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Invisalign Treatment Planning Guide

Introduction

ABOUT THIS GUIDE

The goal of this guide is to provide you with a decision making tool you can use while selecting and treatment planning your Invisalign cases. By outlining typically used Invisalign approaches and discussing their complexity and predictability, we hope to make the treatment planning options and implications more clear for you to evaluate.

Align Technology is not a provider of medical, dental or healthcare services and does not and cannot practice medicine, dentistry or give medical advice. This guide is not a comprehensive volume on orthodontic treatment planning nor a detailed how-to manual on treating Invisalign cases. As the treating doctor, you are solely responsible for the treatment of your patients, including but not limited to the outcome of such treatment or decision to move forward with treatment. You are solely responsible for the treatment of your patients. When in doubt, consult another doctor for further guidance.

HOW TO USE THIS GUIDE

The guide is organized by patient diagnosis. Match your patient's diagnosis to the appropriate diagnosis decision tree to see some possible treatment options. Read the accompanying treatment notes and evaluate your options given your Invisalign experience level. *See Figure A, below.*

ABOUT THIS SERIES

This guide is the first in a three-part series of Invisalign patient care references, complementing the ClinCheck® Evaluation Guide (D4458) and the Invisalign Clinical Monitoring Guide (D4219).

Collectively, the guides provide the Invisalign clinician with useful tips and insight on the entire Invisalign process, from start to finish. For additional copies of any of these three guides, please contact your local Invisalign Sales Representative or Align Customer Support at 888-82ALIGN.

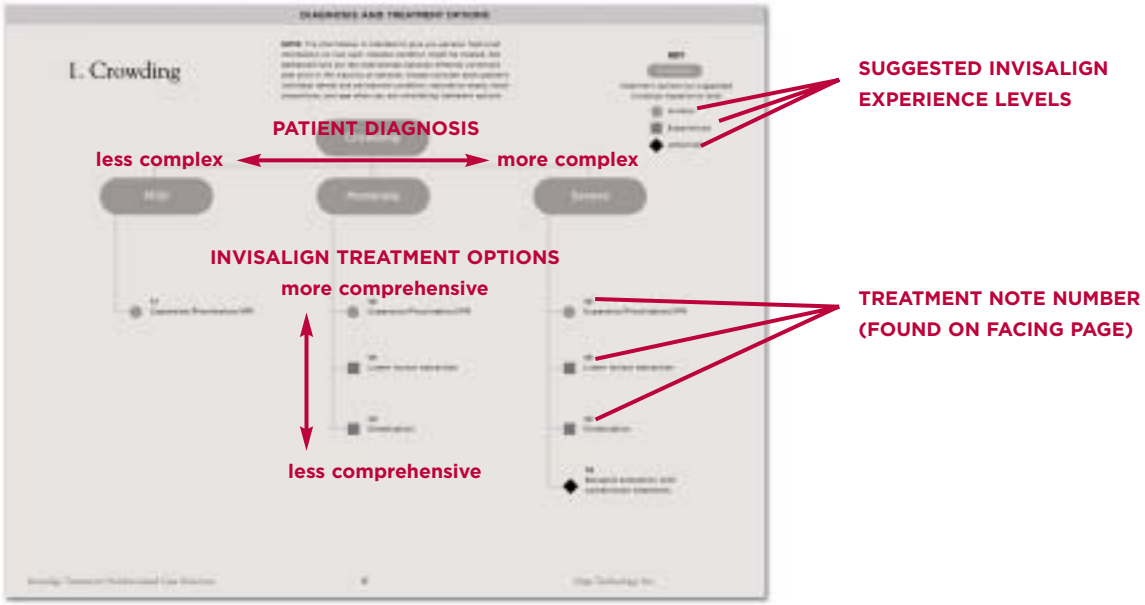


Figure A. Diagnosis and Treatment Options decision tree

Getting Quality Clinical Outcomes with Invisalign

Successful clinical outcomes with Invisalign start with attention to detail during case selection and treatment planning. Here are five guidelines for setting up your cases that pay great dividends later:

1. Submit high quality records. Accurate PVS impressions and clear patient photos and radiographs are critical for the creation of your ClinCheck treatment plan and the manufacturing of the aligners. The number one reason for poor aligner fit is an incomplete or distorted PVS impression.

2. Be detailed when treatment planning. The more clear and specific your directions are on the Invisalign Prescription & Diagnosis form, the better your Align technician can provide the set up that meets your expectations. Remember, the treatment plan is yours—not Align Technology's.

3. Review ClinCheck carefully. ClinCheck is the virtual representation of the treatment plan, and the model used to fabricate the aligners. What you approve in ClinCheck is what you'll get in the aligners.

4. Plan to detail. As certain tooth movements are less predictable with aligners, you may want to integrate auxiliary techniques into your treatment plan at the start. Regardless of the complexity of the case or the movements planned, always be prepared to use auxiliaries to help you get the results you want.

5. Review your past ClinCheck files and treatment outcomes. Regular review of your past treatment plans and their clinical results will give you greater insight when setting up your future Invisalign cases.

Invisalign Applicability

With experience, doctors can use Invisalign to treat a majority of adults and adolescents who want a better smile. Invisalign is effective across a broad range of malocclusions.

WHAT DOCTORS CAN TREAT WITH INVISALIGN

- Arch length discrepancies (Crowding, Spacing)
- Transverse discrepancies (Narrow arches, Crossbite)
- Vertical discrepancies (Deep bite, Open bite)
- Sagittal discrepancies (Class II, Class III)

WHO DOCTORS CAN TREAT WITH INVISALIGN

- Adults
- Teens with fully erupted second molars
- Pre-surgical patients
- Pre-restorative patients

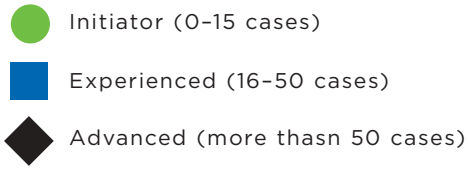
CONTRAINDICATIONS FOR INVISALIGN

- Active compromised periodontal condition
- Mixed dentition
- TMJ dysfunction

DOCTOR EXPERIENCE AND CASE SELECTION

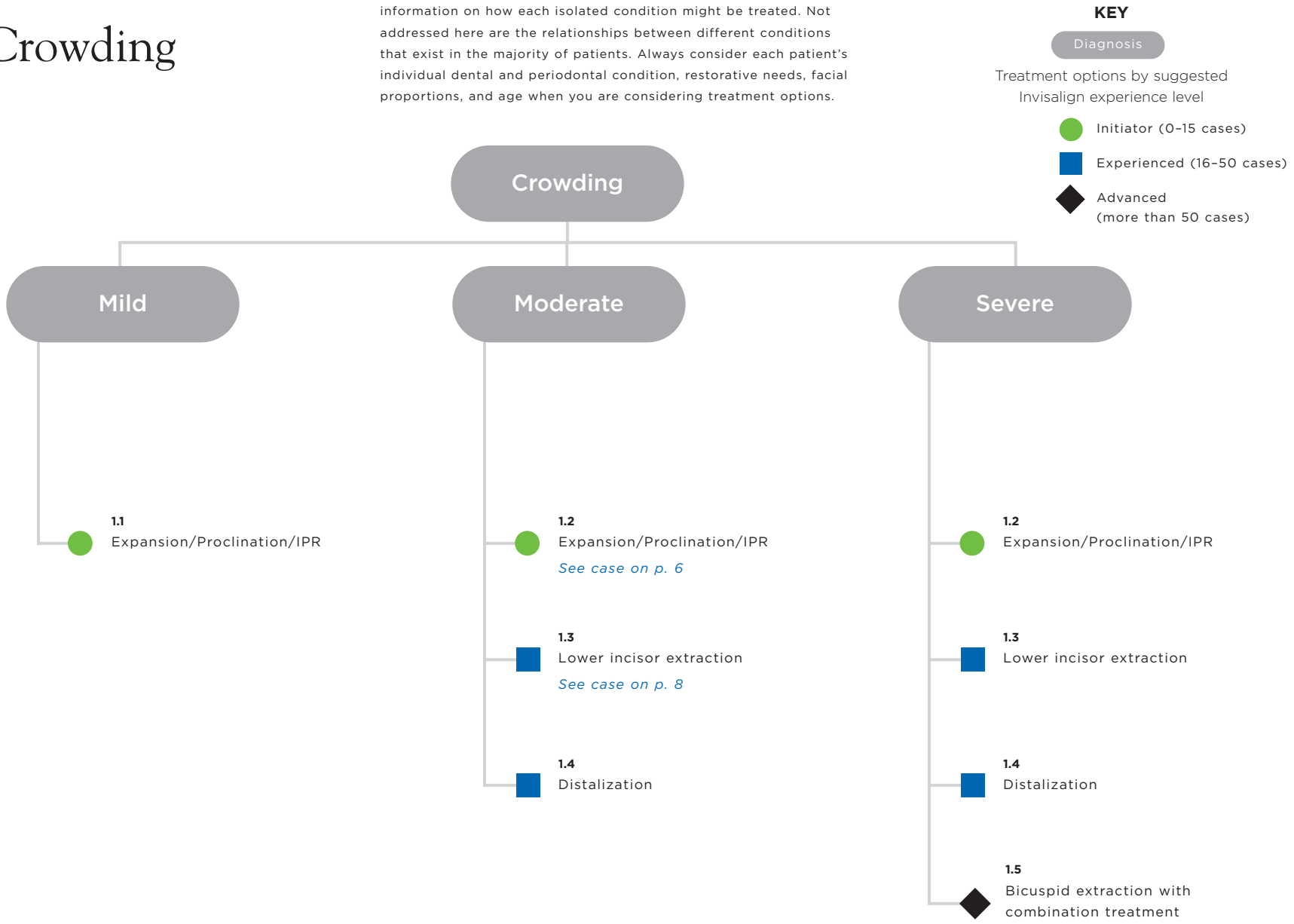
As with any orthodontic technique, there is a learning curve with Invisalign. If you are an Invisalign Initiator (0–15 Invisalign cases), you may want to select relatively simple cases and choose more predictable treatment approaches. As you progress to the Experienced (16–50 Invisalign cases) and Advanced (more than 50 cases) levels, you will want to select more complex cases and utilize more advanced treatment approaches.

Successful treatment outcomes and your personal satisfaction with Invisalign start with informed case selection and thoughtful treatment planning. For more specific information on case selection by suggested Invisalign experience level, please see each Diagnosis and Treatment Option section, and look for the following symbols:



1. Crowding

NOTE: The chart below is intended to give you general, high-level information on how each isolated condition might be treated. Not addressed here are the relationships between different conditions that exist in the majority of patients. Always consider each patient's individual dental and periodontal condition, restorative needs, facial proportions, and age when you are considering treatment options.



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 distalization.

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.

PLANNING NOTES

1.1 Expansion and proclination can be utilized to resolve mild crowding via the Invisalign full product (or proclination and IPR via the Invisalign 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.

1.2 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.

1.3 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.

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

1.5 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 Invisalign, 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 optimize anchorage control.

CLINICAL NOTES

IPR

IPR is a commonly-utilized technique in orthodontics. IPR can be used in the treatment of crowding, especially when there is minimal periodontal support and proclination and expansion are to be kept to a minimum. IPR can be performed prior to PVS impressions, during aligner delivery, or both.

In general, if more than 3-4 mm of IPR is needed, experienced clinicians may consider performing it prior to PVS impressions. Always use a lab set-up to determine the correct amount of removal. If re-contouring teeth prior to the PVS impressions, it is also important to hold the position of the teeth with a retainer while waiting for delivery of the aligners.

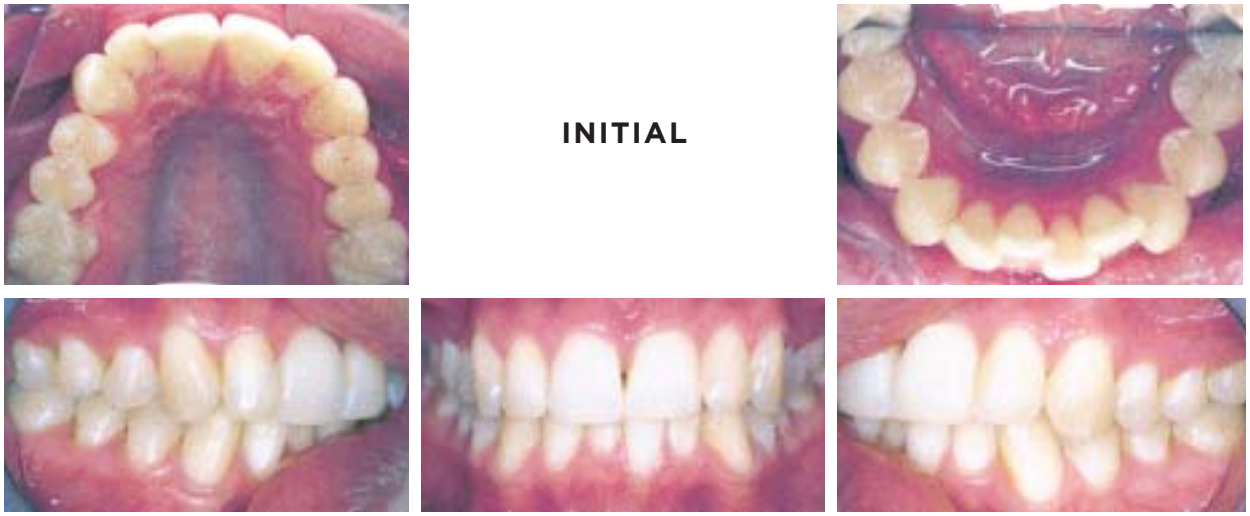
Reproximation with aligner delivery is based upon the reproximation amounts you approve in your ClinCheck treatment plan. The specific timing, location and amount of IPR can be seen by clicking the IPR tab in ClinCheck. IPR can be done using manual strips, slow-speed disks, or high-speed burs. Regardless of which techniques are used, it is important to continually monitor and track the amount of IPR to ensure that contacts are not binding and the teeth are free to move at each stage. **For an online demo and more tips on IPR, go to www.invisaligncec.com/consistent.**

Figure A. Based on computerized measurements, staging, and tooth movements, IPR is often required to allow the teeth to align. IPR is specified by amount, and by stages when it is required.

