

مركز الدكتور شادي الخطيب لطب الأسنان

استشاري تقويم الأسنان
دكتوراه في طب الأسنان وتقويم الأسنان

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• عضو في جمعية تقويم الأسنان الأردنية ومملكة البحرين والكويت
• عضو سابق في اللجنة العلمية في جمعية تقويم الأسنان
• البورد الأردني في جمعية تقويم الأسنان الأردنية
• البورد الكويتي واستشاري في مملكة البحرين
• البورد الكويتي في دولة الكويت

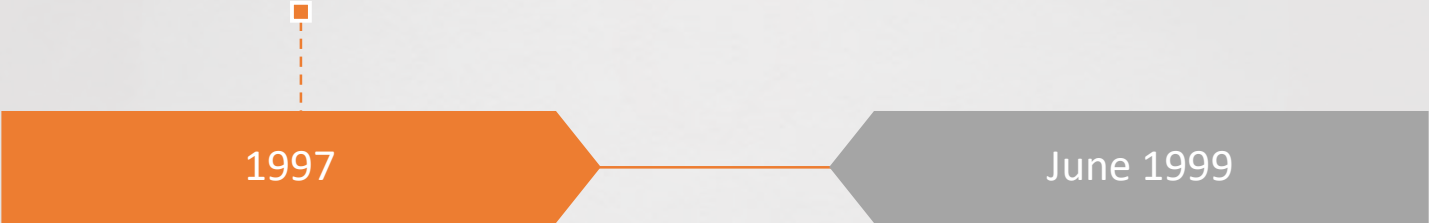
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INTRODUCTION

The Invisalign System was developed by
Align Technology 1997



1997

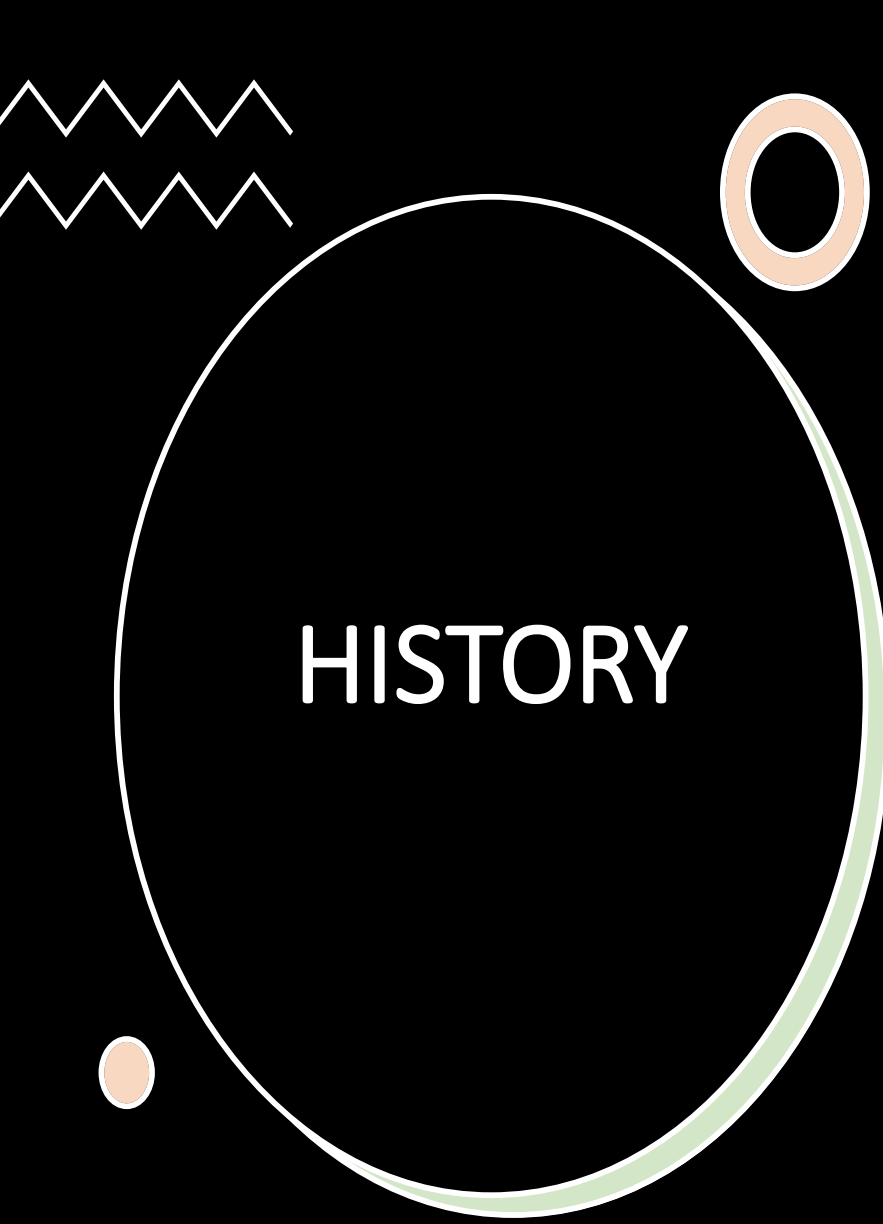
The diagram features a horizontal timeline. On the left, an orange arrow-shaped box points to the right and contains the year '1997'. A dashed orange line extends upwards from the top of this box to a small orange square. A solid orange line connects the right side of the orange box to the left side of a gray arrow-shaped box on the right, which points to the left and contains the text 'June 1999'. A dashed gray line extends downwards from the bottom of the gray box to a small gray square.

