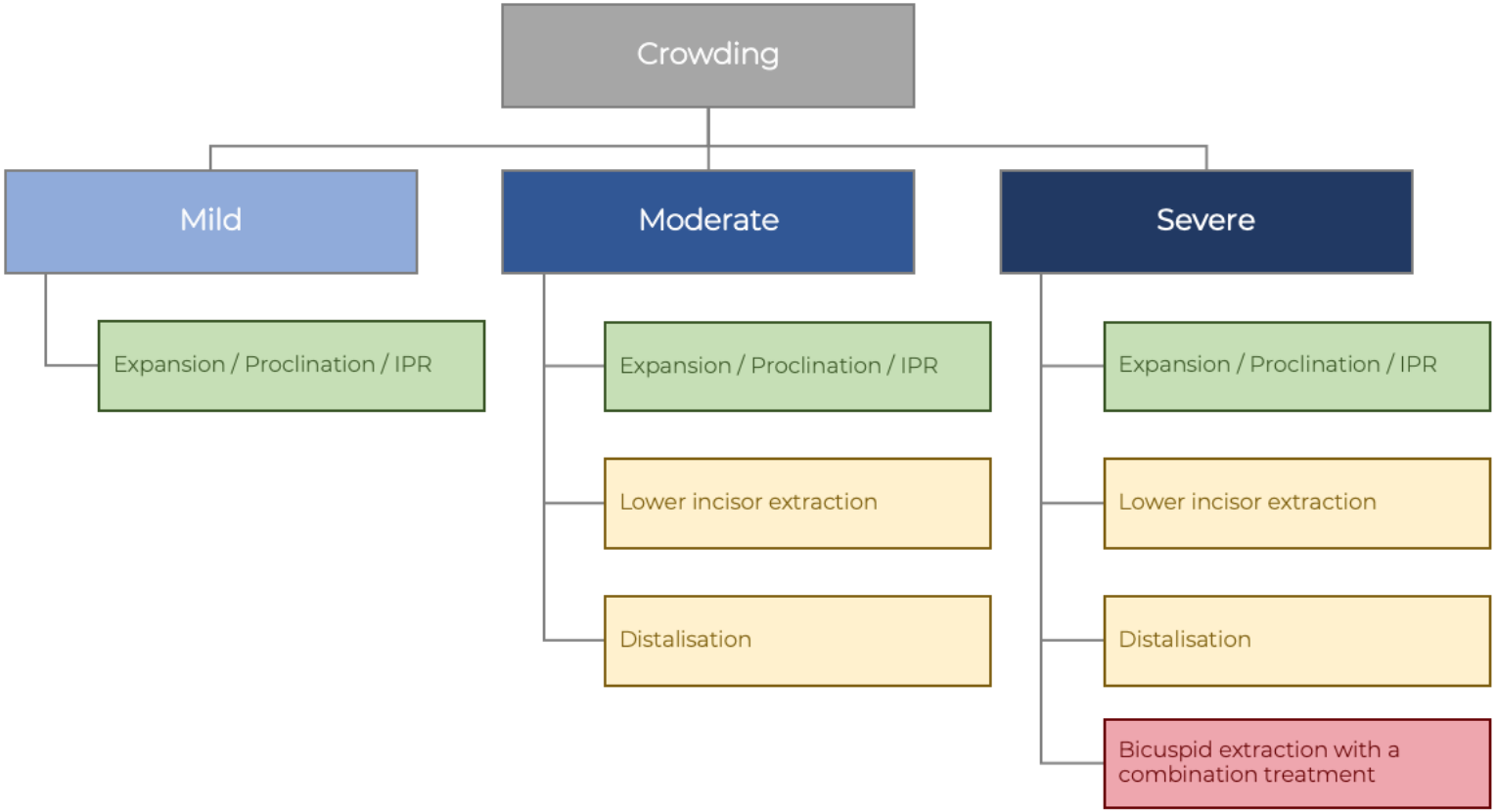


Diagnosis Types

1. Crowding

Crowding is a common aspect of malocclusion, which can manifest itself in varying amounts from mild to moderate to severe. In general, mild crowding can be resolved with some proclination, rounding out of the arches, or even mild IPR. Moderate crowding can be corrected by arch expansion, proclination, IPR and/or extractions. Severe crowding usually requires a combination of expansion, proclination, IPR, extractions, and/or distalisation.

Depending on the arch width and whether crossbites are present or not, the amount of expansion possible will determine the amount of proclination and/or IPR needed to resolve the remaining balance. Extractions can also be used to change anterior-posterior (A-P) relationships, minimize advancing incisors, or changing facial strain. In general, a combination of approaches are used to resolve crowding, each amount depending on the facial profile of the patient, dental positions of the teeth, arch forms, size of teeth, and buccal class relationship of the case.



1. Crowding

Mild

Expansion/Proclination/IPR Novice (0-15 cases)

Expansion and proclination can be utilized to resolve mild crowding via the Proligner full product (or proclination and IPR via the Proligner Anterior product). IPR may also be used if space is limited. The amount of expansion and proclination will vary case by case depending on the patient's arch form (narrow vs. omega vs. square), periodontal condition, and enamel thickness present.

Moderate

Expansion/Proclination/IPR Novice (0-15 cases)

The amount and location of expansion, proclination, and/or IPR is determined on a case-by-case basis. Consider the periodontal condition of the patient and initial dental position and arch forms. If unsure, a pre-orthodontic evaluation by a periodontist may be beneficial. If there is adequate periodontal support, consider expansion and/or proclination in relation to the arch form and treatment goals. If there is minimal periodontal support, consider less expansion and proclination and more IPR or extractions. When considering IPR, evaluate any tooth size discrepancy and/or how IPR may affect the overjet as well as resolving the crowding.

Lower incisor extraction Experienced (16-50 cases)

When considering extracting a lower incisor, keep in mind any tooth size discrepancy, as well as the patient's overbite and overjet relationship. Patients who are generally suitable for single lower incisor extractions are Class I or mild Class II, have moderately crowded lower incisors, mild or no crowding in the upper arch, acceptable soft-tissue profile and minimal to moderate overbite and overjet. A tooth size discrepancy such as missing lateral incisors or peg laterals, can resolve the inevitable tooth-size discrepancy without any IPR. Regardless of the criteria, a full diagnostic setup should be made with these cases to be sure the occlusal results will be acceptable before extracting any teeth. It is important to note the amount of interproximal space that is required to close once the tooth is extracted, and look at the crown and root position of the teeth adjacent to the tooth deciding to extract. The greater the space to close and/or the farther positioned the roots are away from the extraction site, the greater the potential for tipping into the extraction site. This may create black triangles with insufficient interproximal tissue. Therefore, closing of the extraction site needs to be monitored for root parallelism. Consider specifying rectangular attachments to help control tipping. Sectional appliance or auxiliaries may be needed at the end of treatment if tipping is noticed. This is important to disclose to the patient before treatment begins.

Distalisation Experienced (16-50 cases)

Upper distalisation can be used to reduce crowding and/or change the AP relationship of the buccal segments. Note that when distalisation is used to reduce crowding this will affect the relationship of the buccal segments and may or may not reduce the overjet. Lower distalisation is not a common treatment option. Adding distalisation to treatment can significantly increase Proligner treatment time.

Severe

Expansion/Proclination/IPR Novice (0-15 cases)

The amount and location of expansion, proclination, and/or IPR is determined on a case-by-case basis. Consider the periodontal condition of the patient and initial dental position and arch forms. If unsure, a pre-orthodontic evaluation by a periodontist may be beneficial. If there is adequate periodontal support, consider expansion and/or proclination in relation to the arch form and treatment goals. If there is minimal periodontal support, consider less expansion and proclination and more IPR or extractions. When considering IPR, evaluate any tooth size discrepancy and/or how IPR may affect the overjet as well as resolving the crowding.