Figure B. Slow speed disc being used to to create interproximal space

Figure C. Manual diamond strips being used to polish teeth and round out any rectangular line angles.

Expansion/IPR



PATIENT'S CHIEF CONCERN: Crowded lower teeth

DIAGNOSTIC SUMMARY: Class I crowded malocclusion

TREATMENT SUMMARY: Resolve upper and lower crowding with expansion and IPR

AREAS OF CONCERN: Mild anterior enamel wear

TREATMENT NOTES: Between .2 mm and .5 mm of IPR was performed on the upper and lower anteriors. Attachments placed on premolars assisted with intrusion for leveling Curve of Spee. At the end of treatment, detail pliers were used to close very slight spacing of lower anteriors and to finalize postion of #10 which lagged slightly behind aligners.

ALIGNERS: Upper: 14; Lower: 14.

TREATMENT DURATION: 7 months.

	DIAGNOSIS	TREATMENT OBJECTIVES	RESULTS
Sagittal	Class I skeletal and dental relationship.	Maintain.	Maintained.
Vertical	Moderate deep bite.	Level lower Curve of Spee.	Curve of Spee was leveled, overbite corrected.
Transverse	Normal buccal overjet, arch form mild omega shape.	Round-out arch form.	Upper and lower arches were rounded-out.
Arch Length	Mild upper and moderate lower crowding.	Resolve crowding using expansion and interproximal reduction.	The upper and lower crowding was resolved. Black triangle between #8 and #9 was reduced.

To see more commentary and the ClinCheck treatment plan for this case, go the the Invisalign Clinical Education Center at http://www.invisaligncec.com/casestudies/crowding4/diagnosis.php

1. Crowding:
Proclination/Extraction

PATIENT'S CHIEF CONCERN: Upper and lower crowding

DIAGNOSTIC SUMMARY: Class I crowded malocclusion

TREATMENT SUMMARY: Lower incisor extraction, proclination, rotation of lower bicuspids

AREAS OF CONCERN: Tooth size discrepancy. Mucogingival defect due to minimal attached tissue facial to teeth #25 and #27.

TREATMENT NOTES: Attachments were bonded to the buccal surface of the mandibular premolars to assist in rotation. Attachments were also bonded to teeth adjacent to the extraction site to assist in uprighting and the planned translational movements of the incisors while closing spaces. Tooth #27 was brought into the arch, preventing any further damage to the facial tissues.

ALIGNERS: Upper: 11; Lower: 24

TREATMENT DURATION: 12 months

Proclination/Extraction

	DIAGNOSIS	TREATMENT OBJECTIVES	RESULTS
Sagittal	Class I skeletal and dental relationship with proclined incisors.	Maintain.	Maintained.
Vertical	Moderate Curve of Spee.	Maintain.	The Curve of Spee was slightly leveled by intrusion of the lower incisors.
Transverse	Lower midline 3 mm to the right.	Correct the lower midline position to align the upper midline with the middle of the lower left central incisor.	The middle of the lower left central incisor was brought into alignment with the upper.
Arch Length	Mild upper and moderate lower crowding.	Resolve the lower crowding by extraction of the lower right central incisor. Correct the upper crowding by proclination.	The crowding and tooth size discrepancy were resolved.

2. Spacing

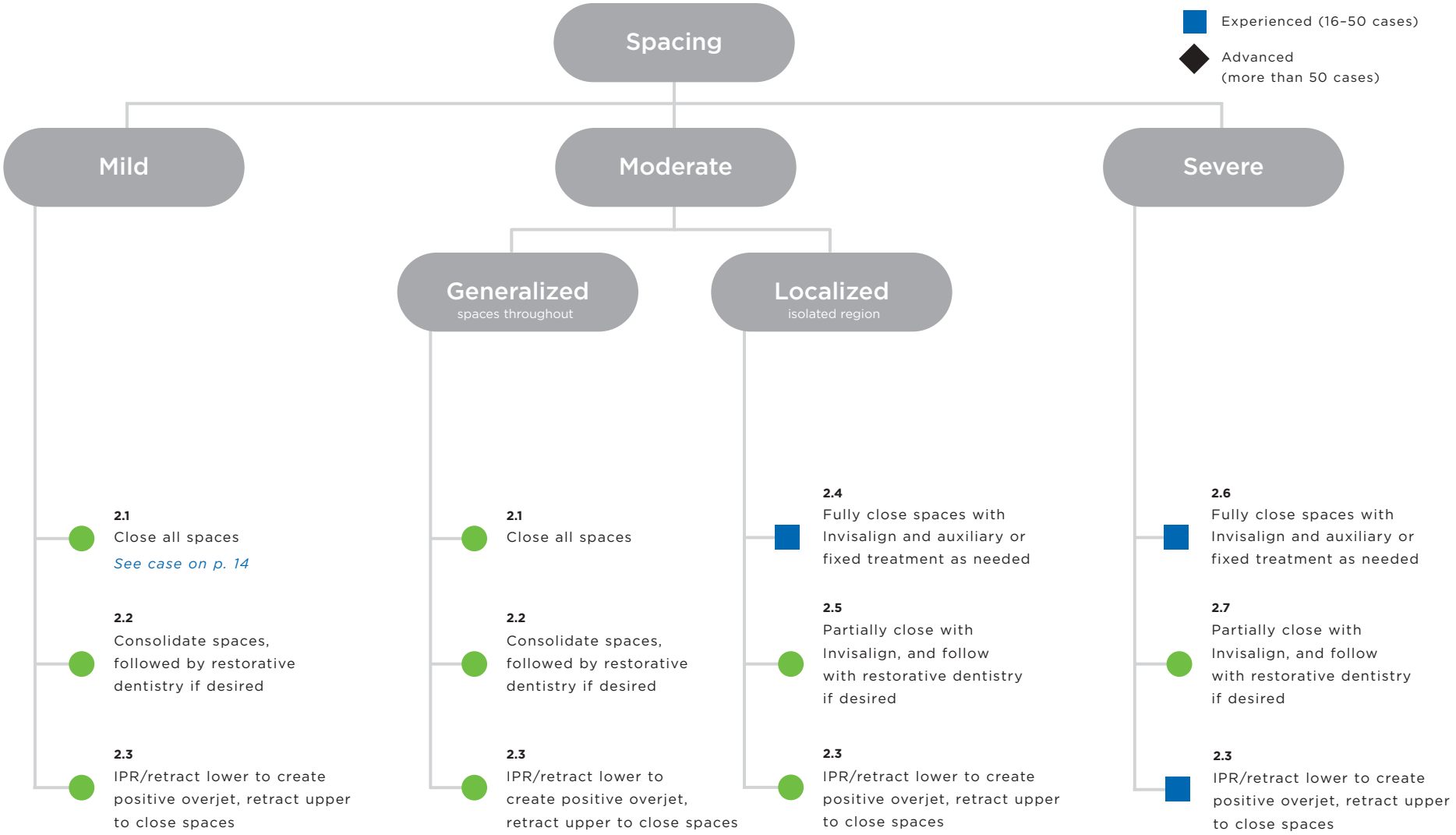
NOTE: The chart below is intended to give you general, high-level information on how each isolated condition might be treated. Not addressed here are the relationships between different conditions that exist in the majority of patients. Always consider each patient's individual dental and periodontal condition, restorative needs, facial proportions, and age when you are considering treatment options.

KEY

Diagnosis

Treatment options by suggested Invisalign experience level

- Initiator (0–15 cases)
- Experienced (16–50 cases)
- Advanced (more than 50 cases)



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 Invisalign 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 circumferance 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 esthetics 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 mesialization). To close all of the space while maintaining the crowns and roots in a good esthetic and functional position almost always requires a combination of Invisalign and restorative dentistry, because of the mesial tipping that can occur.

In general, Invisalign 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. First, create and maintain good arch form using the alveolar denture base as the template. Over-retraction and/or constriction can result in asymmetry. Second, establish or maintain good inclination (torque) to create the best esthetics, function and stability. Problems usually arise when the teeth are inclined too far lingually with over-retraction.Third, significant tooth size discrepancy most of the time requires restorative dentistry as well as Invisalign. Fourth, 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 movemnt 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.

PLANNING NOTES

2.1 Closing all of the space with Invisalign 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 performed in the appropriate arch. Otherwise, slight anterior equilibration may be needed to settle the posterior bite.

2.2 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-Invisalign 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.

2.3 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.

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

2.5 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 Invisalign usually the tooth movements don't need to be as precise because most limitations can be overcome with the restorative work.

2.6 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. Auxilliary appliances may be required.

2.7 Restorative treatment is very complementary to Invisalign treatment and is almost essential when spaces are severe. Using only Invisalign 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.

CLINICAL NOTES

Tooth Size Discrepancy

A tooth size discrepancy is an incongruity between the sums of the mesiodistal tooth sizes of sets of corresponding maxillary and mandibular teeth. The discrepancy can be maxillary or mandibular excess or deficiency.

Tooth size discrepancy may cause difficulties in achieving an ideal overjet and overbite or at arriving at a good intercuspation in the end result of orthodontic treatment. Different ways to address tooth size discrepancies include:

1. Extraction of tooth/teeth in the arch with excess tooth mass

2. Interproximal reduction in the arch with excess tooth mass

3.. Compromising the angulation of some teeth to occupy more or less space in the arch.

4. Increase the mesiodistal tooth size in the arch with deficiency in tooth mass with restorative dentistry (buildups).

Tooth size discrepancies can be determined by a Bolton Analysis, which measures if the maxillary and mandibular teeth are ideal widths to fit together or coordinate. Anterior or overall tooth-size discrepancy can be assessed using this tool. An anterior tooth-size discrepancy of more than 1.0 mm is considered significant.

For a full discussion on this method, see:
Bolton, W.A. *The clinical application of a tooth-size analysis.* Am. J. Orthod. 48:504-529, 1962.

CLINICAL NOTES

Staging

Staging is a key part in reaching your goals with Invisalign. It is the process of sequencing desired tooth movements from the initial position to the goal. The initial malocclusion will determine the type of staging that Align provides in the initial ClinCheck treatment plan. For example, distalization for Anterior-Posterior correction will have a different staging pattern than intrusion, etc. Align has particular staging patterns that are followed for a given situation, but these can be altered and customized by you to fit the patient's individual needs and your preferences.

It is important to check that you are comfortable with the timing, path, velocity, and sequence of tooth movements. Does the sequence of movements make sense biomechanically? If there is IPR, is there adequate access space around the tooth? Is the number of prescribed stages so high that you want to reevaluate your treatment objectives?

Remember: the treatment plan is yours, not Align Technology's. Be specific with your desired set-up, and don't be afraid to challenge your ClinCheck treatment plan.

In crowded situations, look for movements on teeth that are more buccally positioned first then movements on teeth that are lingually positioned. Consider switching a treatment from Anterior Only to Full Arch if moving the posterior teeth (expanding) or doing posterior IPR to create room for the anterior teeth will significantly improve the clinical outcome of the treatment.

Distalization and mesialization are movements that will require a greater number of aligners due to the staging patterns. These staging patterns are used to improve anchorage by minimizing the number of teeth moving at once. Be aware that anchorage considerations may require the use of additional auxiliary treatment that will not be shown in the ClinCheck treatment plan.

Check the Reproximation Form and stages where interproximal reduction is prescribed. You should feel comfortable in accessing the interproximal surfaces at the indicated stages. The ClinCheck treatment plan can be modified to change the staging to allow easier access to the interproximal contacts.

Look for explanatory comments from Align on your ClinCheck treatment plan regarding staging. Sometimes one arch must be delayed to avoid heavy interferences during the treatment with the opposing arch. You can request that both arches finish concurrently to simplify the Case Refinement process provided there are no inter-arch interferences that preclude this from being feasible.

Less predictable movements should be staged towards the end of treatment when possible (i.e. extrusions, rotations, large molar uprighting) in order not to compromise the success of more predictable movements.

HOW TO REQUEST SPECIFIC STAGING:

When requesting staging changes ***be specific*** with:

1. which teeth
2. which direction
3. how much in in degrees and/or mm.

Example: "Move tooth #9 distally first, then move #8. Slow the rotation of the #8 by 2 stages"

CLINICAL NOTES

Auxiliary Treatment

Auxiliary treatment refers to the use of additional orthodontic techniques in combination with aligners. Having to use auxiliary techniques should not be considered a failure of Invisalign or the doctor. Rather, they should be recognized as useful tools that help you achieve your desired treatment goals.