June 1999

The Invisalign System was introduced
commercially in June 1999



- ❖ Invisalign® is an orthodontic technique that uses a series of clear plastic aligners to move teeth.
- ❖ The aligners are made from thin, see through plastic, which fits over the buccal, lingual (palatal), and occlusal surfaces of the teeth.



HISTORY

- Zia Chishti and Kelsey Wirth, graduate students in Stanford University's MBA program.
- Zia Chishti had finished adult treatment with traditional braces, and wore a clear plastic retainer. He noticed that if he did not wear his retainer for a few days, his teeth shifted slightly -- but the plastic retainer soon moved his teeth back the desired position.
- Together they started Align Technologies in April 1997 and with the help of a handful of forward thinking orthodontists, they applied 3-D computer imaging graphics and created the Invisalign method.





The aligners are worn for a minimum of 20 hours per day and are changed on a 2-weekly basis.



Each aligner is designed to move a tooth or small group of teeth about 0.25–0.3 mm.

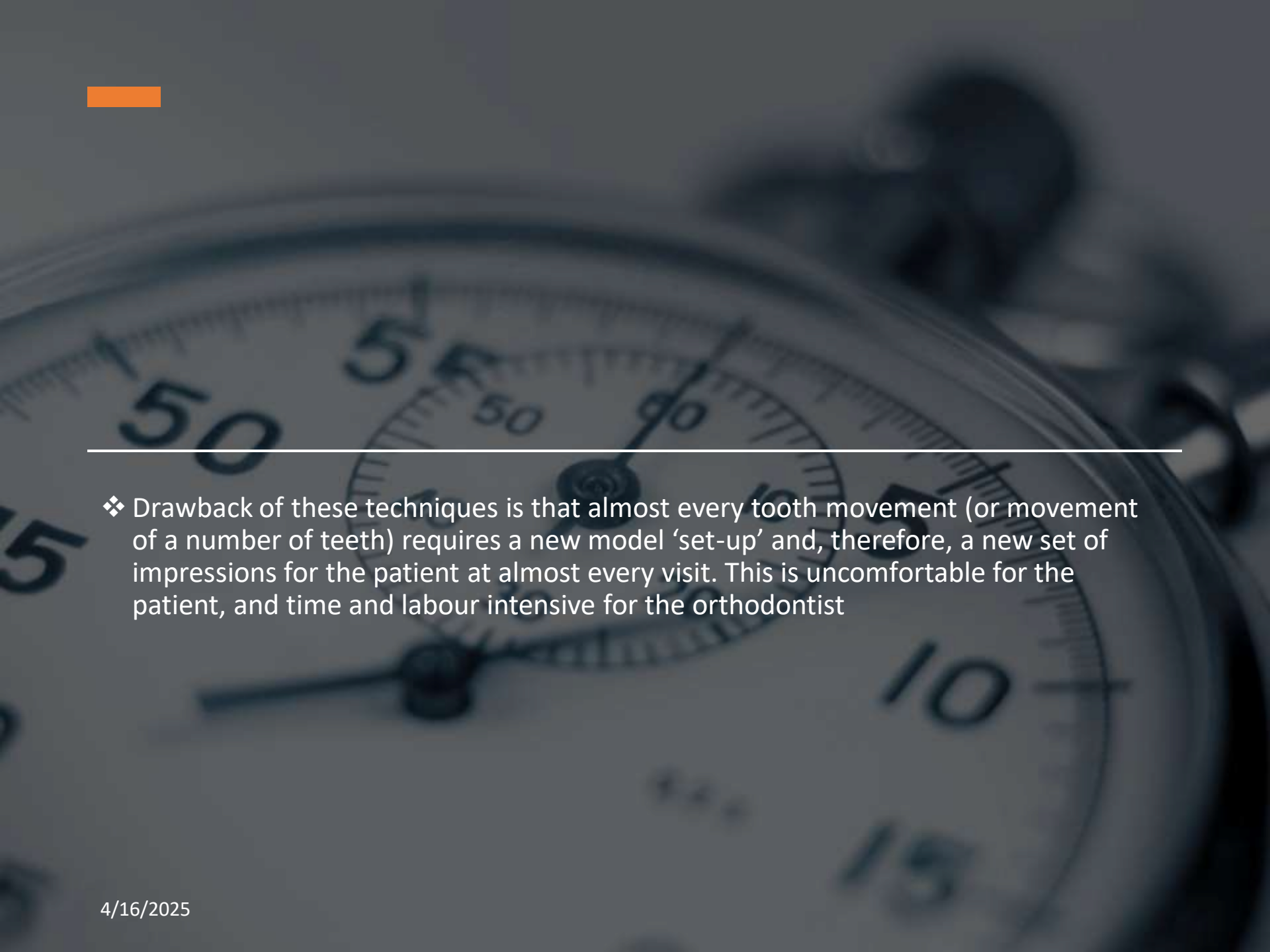
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- The Invisalign® is not a 'new' concept. Sheridan and Sheridan et al reported on the techniques of interproximal tooth reduction (IPR) and aligning teeth using clear Essix appliances.



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- This is based on the Kesling 'set-up' technique, where teeth are 'repositioned' by cutting them individually off a model and then making appliances to move the teeth into the 'set-up' position

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- ❖ Drawback of these techniques is that almost every tooth movement (or movement of a number of teeth) requires a new model 'set-up' and, therefore, a new set of impressions for the patient at almost every visit. This is uncomfortable for the patient, and time and labour intensive for the orthodontist



- ❖ Align Technology, uses computer-aided scanning, imaging. [**computer- aided -design - computer –aided -manufacture (CAD-CAM))**],
- ❖ The revolutionary aspect of Invisalign® is the scanning in and imaging of high precision casts made from very accurate impressions. This allows the patient's teeth to be replicated as an 'on screen' 3-D model, which can be manipulated and 'virtually' corrected through a treatment plan developed by the orthodontist and translated by Invisalign® using sophisticated software



- ❖ The clinician has the ability to view the 'virtual' models from malocclusion to correction, movement by movement, through an Internet connection program ®