Lower incisor extraction Novice (0-15 cases)

When considering extracting a lower incisor, keep in mind any tooth size discrepancy, as well as the patient's overbite and overjet relationship. Patients who are generally suitable for single lower incisor extractions are Class I or mild Class II, have moderately crowded lower incisors, mild or no crowding in the upper arch, acceptable soft-tissue profile and minimal to moderate overbite and overjet. A tooth size discrepancy such as missing lateral incisors or peg laterals, can resolve the inevitable tooth-size discrepancy without any IPR. Regardless of the criteria, a full diagnostic setup should be made with these cases to be sure the occlusal results will be acceptable before extracting any teeth. It is important to note the amount of interproximal space that is required to close once the tooth is extracted, and note at the crown and root position of the teeth adjacent to the tooth deciding to extract. The greater the space to close and/or the farther positioned the roots are away from the extraction site, the greater the potential for tipping into the extraction site. This may create black triangles with insufficient interproximal tissue. Therefore, closing of the extraction site needs to be monitored for root parallelism. Consider specifying rectangular attachments to help control tipping. Sectional appliance or auxiliaries may be needed at the end of treatment if tipping is noticed. This is important to disclose to the patient before treatment begins.

Distalisation Experienced (16-50 cases)

Upper distalisation can be used to reduce crowding and/or change the AP relationship of the buccal segments. Note that when distalisation is used to reduce crowding this will affect the relationship of the buccal segments and may or may not reduce the overjet. Lower distalisation is not a common treatment option. Adding distalisation to treatment can significantly increase Proligner treatment time.

Bicuspid extraction with a combination treatment
Advanced (>50 cases)

When considering bicuspid extractions, auxiliaries or fixed appliances may be needed at the end of treatment to achieve root parallelism and close the remaining extraction site. If deciding to begin an extraction case using Proligner, keep in mind the initial root position of the canines and bicuspids. The greater the space to close and/or the farther positioned the roots are away from the extraction site, the greater the potential for tipping into the extraction site. Therefore, closing of the extraction site needs to be monitored for root parallelism. Consider specifying rectangular attachments to help control tipping. Sectional appliance or auxiliaries may be needed at the end of treatment if tipping is noticed. Class II or Class III extraction cases may require elastics to optimise anchorage control.

2. Spacing

A significant percentage of the general population has interproximal spaces. Spaces are most commonly due to a tooth size discrepancy, missing teeth, proclined teeth or any combination. Spaces can be distributed anywhere in the dental arch, with anterior spacing more easily treatable Spacing can be divided into three main categories: mild, moderate and severe.

Mild anterior spacing can usually be closed completely with Proligner alone by retracting the crowns and constricting the arch circumference. Mild anterior space closure often allows the practitioner to treat only one arch, provided the constriction in arch circumference does not create occlusal interferences.

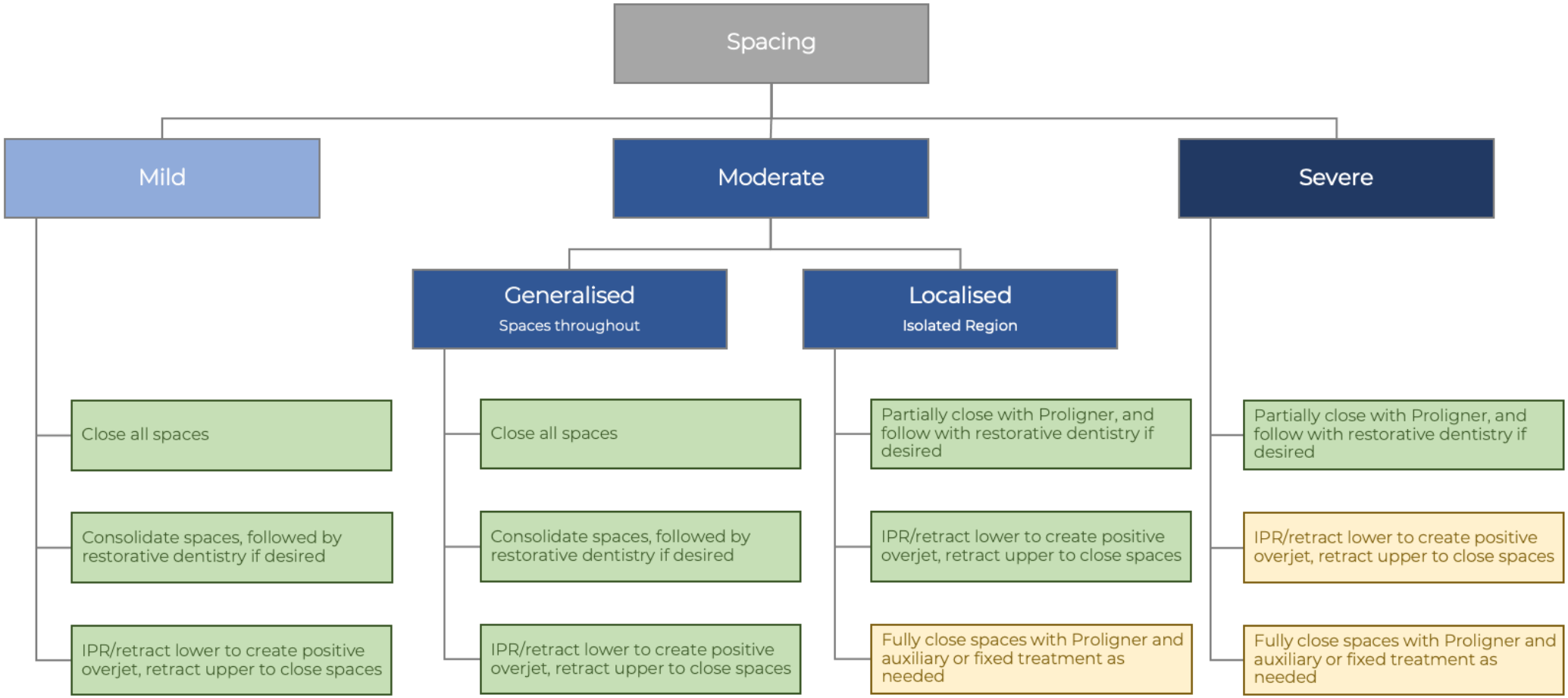
Moderate anterior spacing can be resolved with retraction when the teeth are significantly proclined and of normal size. If there is a tooth size discrepancy and/or the teeth are not proclined, then closing all of the space with retraction usually results in poor aesthetics and/or premature anterior contact. If contact with the lower anterior teeth prevents the uppers from being retracted, you may need to consolidate the spaces in the upper arch and close the remaining spaces with dental restorations.

Severe spacing greater than 6 mm is not just confined to the anterior most of the time. If there are posterior spaces, closing them can require moving the teeth forward (referred to as mesialisation). To close all of the space while maintaining the crowns and roots in a good aesthetic and functional position almost always requires a combination of Proligner and restorative dentistry, because of the mesial tipping that can occur.

In general, Proligner is the treatment of choice when treating cases with spacing, especially confined to the anterior, as long as the following rules are kept in mind during the diagnosis and treatment planning.

1. Create and maintain good arch form using the alveolar denture base as the template. Over-retraction and/or constriction can result in asymmetry.
2. Establish or maintain good inclination (torque) to create the best aesthetics, function and stability. Problems usually arise when the teeth are inclined too far lingually with over-retraction.
3. Significant tooth size discrepancy most of the time requires restorative dentistry as well as Proligner.
4. The periodontal tissues need to be adequate to support the desired tooth movements. This applies most often to posterior spaces where the alveolar bone isn't adequate to accommodate tooth movement into the ridge. Attempting to move teeth into an area that lacks bone will result in crown tipping.

With all space closure cases, post-treatment retention is the key to long-term stability. This is an important discussion point before and after treatment.


Spacing
Mild
Moderate
Severe
Generalised
Spaces throughout
Localised
Isolated Region
Close all spaces
Consolidate spaces, followed by restorative dentistry if desired
IPR/retract lower to create positive overjet, retract upper to close spaces
Close all spaces
Consolidate spaces, followed by restorative dentistry if desired
IPR/retract lower to create positive overjet, retract upper to close spaces
Partially close with Proligner, and follow with restorative dentistry if desired
IPR/retract lower to create positive overjet, retract upper to close spaces
Fully close spaces with Proligner and auxiliary or fixed treatment as needed
Partially close with Proligner, and follow with restorative dentistry if desired
IPR/retract lower to create positive overjet, retract upper to close spaces
Fully close spaces with Proligner and auxiliary or fixed treatment as needed

2. Spacing

Mild

Close all spaces Novice (0-15 cases)

Closing all of the space with Proligner is most effective when teeth are proclined and can be retracted uprighting the crowns over the roots. Be careful not to over-retract the incisors. Maintaining arch symmetry as the spaces are closed is important. Over-retracting any segment should be avoided. The overbite will increase as the teeth are retracted changing the crown inclination. If a slight tooth size discrepancy exists, a small amount of IPR can be per- formed in the appropriate arch. Otherwise, slight anterior equilibration may be needed to settle the posterior bite.