Plan ahead to use auxiliary treatment when your treatment plan includes less predictable movements for Invisalign: rotations, absolute extrusion, and complete bodily translation. Consider the difficulty level, expected success, and timing of these techniques – many can be incorporated into your Invisalign treatment plan before, during, and after aligner wear.

The table below summarizes some common auxiliary treatment techniques and where they are used. For a complete collection of auxiliary tips submitted by practicing Invisalign doctors, go to the Invisalign Clinical Education Center Tips & Techniques page: **www.invisaligncec.com/consistent.**

Auxiliary Treatment, continued.

Tooth Movement/Situation	Technique	Difficulty level	Expected success	Timing	Illustrations
Rotated premolars or lower canines	Rotation with buttons and elastics	Moderate	High, if the tooth is maintained to prevent relapse	Usually done before aligner treatment. It can also be effectively done before case refinement.	Figure A
Absolute extrusion of teeth; cases where the teeth do not settle into a maximum intercuspal position	Extrusion with buttons and elastics	Moderate	High for cases where the tooth does not fit all the way into the aligner; marginal for cases where the teeth fit fully into the aligner	Usually during aligner treatment, but also may be done before case refinement (be sure to take new PVS impressions)	Figures B and C
Complete bodily translation; extraction space closure	Sectional fixed appliances	Difficult	Good	Usually done between primary treatment and case refinement	Figure D
Proclination or retroclination of incisors; rotations	Detailing Pliers	Easy	High for proclination or retroclination; good for minor rotations	Usually done near end of aligner treatment, with or in lieu of case refinement	Figure E

Figure A. Bond buttons to the tooth to be rotated, as well as the tooth on either side of it. Use elastics to rotate the tooth. Then, hold the tooth in place with a retainer until the aligners are delivered.

Figure B. For cases where a tooth is programmed to extrude but doesn't, there will be a space between the incisal edge of the tooth and the aligner itself. The aligner can be trimmed to accommodate buttons bonded to the tooth, and an elastic or C-chain can be used to erupt the tooth into the aligner. The remaining aligners can be used to finish the case.

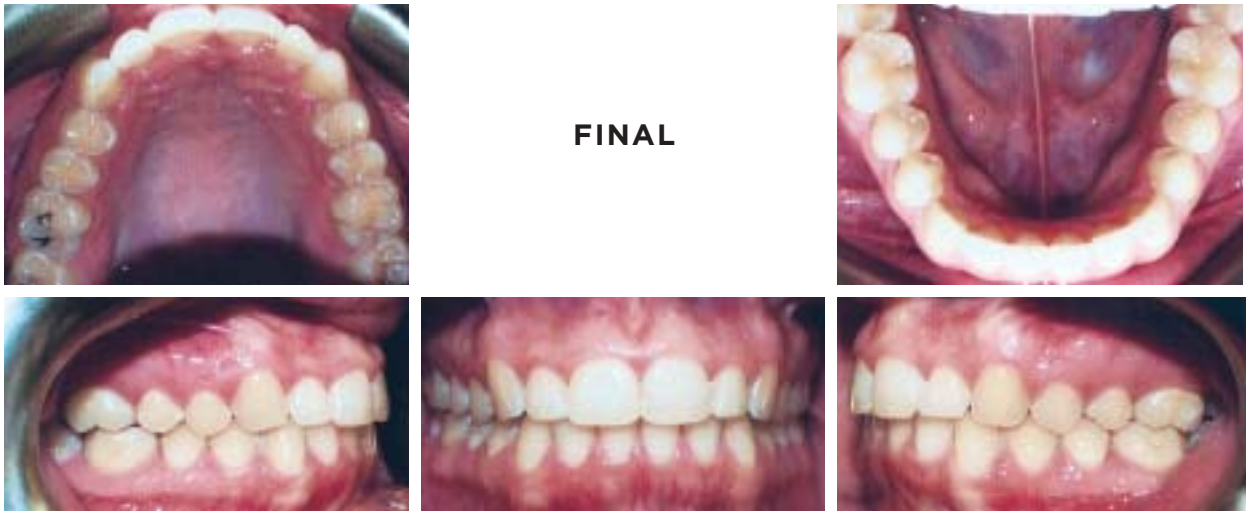
Figure C. For cases where the teeth fit fully into the aligner, but do not come into a settled occlusion, buttons can be bonded to the tooth to be extruded and the two opposing teeth in the other arch and an elastic used to pull the tooth into occlusion. This technique may be used with or without the aligners, and is usually done at the end of the treatment, or before case refinement.

Figure D. In cases where complete bodily translation is required, such as an extraction space closure, sectional fixed appliances can be used as needed to upright the roots after primary Invisalign treatment has be used to close the spaces.

Figure E. In case where one or more teeth "lag" behind the others, detailing pliers can be used to create dimples in the aligners to push the tooth the last little bit to line it up within the arch.

To see more commentary and the ClinCheck treatment plan for this case, go the the Invisalign Clinical Education Center at http://www.invisaligncec.com/casestudies/spacing4/diagnosis.php

Retraction



PATIENT'S CHIEF CONCERN: Upper spacing and lower crowding.

DIAGNOSTIC SUMMARY: Class I malocclusion

TREATMENT SUMMARY: Retraction and pre-PVS IPR and reshaping of the upper central incisors. Proclination of the lower incisors. Treatment performed with the Invisalign Anterior product.

AREAS OF CONCERN: Significant enamel wear of the upper and lower incisors. Wide upper central incisors.

TREATMENT NOTES: IPR was performed to the mesial of the central incisors to reduce their width before the PVS impressions.

ALIGNERS: Upper: 16; Lower: 14

TREATMENT DURATION: 7 months

Retraction

	DIAGNOSIS	TREATMENT OBJECTIVES	RESULTS
Sagittal	Class I skeletal and dental relationships.	Maintain.	Maintained.
Vertical	Moderate anterior deepbite.	The deep bite was to be maintained. There was no plan to restore the anterior teeth.	Maintained.
Transverse	Within normal limits.	Maintain.	Maintained.
Arch Length	Mild upper spacing and moderate lower anterior crowding.	Resolve the upper spacing by retracting the anteriors. Resolve the lower crowding by proclination of the lower incisors.	The upper spacing and lower crowding were resolved.

3. Narrow Arches

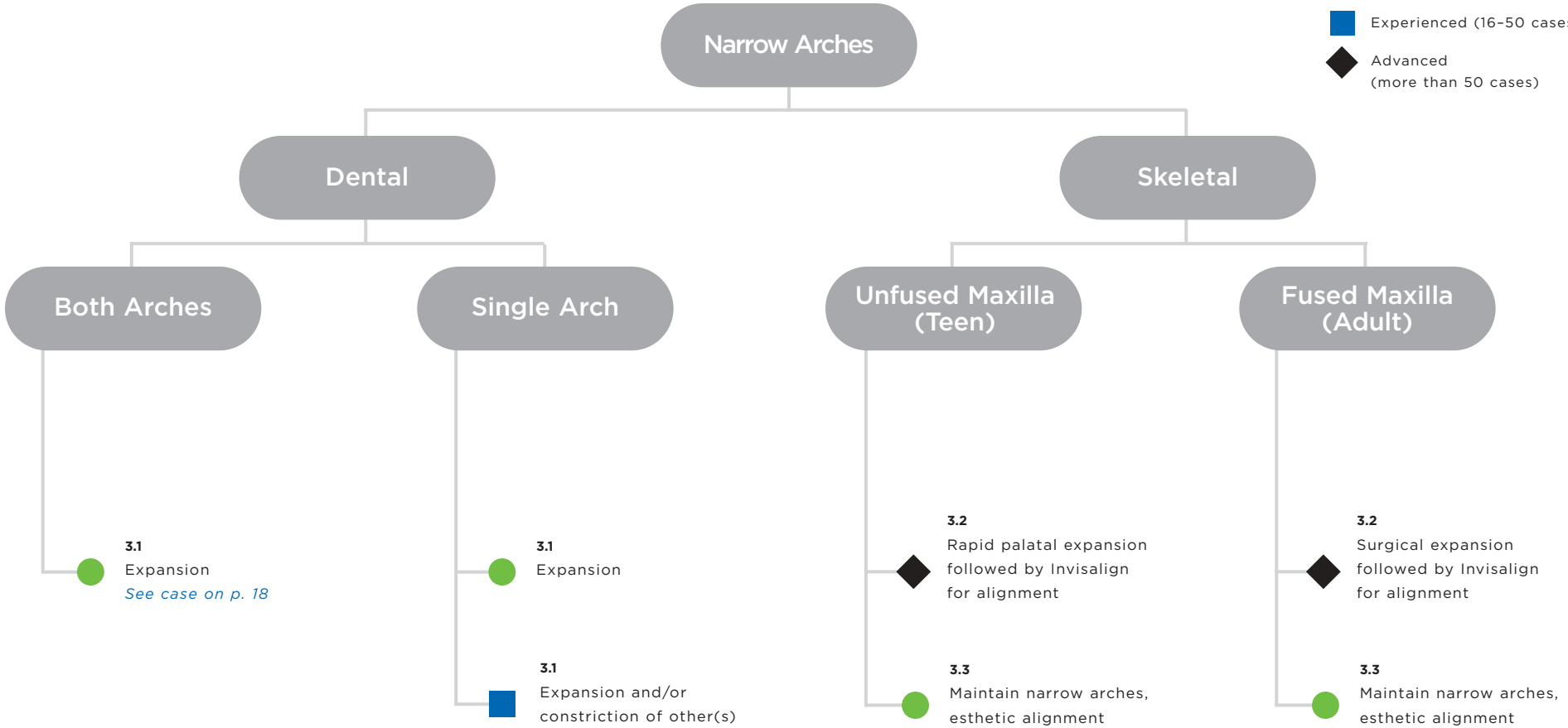
NOTE: The chart below is intended to give you general, high-level information on how each isolated condition might be treated. Not addressed here are the relationships between different conditions that exist in the majority of patients. Always consider each patient's individual dental and periodontal condition, restorative needs, facial proportions, and age when you are considering treatment options.

KEY

Diagnosis

Treatment options by suggested Invisalign experience level

- Initiator (0–15 cases)
- Experienced (16–50 cases)
- Advanced (more than 50 cases)



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 esthetic 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.

PLANNING NOTES

3.1 Dental posterior expansion of 2–3 mm per side is predictable and achievable with Invisalign. 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.

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

3.3 A limited treatment option is to use Invisalign for esthetic alignment of the anterior teeth while maintaining the narrow arches.

CLINICAL NOTES

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.

To see more commentary and the ClinCheck treatment plan for this case, go the the Invisalign Clinical Education Center at http://www.invisaligncec.com/casestudies/narrowarches2/diagnosis.php

3. Narrow Arches: Expansion/IPR

PATIENT'S CHIEF CONCERN: Alignment and position of the canine teeth.

DIAGNOSTIC SUMMARY: Class I crowded malocclusion with narrow arches and a severe deep bite.

TREATMENT SUMMARY: Expansion and intrusion of the upper and lower arches and interproximal reduction of the lower arch.

AREAS OF CONCERN: Significant enamel wear of the upper and lower incisors.

TREATMENT NOTES: IPR was done in the lower arch starting at stage one up to the mesial of the second premolars to help relieve the crowding. Attachments were placed on the upper first and second premolars for the purpose of intruding the upper incisors. The upper right canine received an attachment in case refinement to help complete the rotation.