Consolidate spaces, followed by restorative dentistry if desired Novice (0-15 cases)

It may not be possible or desirable to close all of the spaces, especially when a tooth size discrepancy exists. This situation most commonly exists when the maxillary lateral incisors are smaller than average. Space can be distributed in the appropriate places preparing those teeth for post-Proligner restoration. Most experts agree that the space around the lateral incisors, on average should have 1/3 on the mesial and 2/3 on the distal. But this setup can be adjusted according to your preferences.

IPR/retract lower to create positive overjet, retract upper to close spaces Novice (0-15 cases)

If inadequate overjet prevents upper anterior retraction, one treatment approach is to retract the lowers by first creating space with IPR. The resulting overjet will allow upper retraction.

Moderate

Generalised (spaces throughout)

Close all spaces Novice (0-15 cases)

Closing all of the space with Proligner is most effective when teeth are proclined and can be retracted uprighting the crowns over the roots. Be careful not to over-retract the incisors. Maintaining arch symmetry as the spaces are closed is important. Over-retracting any segment should be avoided. The overbite will increase as the teeth are retracted changing the crown inclination. If a slight tooth size discrepancy exists, a small amount of IPR can be per- formed in the appropriate arch. Otherwise, slight anterior equilibration may be needed to settle the posterior bite.

Consolidate spaces, followed by restorative dentistry if desired Novice (0-15 cases)

It may not be possible or desirable to close all of the spaces, especially when a tooth size discrepancy exists. This situation most commonly exists when the maxillary lateral incisors are

smaller than average. Space can be distributed in the appropriate places preparing those teeth for post-Proligner restoration. Most experts agree that the space around the lateral incisors, on average should have 1/3 on the mesial and 2/3 on the distal. But this setup can be adjusted according to your preferences.

IPR/retract lower to create positive overjet, retract upper to close spaces Novice (0-15 cases)

If inadequate overjet prevents upper anterior retraction, one treatment approach is to retract the lowers by first creating space with IPR. The resulting overjet will allow upper retraction.

Localised (isolated region)

Partially close with restorative dentistry if desired
Novice (0-15 cases)

When there is a localized space that either can't be fully closed or the desire is not to close it, then an option is to move the tooth or teeth into a pre-restorative position. When restorative treatment is incorporated along with Proligner usually the tooth movements don't need to be as precise because most limitations can be overcome with the restorative work.

IPR/retract lower to create positive overjet, retract upper to close spaces Novice (0-15 cases)

If inadequate overjet prevents upper anterior retraction, one treatment approach is to retract the lowers by first creating space with IPR. The resulting overjet will allow upper retraction.

Fully close spaces with Proligner and auxiliary or fixed treatment as needed Experienced (16-50 cases)

Closing localized spaces fully with the crowns and roots upright (bodily) can be a challenge with Proligner only. To optimize tooth movement(s) auxiliary appliances can be used. The most common auxiliary appliances are sectional fixed orthodontic brackets and wires.

Severe

Partially close with restorative dentistry if desired
Novice (0-15 cases)

Restorative treatment is very complementary to Proligner treatment and is almost essential when spaces are severe. Using only Proligner as the orthodontic appliance means you have to be able to plan your tooth movements that are predictable and use the restorative to finish the case. It usually means consolidating some spaces and or maintaining others. An important point to remember is that if you are only able to achieve 80% of the desired tooth movements the restorative work can still be done ideally.

IPR/retract lower to create positive overjet, retract upper to close spaces Experienced (16-50 cases)

If inadequate overjet prevents upper anterior retraction, one treatment approach is to retract the lowers by first creating space with IPR. The resulting overjet will allow upper retraction.

Fully close spaces with Proligner and auxiliary or fixed treatment as needed Experienced (16-50 cases)

When closing more severe spaces, it may be helpful to only move a few teeth at a time. For example, retracting canines first before closing spaces around the incisors. Using attachments on the bicuspids to help anchor the aligner may be helpful for retention as the teeth become more upright. Auxiliary appliances may be required.

3. Narrow Arches

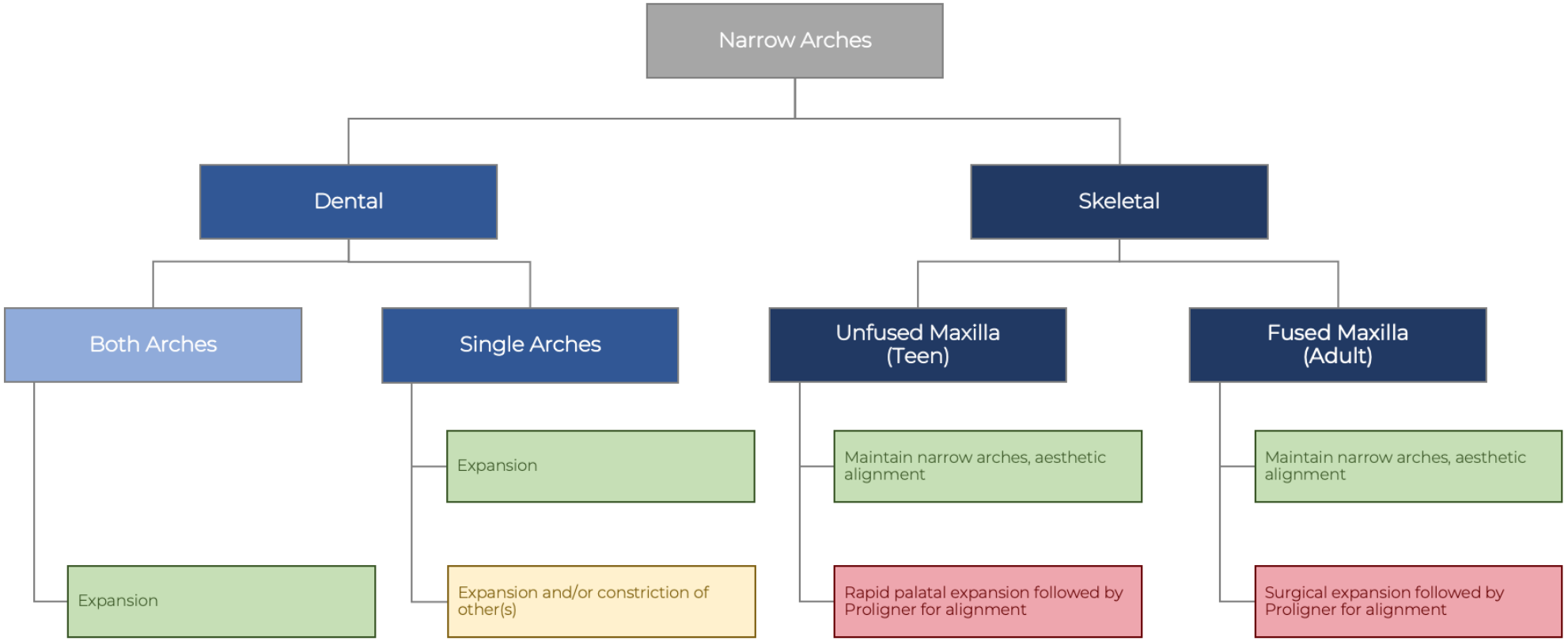
Narrow arches are characterized by arches that are tapered rather than broad and U-shaped. Narrow arches can occur in the presence or absence of a posterior crossbite.

From the anterior view, an aesthetic smile is one where the bicuspids and the first molar can be seen in a full smile. In a case with narrow arches, the upper posterior teeth cannot be seen in the smile and the teeth are usually inclined lingually. Narrow arches can be broadened to improve the arch form and improve a smile, provided that adequate periodontal support is present to allow healthy dental expansion.