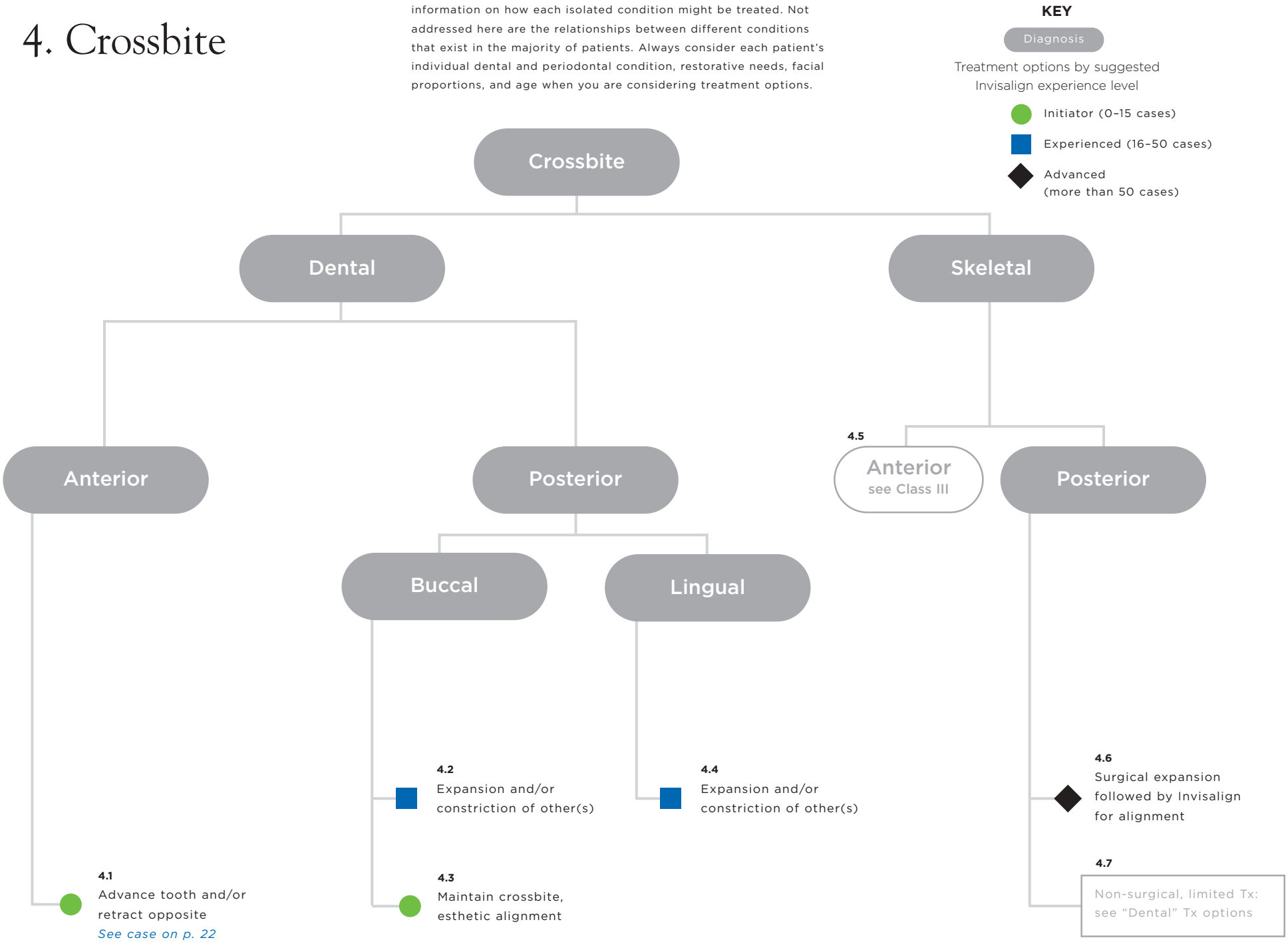
ALIGNERS: Upper: 15 + 4; Lower: 25

TREATMENT DURATION: 19 months

	DIAGNOSIS	TREATMENT OBJECTIVES	RESULTS
Sagittal	Class I.	Maintain.	Maintained.
Vertical	Severe anterior deep bite.	Correct the deep bite by intrusion and proclination of the incisors.	The Curve of Spee was leveled by proclination and intrusion of the lower incisors. The compensating curve in the upper arch was leveled by intrusion of the upper incisors.
Transverse	Lower midline 2 mm to the right. Omega shaped arch forms.	Upright the buccal segments to the correct inclination. Correct the lower midline position.	The lower midline position was improved. The posterior teeth were uprighted to the correct inclination.
Arch Length	Mild upper and severe lower crowding.	Resolve the crowding by inter-proximal reduction (lower arch); proclination of the incisors and expansion/uprighting of the posterior teeth (both arches).	The upper and lower crowding was resolved.

4. Crossbite

NOTE: The chart below is intended to give you general, high-level information on how each isolated condition might be treated. Not addressed here are the relationships between different conditions that exist in the majority of patients. Always consider each patient's individual dental and periodontal condition, restorative needs, facial proportions, and age when you are considering treatment options.



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. *see Figures A and B, right.*

PLANNING NOTES

4.1 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 ClinCheck 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.

4.2 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 distalization 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 crossbite 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.

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

4.4 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 distalization 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.

4.5 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 anteior interference is removed. If anterior, see Class III treatment options starting on p. 40.

4.6 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 Invisalign treatment for general alignment.

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

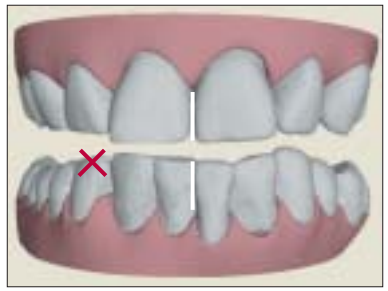


Figure A During closure of the mandible, the midlines are aligned, but as the teeth close together the premature contact (✕)...

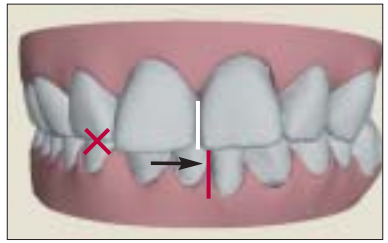
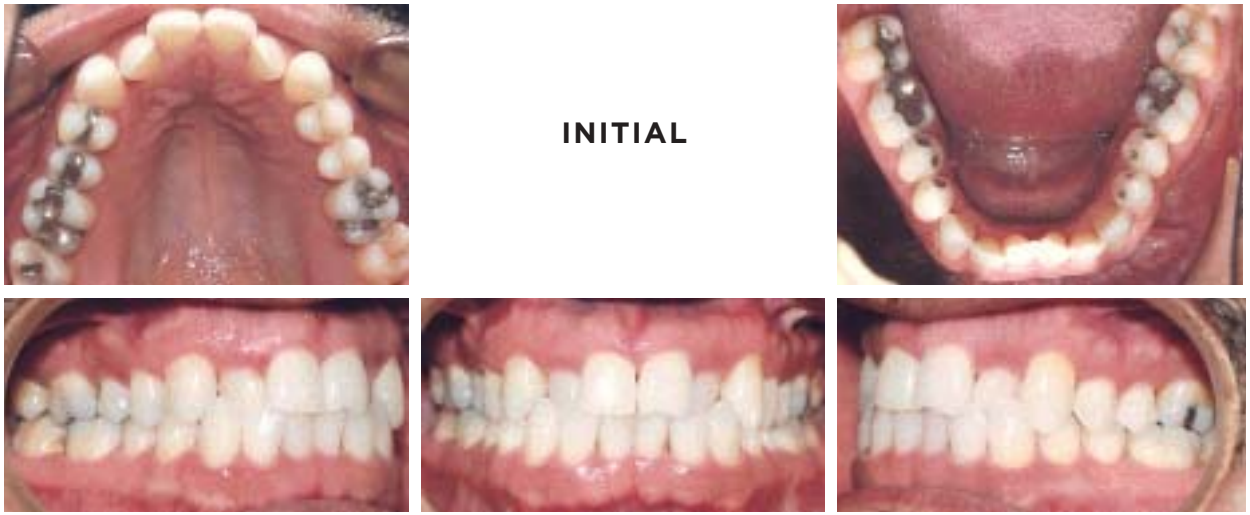


Figure B ...causes the mandible to be deflected to the left.

To see more commentary and the ClinCheck treatment plan for this case, go the the Invisalign Clinical Education Center at http://www.invisaligncec.com/casestudies/crossbite1/diagnosis.php

4. Crossbite: Expansion/Proclination



PATIENT'S CHIEF CONCERN: Upper and lower crowding of the front teeth.

DIAGNOSTIC SUMMARY: Class I crowded malocclusion with anterior crossbite.

TREATMENT SUMMARY: Posterior expansion and anterior proclination were used to relieve the crowding and correct the crossbites.

AREAS OF CONCERN: Significant enamel wear of the upper and lower incisors.

TREATMENT NOTES: In traditional fixed appliance treatment, a bite plane is often needed to open the bite to "jump" the crossbite. With Invisalign treatment, however, the thickness of the aligners functions as a bite plane.The aligner material also works to protect the teeth during the crossbite correction. During the jump, the patient merely had to exercise caution when eating to avoid hitting the anterior teeth together too hard.

ALIGNERS: Upper: 20; Lower: 25

TREATMENT DURATION: 15 months

Expansion/Proclination

	DIAGNOSIS	TREATMENT OBJECTIVES	RESULTS
Sagittal	Class I skeletal relationship with Class I dental malocclusion.	Maintain.	Maintained.
Vertical	Within normal limits.	Maintain.	Maintained.
Transverse	Crossbite of the upper lateral incisors.	Resolve crossbite by expansion.	The crossbite was resolved.
Arch Length	Moderate upper and lower anterior crowding.	Resolve the crowding by proclining the incisors and expanding the posterior teeth.	The upper and lower crowding were resolved.

5. Deep Bite

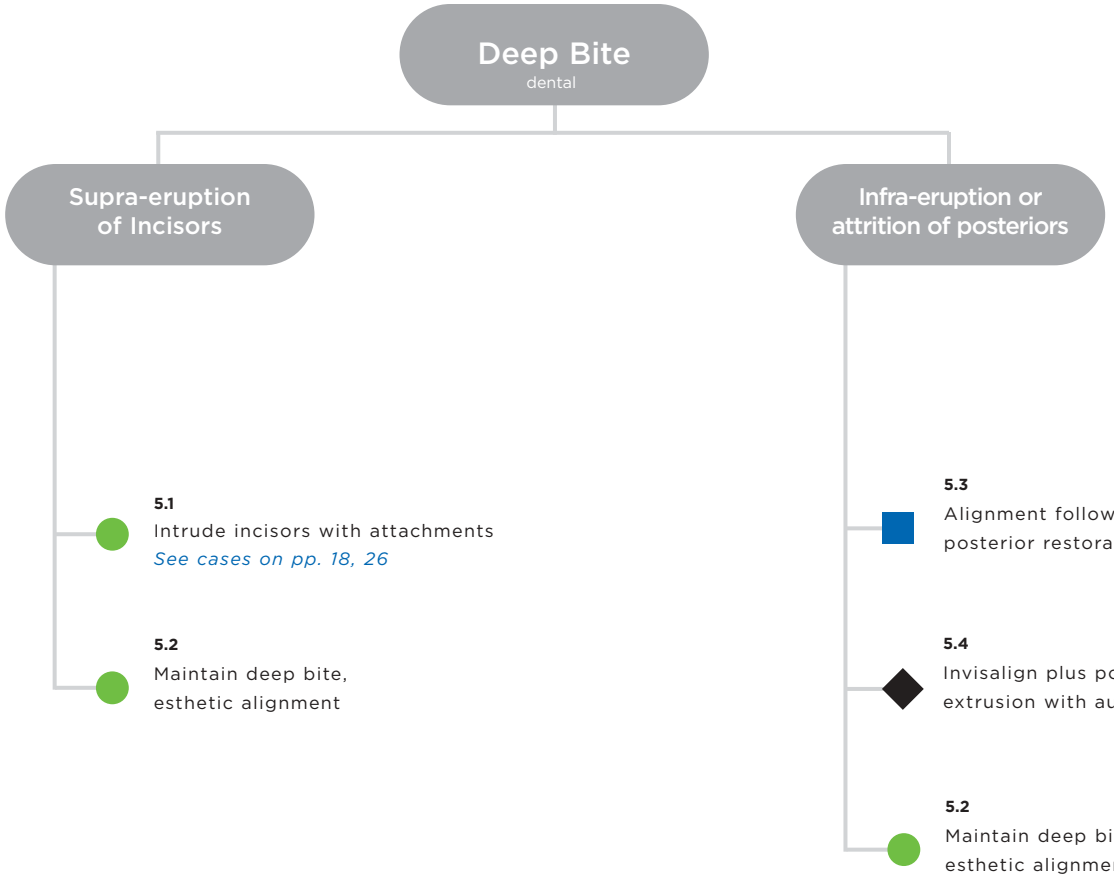
NOTE: The chart below is intended to give you general, high-level information on how each isolated condition might be treated. Not addressed here are the relationships between different conditions that exist in the majority of patients. Always consider each patient's individual dental and periodontal condition, restorative needs, facial proportions, and age when you are considering treatment options.

KEY

Diagnosis

Treatment options by suggested Invisalign experience level

- Initiator (0–15 cases)
- Experienced (16–50 cases)
- Advanced (more than 50 cases)



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 leveled 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 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 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.

PLANNING NOTES

5.1 Invisalign 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.

5.2 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 esthetic alignment will take place, the functional occlusion will be maintained.

5.3 Invisalign 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 Invisalign 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 Invisalign in order to achieve adequate crown length. To avoid dislodging the temporary restorations with the aligners, be sure to use a durable cement.

5.4 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.

CLINICAL NOTES

Attachments

Attachments are created by bonding composite on the target teeth using a special template or the treatment aligners. These composite additions act as handles or purchase points on the teeth to augment the motion or retention of the treatment aligners on those teeth. Attachments should not be confused with bonded buttons or other auxiliary anchors. Attachments appear in the ClinCheck treatment plan as red shapes on the tooth geometry.

Attachments currently in use are ellipsoidal and rectangular in shape, see Figure A.

Ellipsoid attachments are applied when intrusion, extrusion, or rotation is intended for the underlying tooth. For intrusions, the attachments add retention of the appliance on the teeth adjacent to the tooth to be intruded. For extrusions and rotations, the attachments assist in creating the forces needed to effect the motions.

Rectangular attachments are applied to increase appliance retention in the absence of significant vertical or rotational movements. They are customarily placed on each of the teeth adjacent to an extraction space.

At your discretion, you may request attachments for any of these movements by specifying in the special instructions box of the treatment form or in the comments box in ClinCheck.

For a complete discussion of attachments, see the Attachment Protocol on the Tips & Techniques page at **www.invisaligncec.com/consistent.**

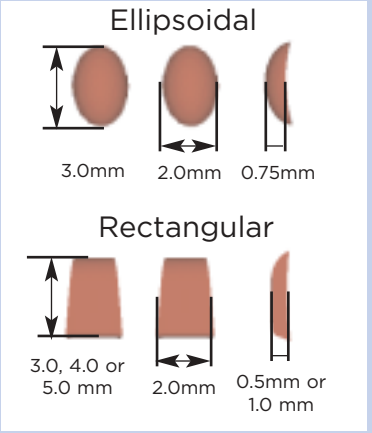
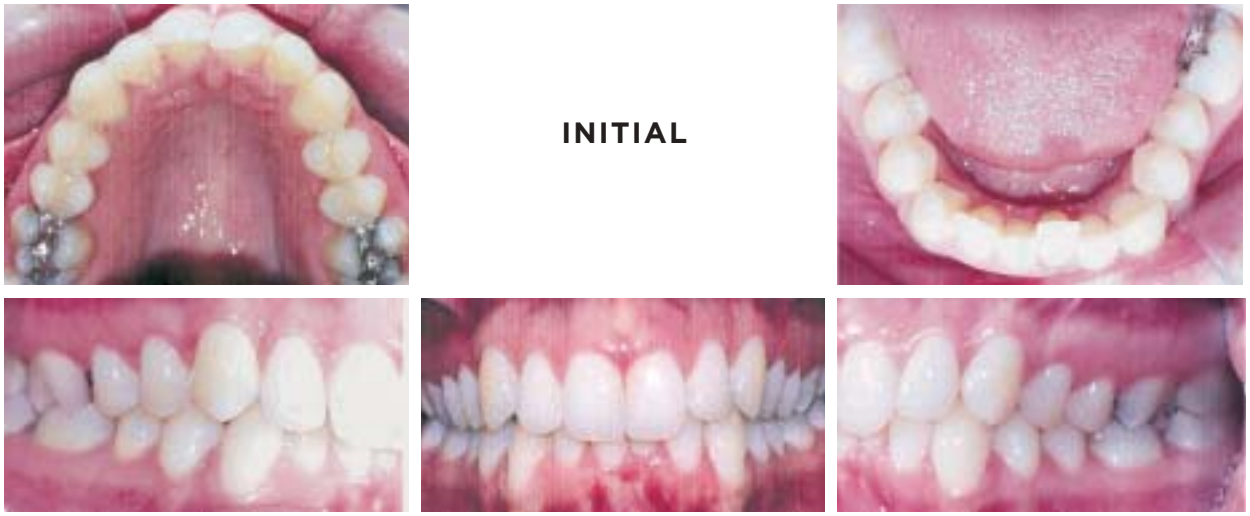


Figure A. Attachments may be requested in a vertical or horizontal orientation.

To see more commentary and the ClinCheck treatment plan for this case, go the the Invisalign Clinical Education Center at http://www.invisaligncec.com/casestudies/deepbite2/diagnosis.php

5. Deep bite: Intrusion



PATIENT'S CHIEF CONCERN: Lower incisor crowding.

DIAGNOSTIC SUMMARY: Dental Class I crowding with deep overbite, thin gingival tissues on lower anteriors.

TREATMENT SUMMARY: The deep bite was corrected by intrusion of the anterior teeth, supported by the use of attachments. Crowding was resolved by a combination of arch expansion, proclination/advancement and lower selective IPR.

AREAS OF CONCERN: Minimal attached gingiva on lower central incisors. This is commonly seen in teeth that are displaced lingually. As the tooth is advanced some increase in clinical crown length is expected. If the uneven gingival margin is in an esthetic zone, some gingival re-contouring may be required after completion of the orthodontic movements.

TREATMENT NOTES: A small amount of IPR was performed on the lower anteriors. Attachments were placed on the upper canines to help anchor the aligners for the intrusion movements. The canines were rotated without attachments, though they are typically recommended.

ALIGNERS: Upper:16; Lower: 34

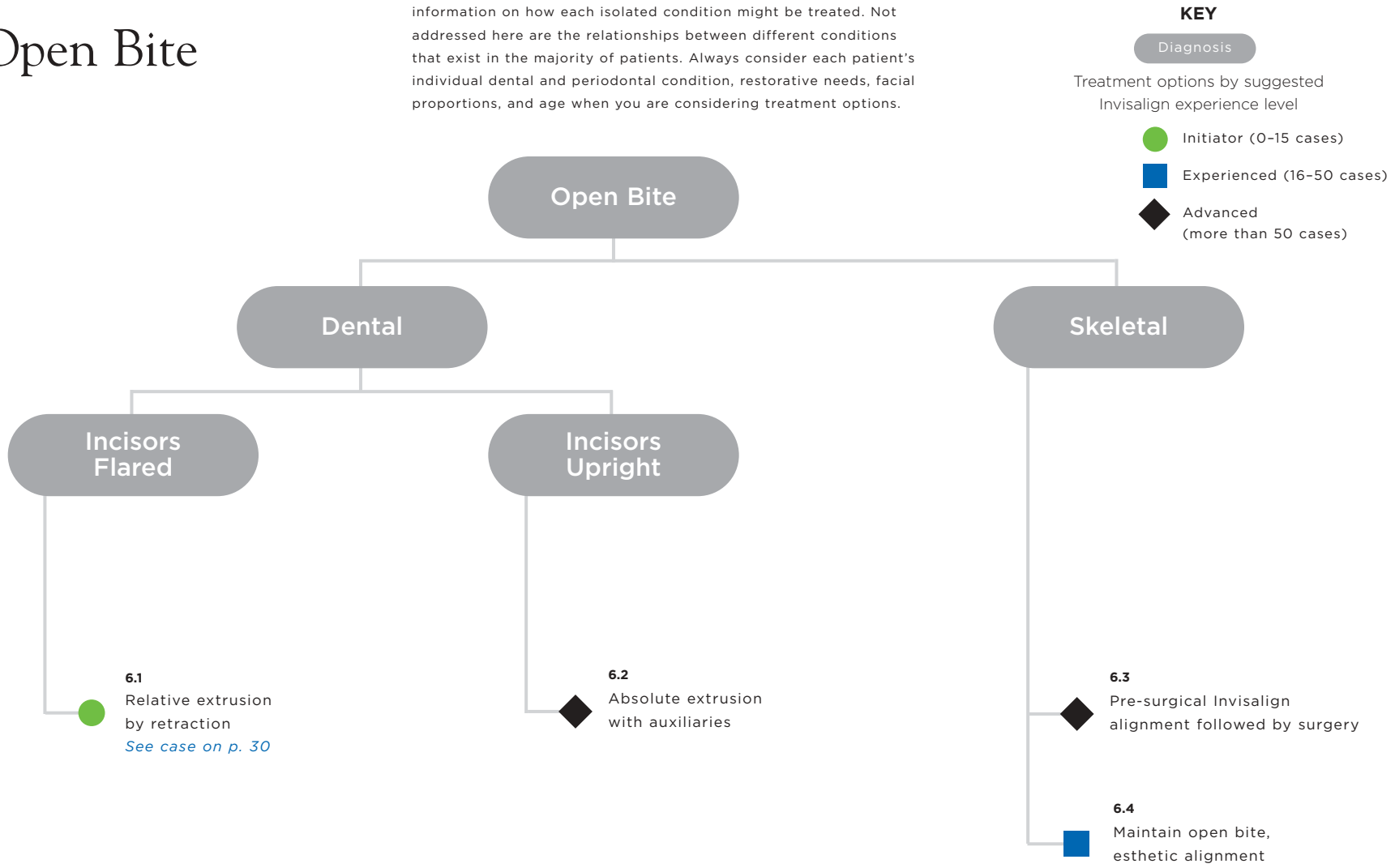
TREATMENT DURATION: 12 months (The doctor chose to use an accelerated 10-day aligner change schedule. 14 days is typically recommended.)

Intrusion

	DIAGNOSIS	TREATMENT OBJECTIVES	RESULTS
Sagittal	Mild Class II skeletal, Class I molar relation, increased overjet, upright placement of upper & lower incisors.	Maintain Class I molar relation, decrease overjet by advancement of lower incisors. The advancement will also help to relieve crowding by increasing the available space.	Class I was maintained. The overjet was reduced.
Vertical	Deep overbite, deep Curve of Spee in the lower arch and a reverse curve of Spee in the upper arch. Tooth #24 is over-erupted. Lingually displaced teeth commonly over-erupt until they encounter an incisal stop. To enable correction of the lower crowding, the increased overbite must also be addressed.	Decrease overbite by intrusion of upper and lower incisors. These movements will correct the Curve of Spee, and will improve the reverse smile line evident especially on the left lateral view. The decreased overbite will create the clearance needed for lower incisor advancement.	Good leveling of the upper and lower Curve of Spee, resulting in reduction of the overbite. The incisal edges were placed in a balanced relationship.
Transverse	Constricted dental arches. The lower dental midline is off to the left slightly, due to asymmetric lower crowding.	Upright lingually tipped posterior teeth. Center the dental midlines.	The dental arches were rounded out to an even and balanced arch form. The dental midlines are perfectly centered.
Arch Length	Moderate crowding in the lower arch, #24 blocked out to the lingual, mild crowding in the upper arch, anterior rotations.	Resolve upper crowding via buccal uprighting of the posterior teeth, flaring of the lateral incisors, and retraction of upper centrals. Correct upper rotations. Resolve lower crowding via anterior proclination, buccal uprighting of the posterior teeth, and interproximal reduction.	Upper and lower crowding was resolved, and rotations were corrected.

6. Open Bite

NOTE: The chart below is intended to give you general, high-level information on how each isolated condition might be treated. Not addressed here are the relationships between different conditions that exist in the majority of patients. Always consider each patient's individual dental and periodontal condition, restorative needs, facial proportions, and age when you are considering treatment options.



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 Invisalign 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 Invisalign being used as the treatment of choice to address the dental component.

PLANNING NOTES

6.1 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.

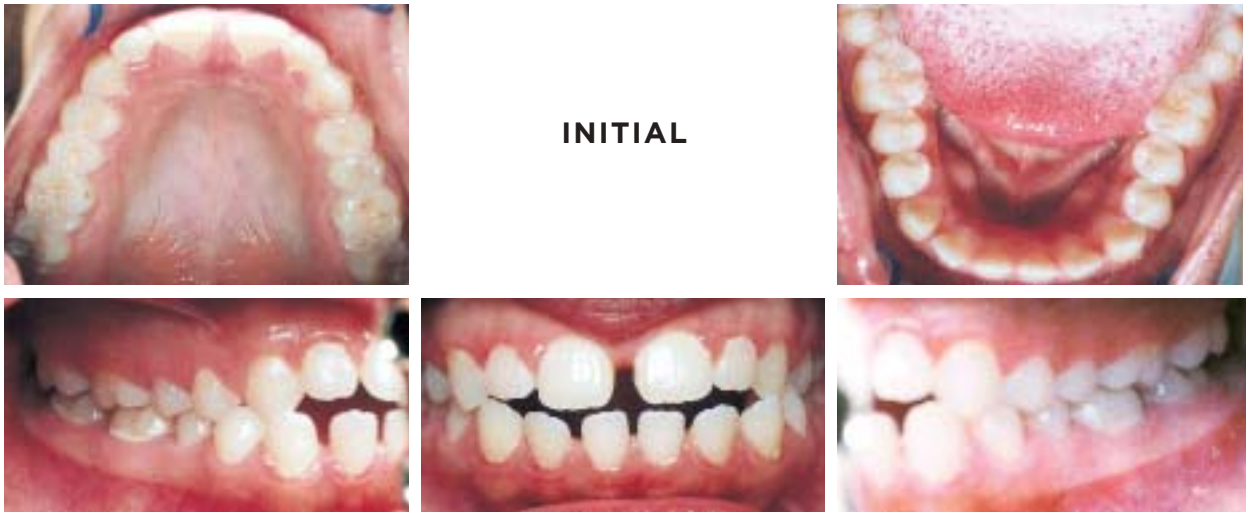
6.2 Bonding buttons to teeth and extruding them with vertical elastics is a typical way to achieve absolute extrusion either prior to or during Invisalign treatment. Be sure to allow adequate time for bone to develop around the teeth to avoid relapse.

6.3 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.

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

To see more commentary and the ClinCheck treatment plan for this case, go the the Invisalign Clinical Education Center at http://www.invisaligncec.com/casestudies/openbite1/diagnosis.php

6. Open bite: Retroclination/Extrusion



PATIENT'S CHIEF CONCERN: Anterior open bite, spacing.

DIAGNOSTIC SUMMARY: Class I spaced malocclusion with anterior open bite

TREATMENT SUMMARY: Retroclination/relative extrusion of the flared upper and lower incisors supported by the use of attachments.

AREAS OF CONCERN: None.

TREATMENT NOTES: Relative extrusion via incisor tip-back was programmed for the first 12 stages, which was then followed by absolute extrusion. Staging the less predictable movement (absolute extrusion) after the predictable movement (retroclination) reduces the risk of failure.

Open bite stability requires diligent retainer wear, in this case a lower bonded 3–3 and upper Hawley. This aspect especially needs to be emphasized with patients to avoid relapse.