When programming dental posterior expansion, expand the posterior segment as a unit (for example from the cuspid to the second molar and also bilaterally if possible). Prior to progressing to the next stage, make sure the existing aligner is fully seated and the teeth have moved to the projected position. You can request attachments on the bicuspids to help anchor the aligners.

Increasing the time interval between aligners to three weeks may be indicated. During expansion, monitor the level of the buccal tissue in the posterior segment. Regularly examine the periodontium and also run a finger across the buccal area to ensure the roots are not being over-expanded at each appointment.

Check for open bite tendency as the teeth are being expanded. Lingual interferance can result in an occlusal prematurity that prevents complete bite closure.


Narrow Arches
Dental
Skeletal
Both Arches
Single Arches
Unfused Maxilla (Teen)
Fused Maxilla (Adult)
Expansion
Expansion
Expansion and/or constriction of other(s)
Maintain narrow arches, aesthetic alignment
Rapid palatal expansion followed by Proligner for alignment
Maintain narrow arches, aesthetic alignment
Surgical expansion followed by Proligner for alignment

3. Narrow Arches

Dental

Both Arches

Expansion Novice (0-15 cases)

Dental posterior expansion of 2–3 mm per side is predictable and achievable with Proligner. As a general guideline, look at the buccal bone in the posterior segment to determine if the case can be expanded dentally. The limiting factor in the level of dental expansion is the amount of buccal bone available and also the overlying periodontium. If there is bone loss or recession in the area, it would be advisable not to expand dentally in these cases. If the teeth are inclined lingually and the amount of buccal bone and periodontium is sufficient then dental expansion is a good treatment option in cases with narrow arches.

Single Arch

Expansion Novice (0-15 cases)

Dental posterior expansion of 2–3 mm per side is predictable and achievable with Proligner. As a general guideline, look at the buccal bone in the posterior segment to determine if the case can be expanded dentally. The limiting factor in the level of dental expansion is the amount of buccal bone available and also the overlying periodontium. If there is bone loss or recession in the area, it would be advisable not to expand dentally in these cases. If the teeth are inclined lingually and the amount of buccal bone and periodontium is sufficient then dental expansion is a good treatment option in cases with narrow arches.

Expansion and/or constriction of other(s)
Experienced (16-50 cases)

Dental posterior expansion of 2–3 mm per side is predictable and achievable with Proligner. As a general guideline, look at the buccal bone in the posterior segment to determine if the case can be expanded dentally. The limiting factor in the level of dental expansion is the amount of buccal bone available and also the overlying periodontium. If there is bone loss or recession in the area, it would be advisable not to expand dentally in these cases. If the teeth are inclined lingually and the amount of buccal bone and periodontium is sufficient then dental expansion is a good treatment option in cases with narrow arches.

Skeletal

Unfused Maxilla (Teen)

Maintain narrow arches, aesthetic alignment
Novice (0-15 cases)

A limited treatment option is to use Proligner for aesthetic alignment of the anterior teeth while maintaining the narrow arches.

Rapid palatal expansion followed by Proligner for alignment Advanced (>50 cases)

Skeletal expansion is not achievable with Proligner alone. Proligner may be used for alignment following surgical expansion. For some teen patients, non-surgical rapid palatal expansion followed by Proligner treatment may also be an option.

Fused Maxilla (Adult)

Maintain narrow arches, aesthetic alignment
Novice (0-15 cases)

A limited treatment option is to use Proligner for aesthetic alignment of the anterior teeth while maintaining the narrow arches.

Surgical expansion followed by Proligner for alignment Advanced (>50 cases)

Skeletal expansion is not achievable with Proligner alone. Proligner may be used for alignment following surgical expansion. For some teen patients, non-surgical rapid palatal expansion followed by Proligner treatment may also be an option.

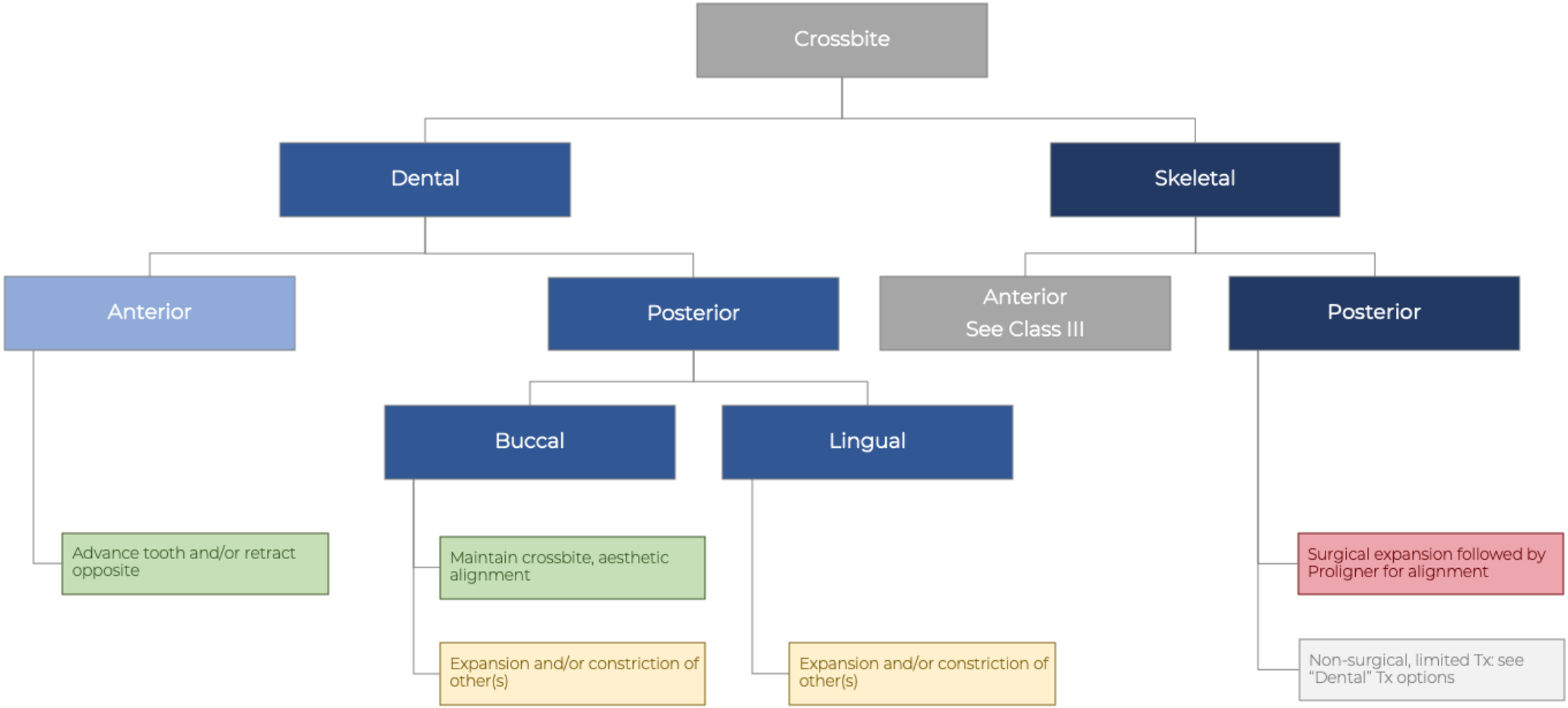
4. Crossbite

Crossbite occurs when the maxillary teeth are buccal or lingual to their normal position with respect to the mandibular teeth. It is important to identify the underlying cause of the crossbite to treat it correctly.

Dental crossbite is characterized by the displacement or buccal/lingual tipping of teeth causing these teeth to be positioned more buccally or lingually with respect to the teeth in the opposing arch. Dental crossbites usually appear to be unilateral. However, they can also be bilateral appearing as unilateral due to mandibular shift. In a maxillary lingual crossbite, the maxillary teeth in crossbite are tipped palatally so that the palatal cusps are much higher compared to the buccal cusps.

Skeletal crossbite is characterized by a narrow maxillary arch and/or a wide mandibular arch. The long axes of the teeth appear to be normal in this situation. However, the arches are not coordinated due to a discrepancy in arch size. A skeletal crossbite requires surgical correction in most adult cases. Teen patients may be corrected with rapid palatal expansion.