ALIGNERS: Upper: 22; Lower: 21

TREATMENT DURATION: 12 months

	DIAGNOSIS	TREATMENT OBJECTIVES	RESULTS
Sagittal	Class I skeletal and dental relationship. Crossbite of the upper left canine.	Correct the crossbite.	The Class I relationship was maintained. The crossbite was corrected.
Vertical	Anterior openbite.	Close anterior open bite by retroclination/relative extrusion of the upper and lower incisors.	The open bite was closed.
Transverse	Within normal limits.	Maintain.	Maintained.
Arch Length	Moderate upper and lower spacing.	Resolve the upper and lower spacing by retraction and constriction of arch length.	The upper and lower spacing was resolved.

7. Class II

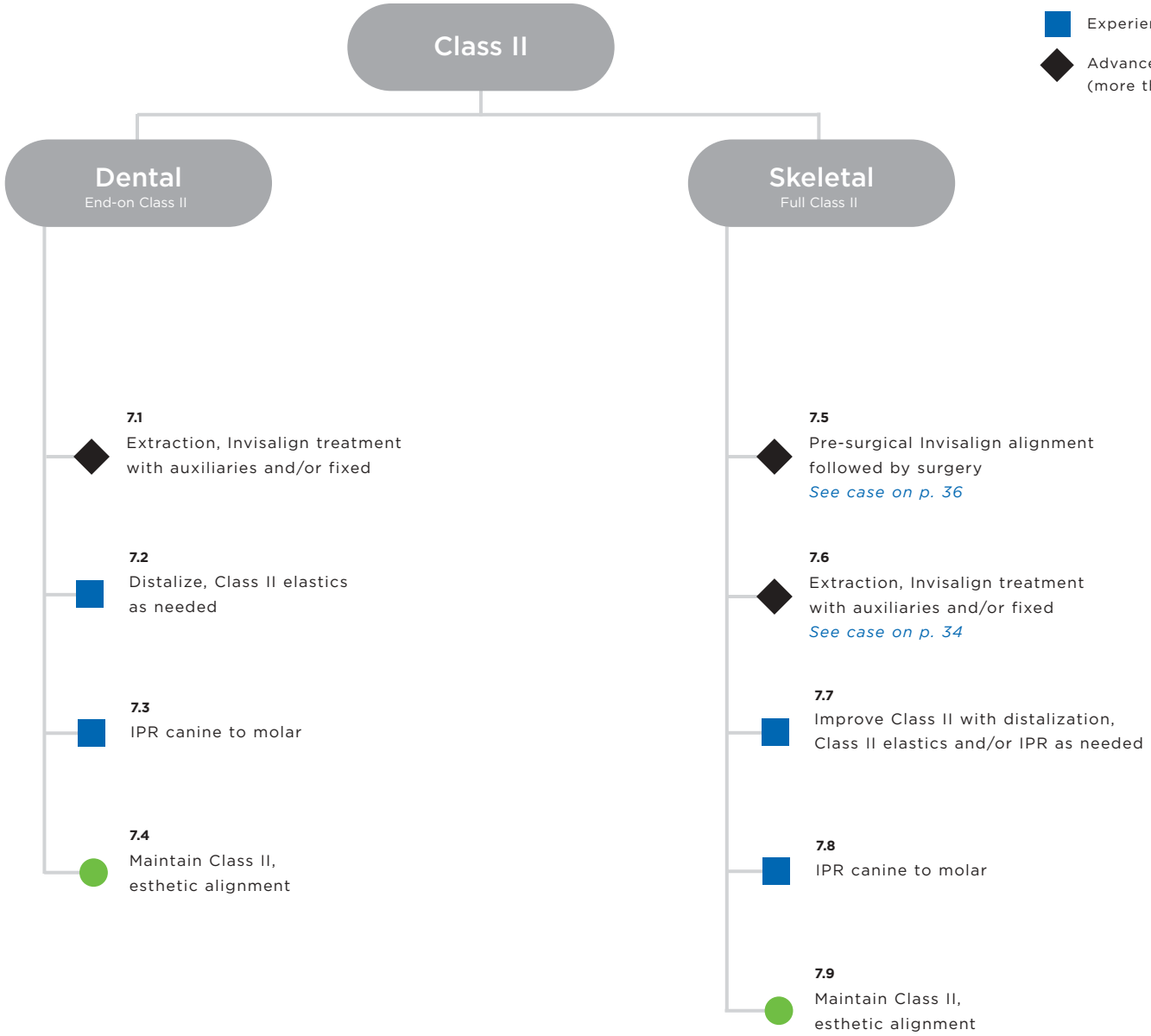
NOTE: The chart below is intended to give you general, high-level information on how each isolated condition might be treated. Not addressed here are the relationships between different conditions that exist in the majority of patients. Always consider each patient's individual dental and periodontal condition, restorative needs, facial proportions, and age when you are considering treatment options.

KEY

Diagnosis

Treatment options by suggested Invisalign experience level

- Initiator (0–15 cases)
- Experienced (16–50 cases)
- Advanced (more than 50 cases)



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 headfilm, 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 intial 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 esthetic dental alignment without additional change to the posterior bite relationship.

PLANNING NOTES

7.1 Extraction of two upper bicuspids or two upper and two lower bicuspids, using Invisalign 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 Invisalign 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.

7.2 Distalization 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. Distalization cases take longer than the average Invisalign 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 distalizing 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.

7.3 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.

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

7.5 Pre-surgical Invisalign 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 Invisalign refinement aligners.

7.6 Extraction of two upper bicuspids or two upper and two lower bicuspids, using Invisalign with auxiliaries as needed and possibly combining Invisalign 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 Invisalign and fixed appliances.

7.7 Distalization 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. Distalization cases take longer than the average Invisalign 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.

7.8 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.

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

To see more commentary and the ClinCheck treatment plan for this case, go the the Invisalign Clinical Education Center at http://www.invisaligncec.com/casestudies/classii1/diagnosis.php

7. Class II: Extraction

PATIENT'S CHIEF CONCERN: Crowding and overjet.

DIAGNOSTIC SUMMARY: End on Class II subdivision right crowded malocclusion with a moderate deep bite.

TREATMENT SUMMARY: Extraction of #5. Pre-PVS IPR. Reciprocal space closure of the extraction space (for an illustration, see the Anchorage Clinical Notes on p. 42). Proclination of the upper and lower incisors. After Invisalign treatment, the patient was referred back to her general dentist for composite build-ups on #7 and #10.

AREAS OF CONCERN: None. Composite veneer restoration of the upper right central incisor.

TREATMENT NOTES: To maintain root parallelism during the closure of the extraction space, a staging protocol with sequential movement of few teeth was used. Specifically, only the teeth on either side of the extraction space were first moved. Then the upper right first molar was moved, followed by the incisors, etc. Moving the teeth sequentially like this creates spaces between adjacent teeth that allow the aligner material to cover more tooth surface and better control the tooth and root position. The longest possible rectangular attachments were also used to assist mesializing the upper right first molar, second premolar, and retracting the canine.

ALIGNERS: Upper: 33 + 9; Lower: 15

TREATMENT DURATION: 22 months

	DIAGNOSIS	TREATMENT OBJECTIVES	RESULTS
Sagittal	Class II skeletal relationship with an end on Class II subdivision right dental malocclusion. Division 2 upper incisors.	Extract the upper right first premolar and close the space to Class I canine and Class II molar.	Class I canine relationship was achieved.
Vertical	Moderate anterior deep bite.	Correct the deep bite by relative intrusion of the upper and lower incisors (via proclination) and by intrusion of the lower incisors.	The Curve of Spee was leveled by proclination and intrusion of the lower incisors.
Transverse	Lower midline off to the right, upper midline off to the left.	Center midlines.	The upper midline was corrected to the lower midline.
Arch Length	Moderate upper and lower anterior crowding. Tooth size discrepancy due to small upper lateral incisors.	Resolve crowding by proclination of the incisors and lower IPR. Correct the tooth size discrepancy with bonding of the small upper laterals after orthodontic treatment.	The upper and lower crowding was resolved.

INITIAL

FINAL

PATIENT'S CHIEF CONCERN: Large overjet

DIAGNOSTIC SUMMARY: Class II malocclusion with flared upper teeth and anterior spacing, lower mild crowding. Decreased lower face height with mandibular retrusion.

TREATMENT SUMMARY: Align teeth and coordinate arches prior to orthognathic surgery.

AREAS OF CONCERN: Previous orthodontic treatment with four first bicuspid extractions

TREATMENT NOTES: The upper spaces were closed and the lower incisors intruded. There was slight lower incisor resorption which is consistent with intrusion. Attachments were placed on the upper canines and second premolars for retention during the anterior intrusion.

ALIGNERS: Upper: 20; Lower: 31

TREATMENT DURATION: 14 months for Invisalign tretament, 4 months fixed appliances pre-surgery

	DIAGNOSIS	TREATMENT OBJECTIVES	RESULTS
Sagittal	Class II malocclusion with 12 mm of overjet and 6 mm of overbite.	Coordinate arches in preparation for orthognathic surgery.	Pre-surgical alignment and arch coordination.
Vertical	Deep Curve of Spee.	Intrude lower incisors.	Curve of Spee leveled.
Transverse	Constricted upper arch.	Expand upper arch.	Arch expanded.
Arch Length	Upper spacing and lower crowding.	Close spacing and resolve crowding.	Spacing and crowding resolved.

8. Class III

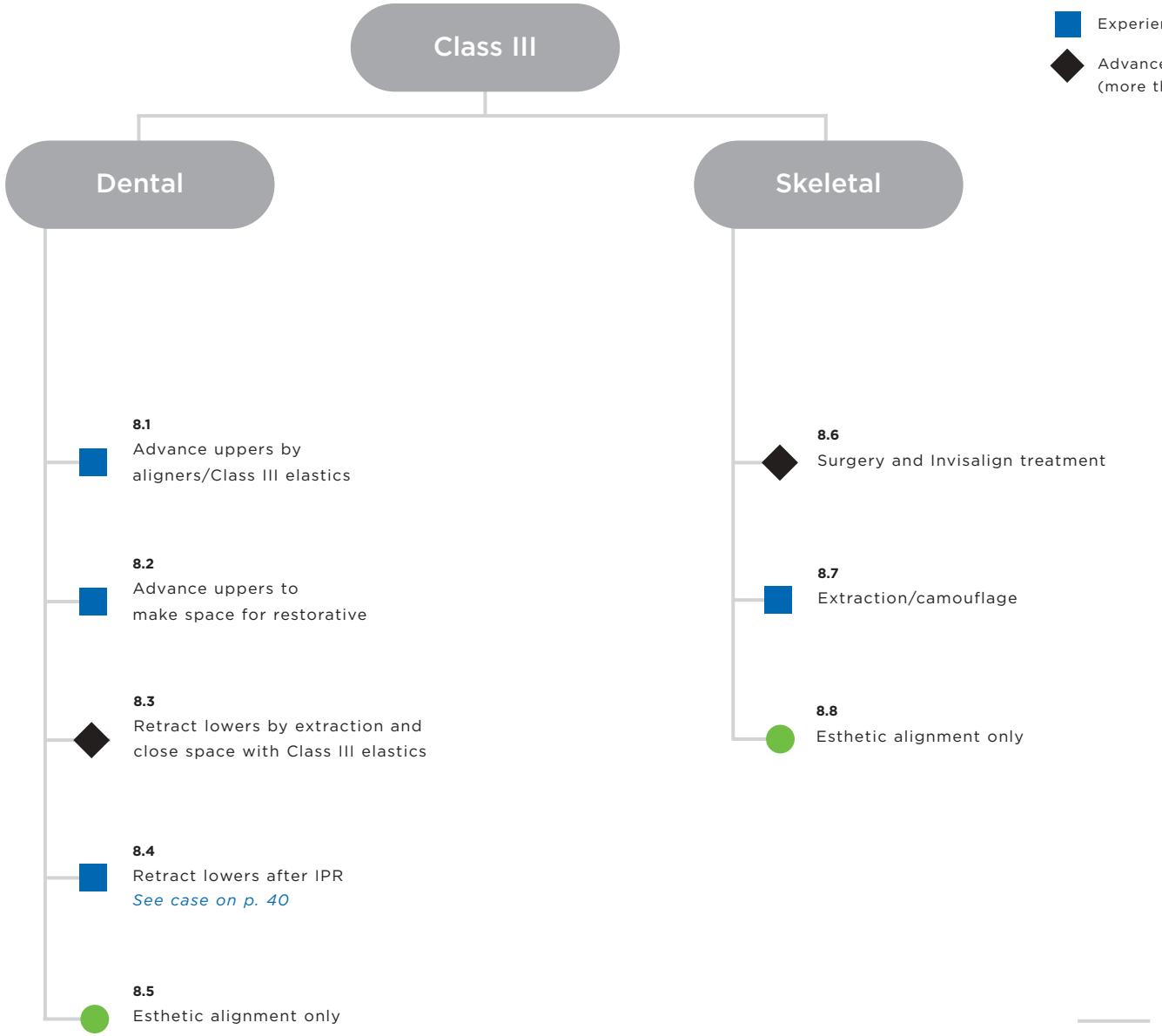
NOTE: The chart below is intended to give you general, high-level information on how each isolated condition might be treated. Not addressed here are the relationships between different conditions that exist in the majority of patients. Always consider each patient's individual dental and periodontal condition, restorative needs, facial proportions, and age when you are considering treatment options.

KEY

Diagnosis

Treatment options by suggested Invisalign experience level

- Initiator (0–15 cases)
- Experienced (16–50 cases)
- Advanced (more than 50 cases)



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 characterized 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 Invisalign 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 ClinCheck 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 ClinCheck 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.

PLANNING NOTES

8.1 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.

8.2 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.

8.3 If inadequate space is present in the lower arch for anterior retraction, space may be created through extraction. 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.

8.4 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.

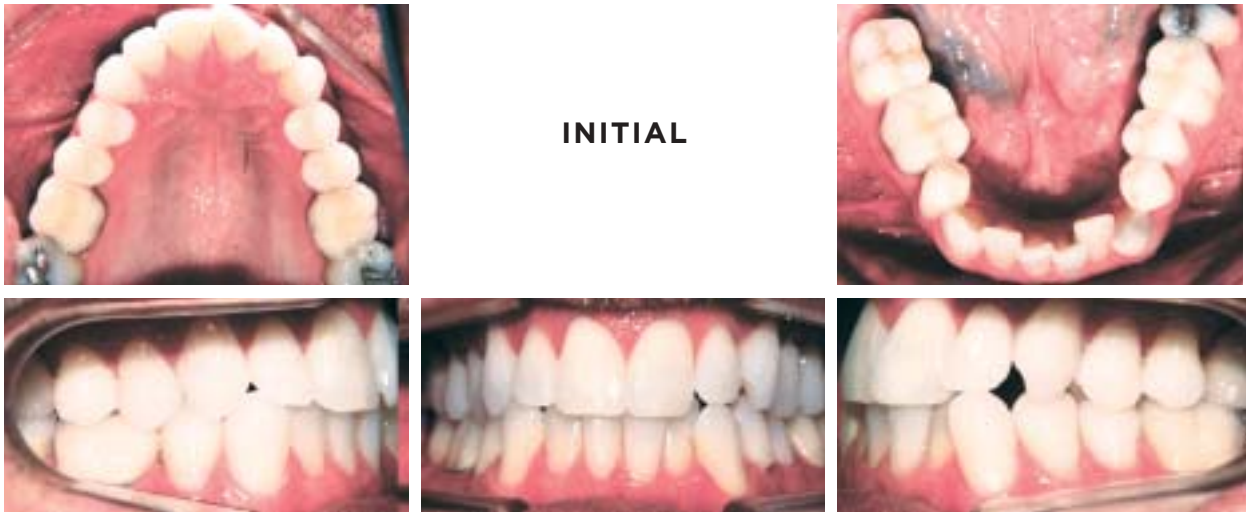
8.5 In some cases, a positive overjet cannot be achieved via dental camouflage, even with extractions. Without orthognathic surgery, the only option may be to align the teeth for esthetic purposes only. Retention for stability may be especially important in these cases, and patients should be fully aware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

8.6 Treatment with Invisalign combined with orthognathic surgery typically involves the initial alignment and arch coordination phase with Invisalign 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.

8.7 Some Class III cases can be treated with dental camouflage using extractions. Invisalign 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.

8.8 Patients unwilling to undergo orthognathic surgery or extractions for dental camouflage may elect for esthetic 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.

IPR/Retraction



INITIAL

FINAL

PATIENT'S CHIEF CONCERN: Crooked lower teeth.

DIAGNOSTIC SUMMARY: Class III molars and left canine, right canine Class I. Mild upper and moderate lower crowding. Lower midline shifted right 1 mm. End-to-end bite of lower left canine with upper left lateral. Lower right second bicuspid absent, no third molars present.

TREATMENT SUMMARY: Pre-PVS IPR was performed. Lower left canine was retracted to a Class I relationship, with normal overbite and overjet. Molar relationship was maintained, upper and lower crowing was resolved.

AREAS OF CONCERN: Thin attached gingiva requires careful control of archform and monitoring during treatment.

TREATMENT NOTES: Pre-PVS IPR was used to create space to resolve crowding and for retraction of lower left canine and premolars to achieve Class I canine relationship. Selective IPR is a nice alternative to single bicuspid removal in this case. Note solid occlusion on the second molars was maintained in this case on the left side. Attachments were used to maximize anchorage for lower left side retraction and for rotations of round teeth. Note correction of rotated lower first bicuspids was accomplished. Gingival condition was maintained during treatment. A fixed lower 3–3 retainer was bonded in place to maintain the correction.

ALIGNERS: Upper: 22; Lower: 29

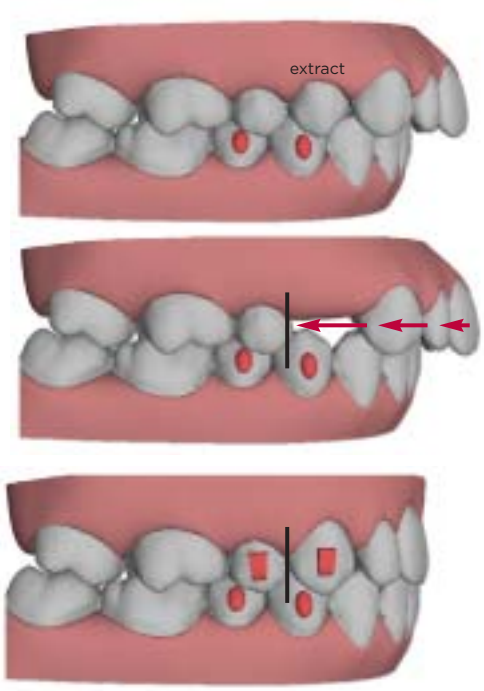
TREATMENT DURATION: 15 months

	DIAGNOSIS	TREATMENT OBJECTIVES	RESULTS
Sagittal	Class III molars and left canine, right canine Class I.	Correction of left sagittal relationship from 3 mm Class III to solid Class I.	Both canines corrected to Class I.
Vertical	Single tooth crossbite of #10.	Correct crossbite.	Crossbite corrected.
Transverse	Mandibular midline displaced to right.	Correct midline by resolution of crowding.	Midlines coincident.
Arch Length	Mild upper and moderate lower crowding. Partially blocked lower left lateral.	Resolve upper and lower crowding.	Crowding corrected.

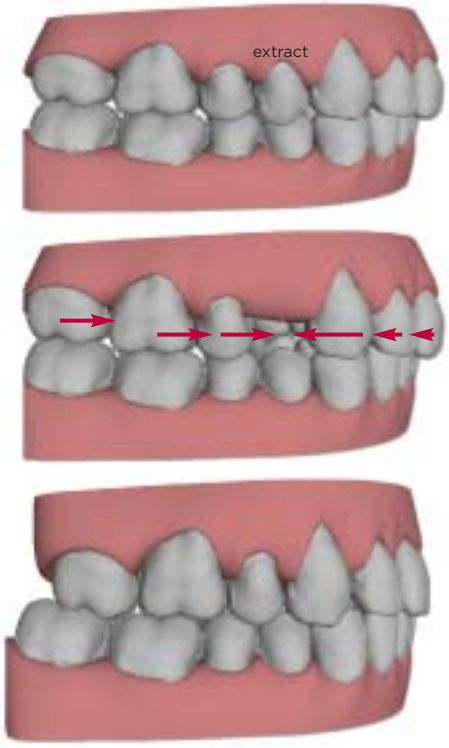
Anchorage

Anchorage is the resistance of the teeth to displacement. The Invisalign system allows for intra-arch anchorage by isolating selected teeth to be moved. A tooth's "anchorage value" is roughly equal to its root surface area. On average and roughly speaking the root surface of a first molar and a premolar is equal to the root surface area of a canine, and two incisors. Hence, posterior teeth have greater anchorage value than anterior teeth and distalization or mesialization of posteriors require anchorage considerations. The use of buttons and Class II/III elastics are often effective adjuncts that utilize the anchorage value of the entire arch.

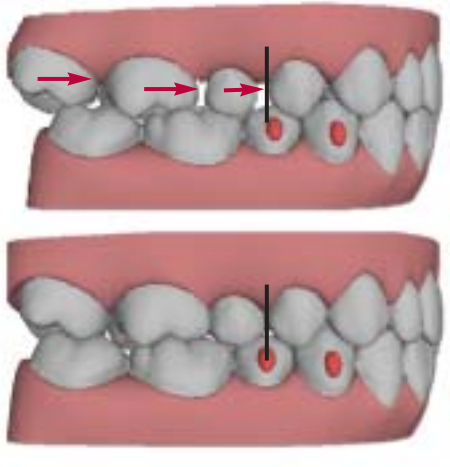
Maximum Anchorage During space closure, no or very little anchorage can be lost.



Reciprocal Anchorage During space closure, anchorage is not critical and both segments can move together equally



Minimum Anchorage During space closure, a considerable movement of the anchorage segment is desirable. "Anchorage loss"



Prescription Form Tips (Anterior)

These two pages are designed to help explain the sections on the Invisalign Prescription & Diagnosis Form, both the Anterior and Full versions. Some issues to consider when filling out the form are presented for each section, but these lists are not comprehensive. It is your responsibility as the treating doctor to diagnose and treatment plan your cases

1. Is there enough overjet to treat one arch only?

   If expansion is needed, is it necessary to coordinate the movement if both arches are treated?

   If anterior crossbite correction is needed, is it easier to coordinate if both arches are treated?

2. Are all teeth that should not be moved indicated? (e.g. implants, ankylosed teeth)

3. Have all facial / buccal restorations (esp. veneers and buccal alloys) been noted (even if the teeth are not being moved)? Remember that some patients may not want anterior attachments.

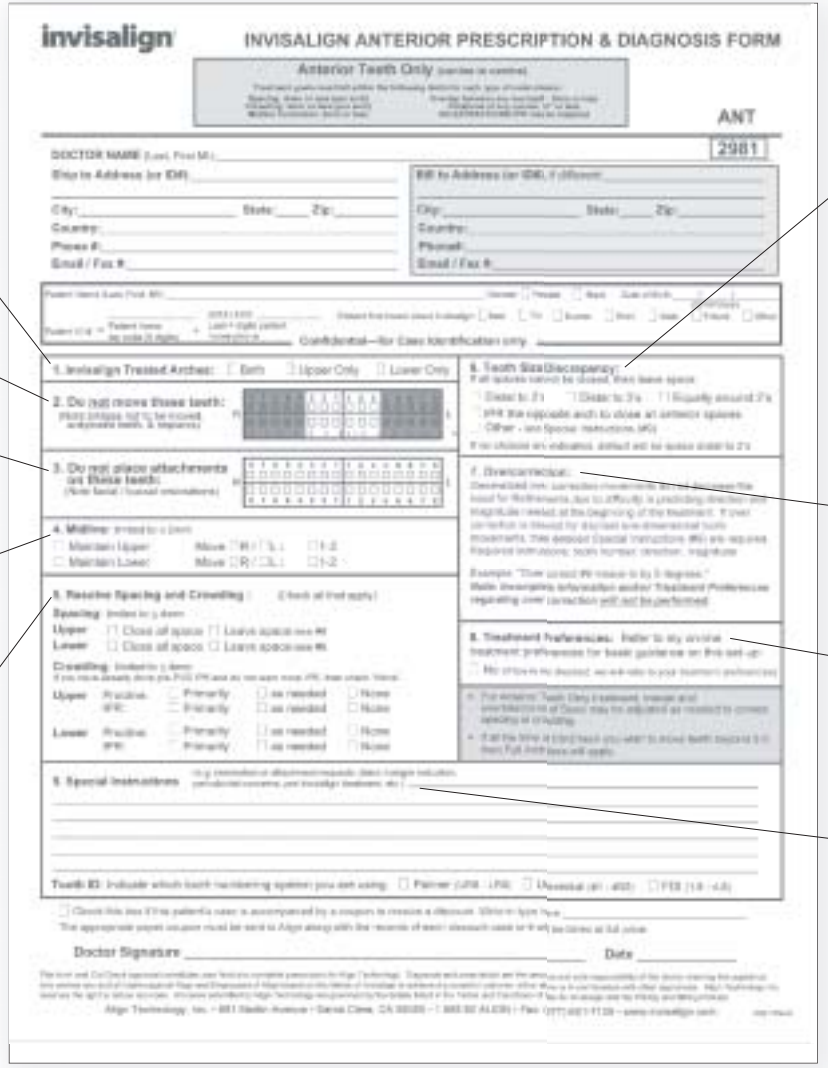
4. If a large midline correction is required (more than 2 mm), is IPR or an A-P correction (distalization) acceptable to resolve the midline shift?

5. *Spacing:*
   Can all the spacing be closed without losing overjet?

   If space must be left, will I simply leave it or use restorations?

   Crowding:
   Does tooth anatomy prohibit IPR (e.g. small narrow teeth)?

   Do periodontal conditions (proper bone support) prohibit proclination and/or expansion?


invisalign

INVISALIGN ANTERIOR PRESCRIPTION & DIAGNOSIS FORM

Anterior Teeth Only

ANT

2981

DOCTOR NAME

Ship to Address

Bill to Address

Doctor Signature

Date

6. If all spaces cannot be closed, can IPR be performed in the opposite arch to close the space?

   If not restoring to close spaces, where would it be best to leave space?

   If applying bonding or veneers, what position of the laterals would allow for best restoration? (Be as specific as possible.)