Dental or skeletal crossbites often occur in conjunction with a mandibular shift which can be both in transverse or A-P planes. The shift is due to the occlusal interferences caused by the crossbite. These interferences force the patient to shift the mandible to the side or forward for better function.


Crossbite
Dental
Skeletal
Anterior
Posterior
Anterior
See Class III
Posterior
Buccal
Lingual
Advance tooth and/or retract opposite
Maintain crossbite, aesthetic alignment
Expansion and/or constriction of other(s)
Expansion and/or constriction of other(s)
Surgical expansion followed by Proligner for alignment
Non-surgical, limited Tx: see "Dental" Tx options

4. Crossbite

Dental

Anterior

Advanced tooth and/or retract opposite
Novice (0-15 cases)

Anterior crossbites are corrected by moving the displaced teeth into the correct position. This can be in either or both arches. It is important to ensure that adequate interproximal space exists around the crossbite to ensure adjacent teeth do not hinder the movement into the correct final position. Review The treatment plan for space around the tooth as the crossbite is being jumped. In severe deep bites the use of a bite plate in the opposing arch to aid in opening the bite may be helpful. In cases in which a tooth is severely lingually positioned, some sectional fixed treatment may be necessary to upright the root and correct the long axis in a bucco/lingual direction.

Posterior

Buccal

Maintain crossbite, aesthetic alignment
Novice (0-15 cases)

Alignment can be achieved without correcting the crossbite in mild to moderate crowding cases if the patient declines surgical skeletal correction.

Expansion and/or constriction of other(s)
Experienced (16-50 cases)

Buccally displaced posterior teeth can be corrected by lingual movement with or without buccal movement of the opposing teeth. It is important to ensure there is enough space for this correction. Some posterior crossbites can benefit from distalisation as well as IPR to provide the space required for this correction. Enamelopolasty may be necessary to remove final occlusal interferences present at the end of treatment. The use of a bite plate may facilitate the crossbite correction depending on the amount of cross-bite correction. A crossbite that involves all of the posterior teeth up to the canine should be treated cautiously. Factors to be considered are the amount of crossbite, the number of teeth in crossbite and the patient's periodontal health.

Lingual

Expansion and/or constriction of other(s)
Experienced (16-50 cases)

Lingually displaced teeth can be corrected by expanding them to their correct positions. Constriction of the opposing teeth may also be indicated. It is important to ensure there is enough space for this correction. Some posterior crossbites can benefit from distalisation as well as IPR to provide the space required for this correction.

Enamelopolasty may be necessary to remove any occlusal interferences present at the end of treatment. The use of a

bite plate may facilitate the crossbite correction depending on the depth of the bite.

Skeletal

Anterior (see Class III)

It is important to determine whether an anterior crossbite is dental or skeletal, because skeletal correction requires skeletal treatment in addition to alignment. It is also important to check for functional shifts because the bite relationship can settle into a different bite once the anterior interference is removed. If anterior, see Class III treatment options starting on p. 40.

Posterior

Surgical expansion followed by Proligner for alignment Advanced (>50 cases)

Skeletal crossbite is characterized by a narrow maxillary arch and/or a wide mandibular arch. The long axes of the teeth appear to be normal in this situation. However, the arches are not coordinated due to a discrepancy in arch size. A skeletal crossbite requires surgical correction in most cases. Surgical treatment can be followed up with Proligner treatment for general alignment.

Non-surgical, limited Tx see Dental Tx options

Limited treatment to align the anterior teeth can be done with Proligner for mild to moderate crowding cases.

5. Deep Bite

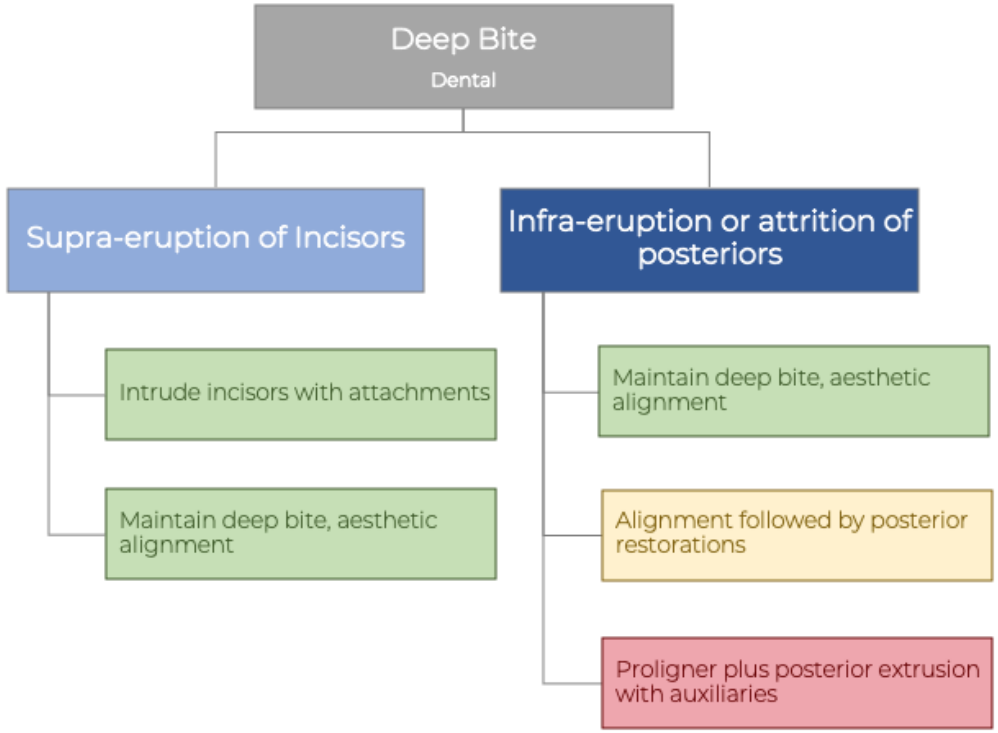
A common vertical problem is a deep overbite, commonly referred to as deep bite. It is important to correct a deep bite situation because doing so will allow for improved function of the occlusion, such as lateral excursions and protrusive movements. When the mandibular incisor teeth erupt excessively, anterior deep bite problems may result. This is particularly common in Class II malocclusions.

In severe Class II situations the teeth can even erupt into the palatal mucosa. In order to alleviate the problem of over eruption of the lower incisors, the Curve of Spee should be levelled in the lower arch by intruding the over-erupted incisors.

Another cause of deep bite, much more common among adult patients, is the infra-eruption or attrition of posterior the mandible can cause the deep bite as well. Unfortunately, most of these occlusions cannot be restored without comprehensive full mouth rehabilitation.

As a result, many patients opt to have limited orthodontic treatment instead, and maintain the existing posterior occlusion.

teeth. As people age, the effects of parafunctional habits begin to show. Bruxism is a major cause of the aforementioned situation. In addition, a forward and upward rotation of



5. Deep Bite

Supra-eruption of incisors

Intrude incisors with attachments Novice (0-15 cases)

Proligner can predictably intrude incisors, especially lower incisors. The key to intrusion of the lower incisors is having attachments on teeth posterior to the teeth being intruded for retention of the aligner.

Maintain deep bite, aesthetic alignment Novice (0-15 cases)

In certain situations, the patient and clinician may opt to maintain the deep bite. In these cases it is important to inform the patient that although aesthetic alignment will take place, the functional occlusion will be maintained.

Infra-eruption or attrition of posteriors

Maintain deep bite, aesthetic alignment Novice (0-15 cases)

In certain situations, the patient and clinician may opt to maintain the deep bite. In these cases it is important to inform the patient that although aesthetic alignment will take place, the functional occlusion will be maintained.

Alignment followed by posterior extrusion with auxiliaries Experienced (16-50 cases)

Proligner treatment may also be combined with posterior restorations and/or auxiliary treatment. Posterior extrusion with aligners alone should be avoided, as this is a less predictable movement. When combining restorative treatment with Proligner treatment, it is best to complete the final restoration after the orthodontic component is completed. However, it may be necessary to temporize prior to starting with Proligner in order to achieve adequate crown length. To avoid dislodging the temporary restorations with the aligners, be sure to use a durable cement.

Proligner plus posterior extrusion with auxiliaries Advanced (>50 cases)

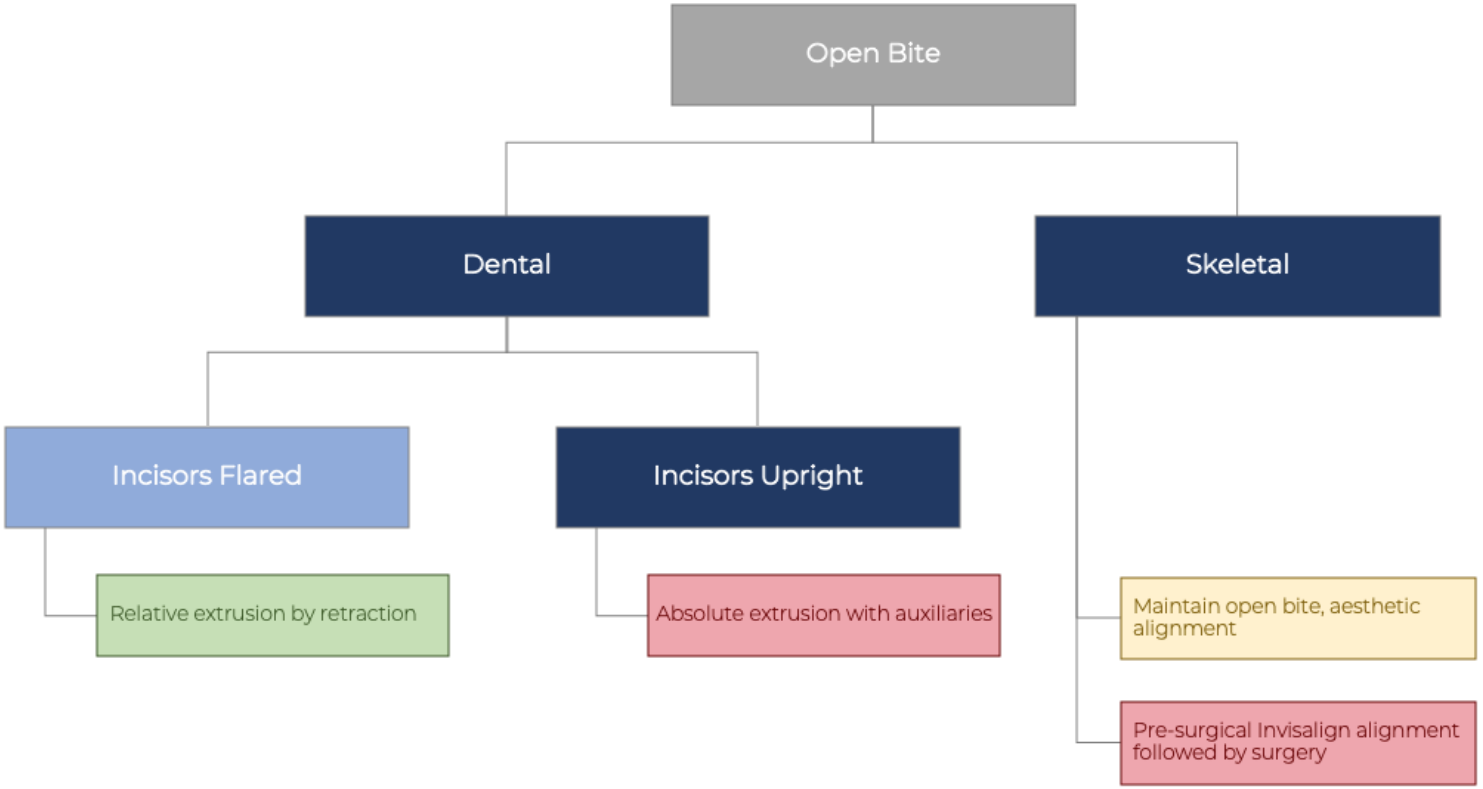
Posterior extrusion with auxiliaries may include vertical elastics attached to buttons and reverse curve arch wires secured to brackets. Posterior extrusion with aligners alone should be avoided, as this is a less predictable movement.

6. Open Bite

Open bite can be a dental or skeletal malocclusion. The clinician needs to pay attention to the patient's soft tissue profile, maxillary archform, and mandibular angle (normally viewed in a lateral cephalometric radiograph). Certain traits of skeletal open bite can be present when looking at a patient's photographs: a long, narrow face type (dolichofacial) with lower face height significantly increased and open mouth at repose.

The most predictable way to correct open bite with Proligner is by tipping back the incisors, thereby creating a relative extrusion effect to deepen the bite. In some cases, open bite can be caused by poor buccal-lingual coordination of the posterior segment and improving the coordination can reduce the vertical dimension of the patient. Long-term retention is especially important with open bite patients.

Skeletal open bites should be treated with skeletal solutions. This may require orthognathic surgery to address the skeletal component, with Proligner being used as the treatment of choice to address the dental component.



6. Open Bite

Dental

Incisor Flared

Relative extrusion by retraction
Novice (0-15 cases)

Anterior teeth can be “extruded” while being retracted (extruded relatively) to reduce open bite. If crowding is present, creating space using IPR and then retracting the teeth is another way to deepen the over bite.

Incisor Upright

Absolute extrusion with auxiliaries
Advanced (>50 cases)

Bonding buttons to teeth and extruding them with vertical elastics is a typical way to achieve absolute extrusion either prior to or during Proligner treatment. Be sure to allow adequate time for bone to develop around the teeth to avoid relapse.

Skeletal

Maintain open bite, aesthetic alignment
Experienced (16-50 cases)

A treatment goal that aligns the teeth but maintains the open bite can be considered if skeletal open bite correction is not an option.

Pre-surgical Proligner alignment followed by surgery Advanced (>50 cases)

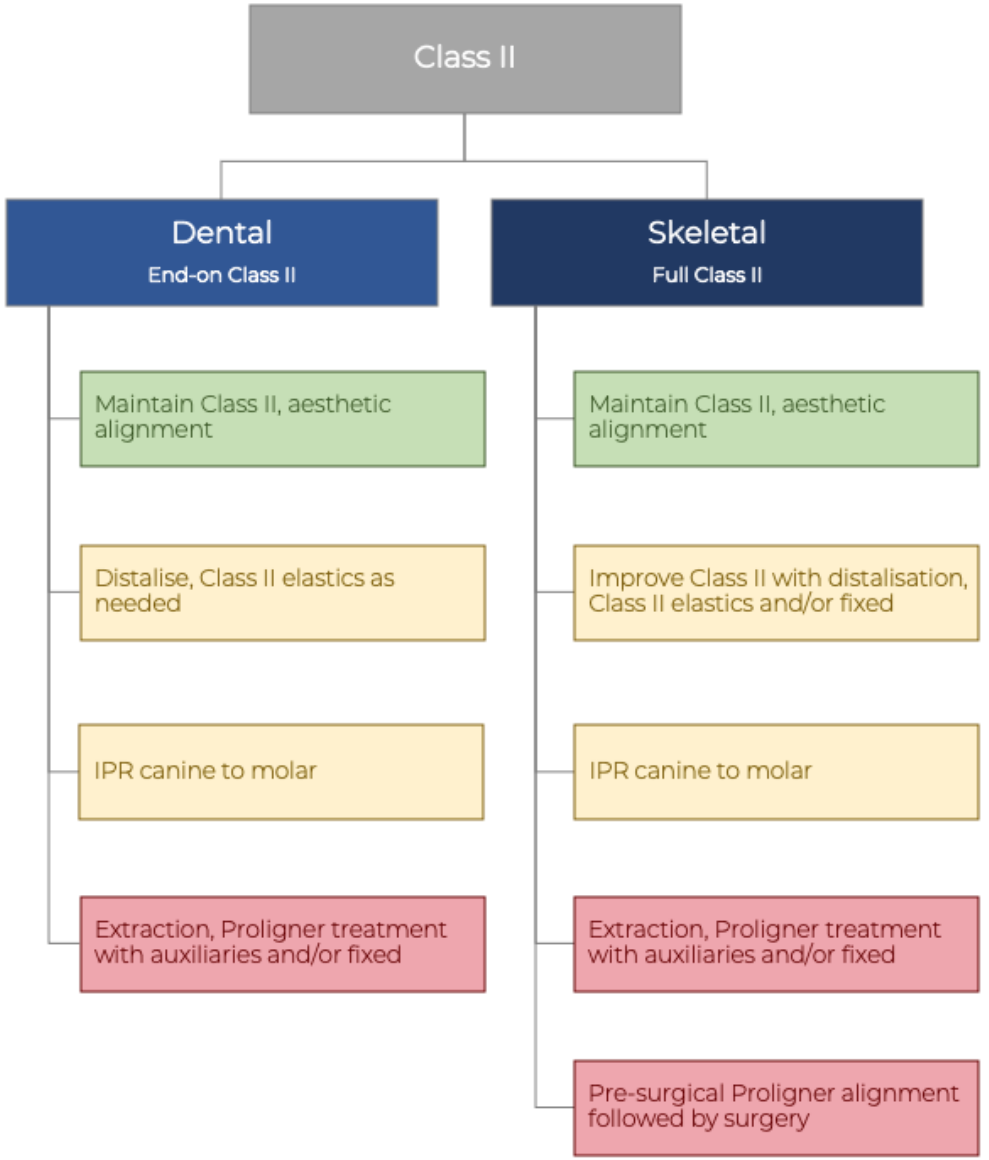
When treating a patient with skeletal open bite, the surgical plan has to be coordinated with an oral surgeon and a final discussion held with the patient to agree on the treatment goal. Once the goal is determined then the patient may start to wear pre-surgical aligners to align the teeth. After surgery, the patient can benefit from a brief phase of treatment to complete any remaining alignment needed.