7. Are there any teeth that are more significantly rotated, or labial, or lingual than others?

8. Is the way I prefer to have this case set-up very different than what is listed in my current treatment preferences found on VIP?

9. Are there any attachment requests that are different than protocol (e.g. lingual, additional, etc.)

   Will black triangle reduction be necessary?

   Are there periodontal concerns that I should note?

   Was there pre-Invisalign treatment that would cause the occlusion to be different than the photos?

   Are there specific restorative dimensions I am expecting from the treatment?

Prescription Form Tips (Full)

1. Is there enough overjet to treat one arch only?

   If expansion is needed, is it necessary to coordinate the movement if both arches are treated?

   Are you treating the other arch with another appliance (eg., braces, spring retainer)?

2. Are all teeth that should not be moved indicated?

3. Have all facial / buccal restorations (esp. veneers and buccal alloys) been noted (even if the teeth are not being moved)?

4. If a large midline correction is required (more than 2 mm), is IPR or an A-P correction (distalization) acceptable to resolve the midline shift?

5. If a large overjet correction is required, is IPR or A-P correction (distalization) acceptable to resolve midline shift?

6. Is overbite correction required or only incisor leveling? If improving deep bite or leveling Curve of Spee, attachments will be required and will be shown in ClinCheck. Only check a box if the improvements are achievable with Aligners (ex. Correcting deep bite by intruding lower incisors, closing open bite by retracting incisors.)

7. Is current A-P relationship/posterior occlusion acceptable as it currently exists? If posterior occlusion is satisfactory then maintain the A-P relationship and do not fill out the rest of this section.

   If distalization if desired, to correct A-P, is the patient willing to accept a longer treatment time?

   Are goals realistic if A-P change is desired (more than 2–3 mm of distalization)?


invisalign

Prescription & Diagnosis Form - FULL

8. If the crossbite is unilateral and many teeth are involved, then is the patient comfortable with the use of auxiliary techniques to resolve the crossbite? Single tooth crossbites are much more predictable. Aligners are not predictable for skeletal expansion.

9. If extracting teeth, auxillary techniques (e.g., sectional braces) may be needed especially with bicuspid extractions. Do not extract tooth before submitting impressions.

10. If all spaces cannot be closed, can IPR be performed in the opposite arch to close the space?

    If not restoring to close spaces, where would it be best to leave space?

    If applying bonding or veneers, what position of the laterals would allow for best restoration? (Be as specific as possible.)

11. Define areas for overcorrection. Are there any teeth that are more than significantly rotated or labial, or lingual, than others?

12. Is the way I prefer to have this case set-up very different than what is listed in my current treatment preferences found on VIP?

13. Are there any attachment requests that are different than protocol (e.g., lingual, additional, etc.)

    Will black triangle reduction be necessary?

    Are there periodontal concerns that I should note?

    Was there pre-Invisalign treatment that would cause the occlusion to be different than the photos?

Glossary

This glossary is intended to be used as a tool for the dental professional as they learn about the Invisalign® treatment modality. It is not designed to be an all-inclusive orthodontic glossary, but to serve as reference to commonly used Invisalign terms.

Absolute Extrusion True vertical movement (translation) along the long (vertical) axis of the tooth.

Advancement Also known as protraction. Anterior (mesial) movment of the teeth, usually referring to the bodily movement.

Anchorage Resistance to displacement. The Invisalign system allows for intra-arch anchorage by isolating selected teeth to be moved.

Angle's Classification A classification system based on the relationship of the permanent maxillary first molars and Occlusion cuspids to the lower permanent teeth.

Angulation Also known as tip. The mesio-distal inclination of the root or crown.

Ankylosis Abnormal immobility, union or fusion. May occur between two bones at their articulation (i.e.,TMJ) or between teeth and the alveolar bone. Dental ankylosis prevents both eruption and orthodontic movement.

Anterior open bite No vertical overlap exists between maxillary and mandibular anterior teeth.

A-P Discrepancy Anterior Posterior Discrepancy. Also known as Sagittal Discrepancy. An evaluation of the anterior-posterior position of the jaws, and / or teeth made from a profile view.

Arch length discrepancy Difference between the available and required space within an arch to align the teeth.

Attachments Composite forms bonded onto facial or lingual surfaces of teeth using a forming template to help achieve certain types of tooth movement with the Invisalign System.

Bilateral Denoting both sides.

Biomechanics Application of physical principals such as force, resistance as it relates to biological systems.

Bite O (Bite Zero) The stage at which the models are virtually articulated in. Extensive measurements are taken of plaster casts to insure the occlusion as you see depicted in the ClinCheck file on the computer matches the patient's actual centric occlusion.

Bodily Translation The movement of a tooth where the crown and root of the tooth move the same distance in the same direction at the same time.

Bolton Analysis A method to evaluate tooth-size discrepancies (mesio-distal crown width) between the upper and lower arches.

Buccal Toward the cheeks.

Case Refinement The term used by Align Technology to describe when additional aligners beyond the last stage are required to get the patient closer to the desired treatment goal as established at the start of treatment. Case refinement forms are required.

Center of Rotation The point about which a tooth rotates. *aka: Centroid*

Centric Relation (CR) The position of the teeth when the mandibular condyles are against the temporomandibular disc in the anterior and superior most portion of the glenoid fossa.

Centric Occlusion (CO) The position of the teeth when in their maximum intercuspal position, i.e., the best fit of the teeth.

Cephalometrics The scientific measurement of the bones of the cranium and face, utilizing a fixed reproducible position for lateral radiographic exposure of the skull and facial bones. Used for the evaluation of facial growth and development, including soft tissue profile.

Class I The mesiobuccal cusp of the upper first molar lies in the buccal groove of the lower first molar. The upper canine lies distal to the lower canine.

Class II The mesiobuccal cusp of the upper first molar lies mesial to the buccal groove of the lower first molar. The upper canine lies mesial to the lower canine.

Class II Division 1 Class II with increased overjet.

Class II Division 2 Class II with retroclined upper central incisors.

Class III The mesiobuccal cusp of the upper first molar lies distal to the buccal groove of the lower first molar. The upper canine lies distal to the contact point between the lower canine and first premolar.

ClinCheck® A computerized movie depicting the patient's teeth from beginning to final position is sent to you via the Internet and is easily viewed using Align Technology's exclusive ClinCheck software. This program allows you to visually review the projected movement as well as the final set up in three dimensions. Depending on the treatment option you select, ClinCheck may also give you the opportunity to request modifications in the treatment plan until you are satisfied with the movement staging and final outcome.

Couple Two parallel forces acting in opposite directions and separated by a distance. Couples result in pure rotational movement about the center of resistance regardless of where the couple is applied on the object.

CR/CO Discrepancy When the CR bite position and the CO bite position are not coincendent.

CR/CO Shift A deflection of the mandible in an anterior, posterior and/or lateral direction to centric occlusion, as a result of a premature contact occurring when the mandible is in centric relation.

Crossbite An abnormal relationship of one or more teeth to one or more teeth of the opposing arch, in the buccolingual or labiolingual direction. May be Anterior, Buccal, Lingual, Palatal, Posterior, or Functional.

Buccal Crossbite A crossbite due to buccal displacement of the affected tooth or group of teeth from their ideal position relative to their antagonists.

Lingual Crossbite A crossbite mainly due to lingual displacement of the affected mandibular tooth or group of teeth from their ideal position relative to their antagonists.

Curve of Spee Curvature of the mandibular occlusal plane, from the buccal view. Ideally it should be flat to slightly concave.

Deep Bite Excessive overbite.

Distal A direction oriented along the dental arch away from the dental midline.

Distalization The movement of teeth in the distal direction.

Edge to edge occlusion An occlusion in which the anterior or posterior teeth of both jaws meet along their incisal or buccal cuspal edges. Often associated with a Class III occlusal relationship.

Expansion Widening of the dental arches.

Extrusion A translational type of tooth movement parallel to the long axis of the tooth in the direction of the occlusal plane.

Finishing *see case refinement*

Force The actions of one body against another—push or pull, it has both magnitude and direction.

Functional shift *see CR/CO Shift*

Headfilm A common term for cephalometric radiograph. In orthodontics lateral and frontal head films are common.

Incisal Pertaining to the cutting edge of the anterior teeth.

Inclination The angle of the long axis of a tooth from a particular line of reference.

Interdigitatation The maxillary teeth "fit" into the mandibular teeth. Sometimes referred to as a "socked-in" occlusion. Solid Class I interdigitation means that the maxillary first molar mesial cusp lines up with the buccal groove of the mandibular first molar and the cusps are seated into proper position.

Interproximal Interference Contacts between adjacent teeth during treatment. Clinically, this can result in lack of movement by the teeth, and may require IPR to enable teeth to slide past each other.

Intrusion A translational type of tooth movement parallel to the long axis of the tooth in an apical direction.

IPR (Interproximal reduction) Interproximal reduction of enamel. Also known as reproximation, slenderizing, stripping, Air-Rotor Stripping (ARS), or recontouring.

Labial Describes a surface facing the lips. The same as "facial" in the anterior portion of the dentofacial complex.

Lateral Relating to the one side or the other.

Lingual Describes surfaces and directions toward the tongue.

Limited Treatment Orthodontic treatment with a limited treatment objective, not involving the entire dentition. Typically addressing the patient's chief concerns or objectives.

Malocclusion Any deviation from the normal or ideal occlusion.

Mesial Toward or facing the midline, following the dental arch. Used to describe surfaces of teeth, as well as direction.

Mid-Course Correction The resubmission of a case when the clinical results have deviated from the approved course of treatment to the point that the teeth no longer fully adapt to the aligner. A mid-course correction is also required if the patient undergoes significant dental work such that the aligners no longer fit. New PVS impressions and instructions regarding treatment are required.The patient should be instructed to wear the latest, best fitting aligner to hold progress until the new aligners arrive.

Moment A force that does not pass through the center of resistance will not produce solely linear movement and will result in some rotational movement. This rotational movement is called a moment of the force.

Occlusal Pertaining to the chewing surfaces of the posterior teeth. May be used to identify those tooth surfaces, as well as the direction (upward in the lower arch, downward in the upper).

Occlusal Interference Undesirable contact between upper and lower teeth preventing maximum intercuspation. Often referred to clinically as premature or excessive contacts. May require occlusal equilibration.

Open Bite Form of malocclusion that may be inherited, developmental, or acquired.

Overbite Vertical overlap.The distance between the upper and lower incisal edges when the patient is in maximum-intercuspation

Overcorrection Tooth movement beyond the ideal, final position to compensate for potential dental relapse.

Overjet The distance from the facial of the lower incisor to the lingual of the upper incisor at the incisal edge.

Palmer Notation Numbering System The standard numbering system used by orthodontists in the United States. The mouth is divided into four quadrants. Numbers 1 through 8 identify each tooth within the quadrant, with 1 designating centrals moving distally with third molars being "8's" When charting, the numbers sit inside an L-shaped symbol to identify the quadrant they belong to—as you look into the patient's mouth. Primary teeth (20) follow the same format but are represented with letters "A" through "E" in each quadrant.

Posterior Open Bite No vertical contact is exhibited between maxillary and mandibular posterior teeth. Posterior open bite may be due to an anterior interference, a posterior interference, or both.

Proclination Inclination of the crown forward.

Protraction Anterior (mesial) movement of teeth, usually referring to bodily movement.

Protrusion The state of being anteriorly positioned.

PVS (aka VPS) Polyvinylsiloxane impression material.

Relapse A partial or full return of malocclusion following orthodontic treatment.

Relative Extrusion Used to describe the appearance of vertical correction by crown inclination (tip).

Reproximation *see IPR*

Retention Holding of corrected occlusion after orthodontic treatment.

Retraction Posterior (lingual) or distal movement, usually referring to the bodily movement.

Retroclination Lingual inclination or tipping of crown backward.

Rotation Spinning a tooth around the vertical axis.

Sagittal Discrepancy *see A-P Discrepancy*

Tipping Crown movement where the crown rotates about a center of resistance. *aka: Angulation*

TREAT Refers to the software used at Align Technology uses internally to do "virtual" set-ups of cases.

TMJ Temporomandibular Joint

Tooth-Size Discrepancy *see Bolton Analysis*

Torque Controlled root movement; the crown incisal edge is essentially the center of rotation.

Translation *see Bodily Translation*

Transverse Discrepancy *see Crossbite*

Universal Numbering System Permanent teeth are numbered 1 to 32, starting with the upper right third molar, working around to the upper left third molar, then dropping down to the lower left third molar and working around to the lower right third molar.The 20 primary teeth are lettered, using capital letters A through T, following the same methodology as for the permanent teeth, starting with the upper right second primary molar and ending with the lower right second molar

Uprighting Tipping inclined teeth to a more normal vertical axial inclination.

VIP Stands for "Virtual Invisalign Practice." This is the name of the program that allows doctors to manage their Invisalign practices online.Within VIP you can: view all aspects of your patient's cases, including ClinCheck; order marketing materials; start a new patient using online treatment planning forms; review Invisalign "how-to" tutorials ; and more.

Vertical Discrepancy *see Deep bite and Open bite*

Index

Credits

We would like to thank the following clinicians
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1. Crowding	2. Spacing	3. Narrow Arches	4. Crossbite	5. Deep Bite	6. Open Bite	7. Class II	8. Class III