7. Class II

The fit of the upper and lower first molars forms the cornerstone of the occlusion. An Angle Class II molar relationship exists when the mesio-buccal cusp of the upper first molar occludes mesial to the buccal groove of the lower first molar. Consequently, all the upper teeth tend to bite forward of their counterparts in the lower arch. The premolars and canines do not interdigitate correctly, and the upper incisors are too far ahead of the lowers. The anterior teeth have typically erupted into a deep overbite.

In most Class II malocclusions the upper incisors are proclined (leaning forward), resulting in a large overjet. These cases are classified as Class II division 1. In some Class II malocclusions the upper incisors are retroclined (leaning back), resulting in a near-normal overjet of just the central incisors. The lateral incisors, however, remain proclined. These cases are classified as Class II, division 2. Furthermore, there may be a difference in the molar relationship on the right side versus the left side. A case that is Class II on the right and Class I on the left is classified as a Class II subdivision right. Class II subdivision left occurs, when the unilateral Class II is on the left side. The upper and lower dental midlines typically reflect the underlying asymmetry in the molar relationship.

A Class II molar relationship can exist in varying degrees of severity. The discrepancy in the bite can range anywhere from 1–2 mm (mild Class II) to 3 mm (end-on Class II) to 6 mm (full cusp Class II), or greater. The effect



on the occlusion of the anterior teeth varies accordingly, with greater overjet in the more severe Class II cases.

A Class II molar relation can have a dental and/or a skeletal basis. A dental Class II can exist, for example, when the upper first molars have drifted mesially after premature loss of the upper deciduous second molars. If the anterior teeth exhibit a large overjet, or if the upper incisors are leaning significantly backwards, the problem is typically skeletal in nature. A lateral cephalometric headfilm can be used to confirm the contribution of the skeletal component to the sagittal diagnosis. In the absence of a lateral head- film, the profile photograph gives a rough indication of the relative size of the upper and lower jaw. Patients that are skeletally Class II tend to have a convex profile, with a retrusive lower jaw.

When treating Class II malocclusions, the age and growth potential of the patient is a primary diagnostic variable. In the growing patient, the Class II may be correctable by growth modification treatment. A wide variety of orthodontic treatment choices exist for correcting a Class II, such as a headgear, Herbst appliance, twin block appliance, and Bionator. The goal of this initial treatment phase is to turn the Class II malocclusion into a Class I malocclusion. Correction of the alignment problems is much simpler once the sagittal problem has been resolved.

The treatment of the non-growing adult Class II case will primarily depend on whether correction of the underlying skeletal discrepancy is desired, or if a dental camouflage solution is adequate to satisfy the patient's concern(s). If correction of the skeletal discrepancy is desired, an orthognathic surgical solution is most common. If dental camouflage is acceptable, the orthodontic solution may entail bicuspid or other extractions, enamel reproximation, or possibly even aesthetic dental alignment without additional change to the posterior bite relationship.

.

7. Class II

Dental (end-on Class II)

Maintain Class II, aesthetic alignment
Novice (0-15 cases)

Maintain the molar and canine Class II relationships and only align the anterior teeth to improve the aesthetics, leaving an anterior overjet. Long term retention is especially important when leaving anterior overjet to help avoid relapse.

Digitise, Class II elastics as needed
Experienced (16-50 cases)

Distalisation of the upper posterior teeth, using Class II elastics as needed to support the anchorage and retracting the anterior teeth to achieve a Class I canine relationship and a good anterior overjet. Distalisation cases take longer than the average Proligner treatment due to the reduced number of teeth moving at any given stage; as a result, patient cooperation and motivation is especially critical for treatment success. When distalising upper molars, the first point of contact in the posterior occlusion may become more pronounced, so equilibration may be needed at the end of the treatment to prevent the patient from pivoting around this point.

IPR canine to molar
Experienced (16-50 cases)

Leaving the molars in Class II and doing posterior reproximation (distal of canine to molar) as needed to improve the canine relationship. Anterior reproximation may also be needed to improve the final overjet. Completing posterior reproximation prior to taking the PVS impression is recommended for maximum accuracy and optimal aligner fit.

Extraction, Proligner treatment with auxiliaries and/or fixed
Advanced (>50 cases)

Extraction of two upper bicuspids or two upper and two lower bicuspids, using Proligner with auxiliaries as needed and possibly combining it with fixed appliances to finish the treatment. This setup should only be attempted by expert clinicians with experience in both Proligner and fixed appliances. The goal of this treatment is to achieve Class I canine relationship and full Class II molar relationship, with optimal overbite and overjet.

Skeletal (Full Class II)

Maintain Class II, aesthetic alignment
Novice (0-15 cases)

If orthognathic surgical correction of the skeletal Class II problem is declined by the patient, aesthetic alignment may be an option. Maintain the molar and canine Class II relationships and only align the anterior teeth to improve the aesthetics, leaving an anterior overjet. However, long term retention is especially important when leaving anterior overjet to help avoid relapse.

Improve Class II with digitisation, Class II elastics and/or IPR as needed
Experienced (16-50 cases)

Distalisation of the upper posterior teeth to improve the Class II molar relationship, using Class II elastics to support the anchorage and/or doing posterior reproximation (distal of canine to molar) as needed to improve the canine relationship and anterior reproximation as needed to improve the final overjet. Distalisation cases take longer than the average Proligner treatment due to the reduced number of teeth moving at any given stage; as a result, patient cooperation and motivation is especially critical for treatment success.

IPR canine to molar
Experienced (16-50 cases)

Leaving the molars in Class II and performing posterior reproximation (distal of canine to molar) as needed to improve the canine relationship and anterior reproximation as needed to improve the final overjet. Completing posterior reproximation prior to taking the PVS impression is recommended for maximum accuracy and optimal aligner fit. Long term retention is especially important when leaving anterior overjet to help avoid relapse.

Extraction, Proligner treatment with auxiliaries and/or fixed
Advanced (>50 cases)

Extraction of two upper bicuspids or two upper and two lower bicuspids, using Proligner with auxiliaries as needed and possibly combining Proligner treatment with fixed appliances to finish the treatment. Due to the long span of tooth movement required, this type of treatment should only be attempted by expert clinicians with experience in both Proligner and fixed appliances.

Pre-surgical Proligner alignment followed by surgery
Advanced (>50 cases)

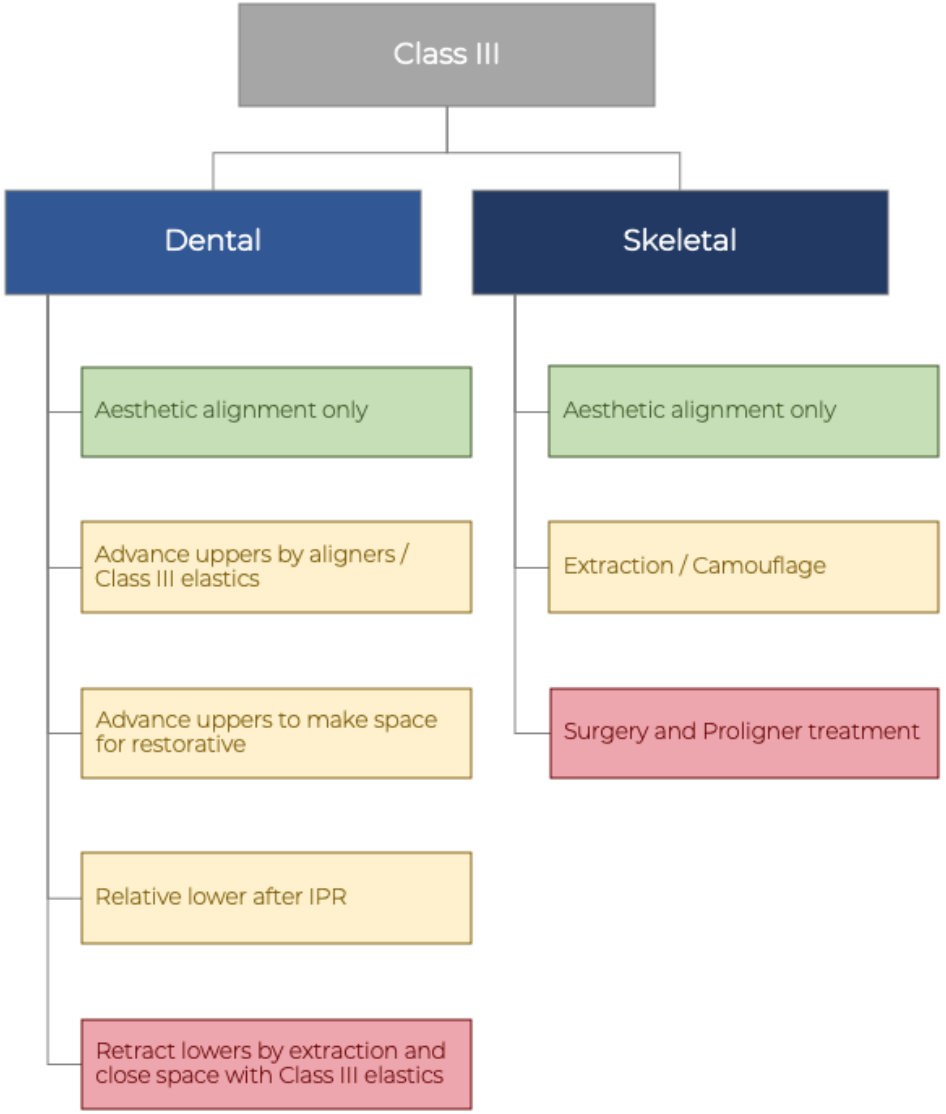
Pre-surgical Proligner treatment to align and coordinate the arches for orthognathic surgical correction of the skeletal Class II problem. Fixed appliances are usually placed immediately prior to surgery for interarch fixation, and a stainless steel archwire bent to fit the brackets in a passive manner. The case may be finished post-surgically using the fixed appliances, or by using Proligner refinement aligners.

8. Class III

Class III malocclusions are divided into dental and skeletal Class III components. They are the result of “mid-face deficiency” or maxillary retrognathia (a retruded relationship of the maxilla with other facial structures due to a size discrepancy or positional abnormality), mandibular prognathia (a forward relationship of the mandible relative to the craniofacial skeleton), or a combination of both.

It is important to note that full Class III’s are primarily skeletal in nature, and may have a dental component. Typically, the skeletal Class III will have a dentition which compensates for the skeletal base discrepancy, and is characterised by proclined upper and retroclined lower incisors. Cases with major skeletal discrepancies will usually need a surgical/orthodontic treatment approach to achieve ideal results. These cases are characterized by decompensating the dentition followed by a correction of the skeletal bases.

Partial Class III’s may be skeletal or dental and can often be treated with dental camouflage to address the dental relationship component. In this instance, any dental compensations present are usually not corrected, and may even be further accentuated to mask the underlying discrepancy. Because of this fundamental difference in approach, in order to successfully treat a patient with a Class III malocclusion it is of major importance to determine the nature of the problem.



Class III patients can show a displacement between centric occlusion and centric relation. This shift can be caused by anterior occlusal interferences and the patient's urge to posture into a more comfortable anterior position. Accurately identifying the direction and amount of displacement is important when determining surgical or non-surgical treatment approaches.

For the purposes of Proligner treatment, centric relation bite registration may not be feasible, since the anterior teeth may touch, leaving the posterior teeth out of occlusion. In this instance, it is necessary to take the bite registration in centric occlusion (with the posterior teeth in contact) so that a treatment plan may be generated. The discrepancy between the centric relation and centric occlusion position will have to be kept in mind by the doctor to ensure that the teeth are moved in the treatment plan the appropriate amount.

Once the anterior interference is corrected, it may be possible to capture a more accurate centric relationship bite relationship at the time of refinement.

8. Class III
Dental

Aesthetic alignment only Novice (0-15 cases)

In some cases, a positive overjet cannot be achieved via dental camouflage, even with extractions. Without orthognathic surgery, the only option may be to align the teeth for aesthetic purposes only. Retention for stability may be especially important in these cases, and patients should be fully aware of other treatment options including orthognathic surgery prior to starting treatment.

Advance uppers by aligners/Class III elastics
Experienced (16-50 cases)

The goal is to create positive overjet by advancing the upper incisors and retracting the lower incisors using aligners and Class III elastics. Ideally, there is crowding in the upper anterior area and adequate periodontal support to allow advancement of the upper incisors. Interproximal space and flared incisors are preferred in the lower anterior, in order to upright and retract the incisors.

Advance uppers to make space for restorative
Experienced (16-50 cases)

In the event that insufficient arch length is present in the upper arch, spaces may be intentionally created in order to achieve positive overjet, and the spaces filled in using conventional restorative dentistry such as bonding or veneers. The technician should be instructed where to position the space(s) for restorative work.

Retract lowers after IPR Experienced (16-50 cases)

If space is needed for retraction of the incisors, and extraction is not indicated, interproximal reduction can also be used to create the space. Performing IPR distal to the canines may be helpful for retracting the canines into a better Class I canine relationship. If the canines are positioned in Class I relationship and inadequate overjet is present, interproximal reduction between the incisors may be indicated.

Retract lowers by extraction and close space with Class III elastics Advanced (>50 cases)

If inadequate space is present in the lower arch for anterior retraction, space may be created through extrac- tion. Remember that with extraction cases, control of the root position is important for success, and Class III elastics and/or sectional fixed appliances may be needed in addition to aligner treatment.

Skeletal

Aesthetic alignment only Novice (0-15 cases)

Patients unwilling to undergo orthognathic surgery or extractions for dental camouflage may elect for aesthetic alignment of the teeth without changing the posterior bite relationship. Aligners can be used for improvement of the patient's dental alignment, while preserving the existing bite relationship. Post-treatment retention is especially important for long-term stability.

Extraction/camouflage Retract lowers after IPR
Experienced (16-50 cases)

Some Class III cases can be treated with dental camouflage using extractions. Proligner can be used for initial alignment and space closure. Depending on the final root position, sectional fixed appliances may also be needed to optimize root position.

Surgery and Proligner treatment
Advanced (>50 cases)

Treatment with Proligner combined with orthognathic surgery typically involves the initial alignment and arch coordination phase with Proligner aligners, followed by the orthognathic surgery. Conventional brackets are usually placed immediately prior to surgery for interarch control, with a stainless steel arch wire bent to passively fit inside the brackets. The patient can be finished post-surgically using the archwire for detailing, or with refinement aligners.