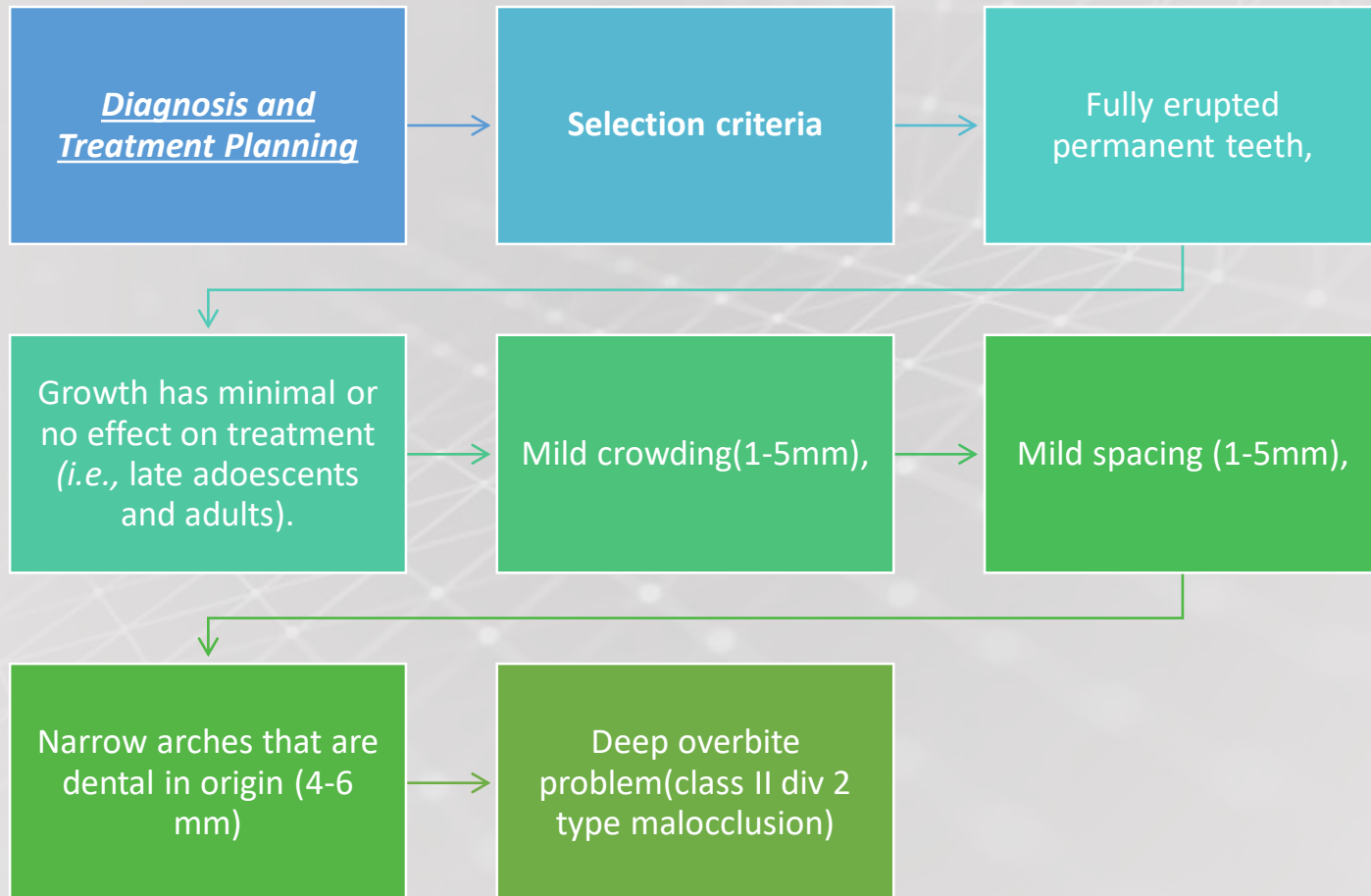
This appliance was the first orthodontic treatment method to be based solely on three-dimensional (3D) digital technology.



Align Technologies received FDA clearance to market (Invisalign) in August 1998, and began commercial operations in July 1999.



This unique treatment approach allowed both the orthodontist as well as the patient to develop a visual understanding of orthodontic tooth movement



Certain complex malocclusion more difficult to treat:

Crowding and spacing over 5 mm.

Skeletal antero-posterior discrepancies

Centric relation and centric occlusion discrepancies.

Severely rotated teeth (more than 20 degrees).

Open bites (anterior and posterior) .

Extrusion of teeth.

Severely tipped teeth (more than 45 degrees).

Teeth with short clinical crowns.

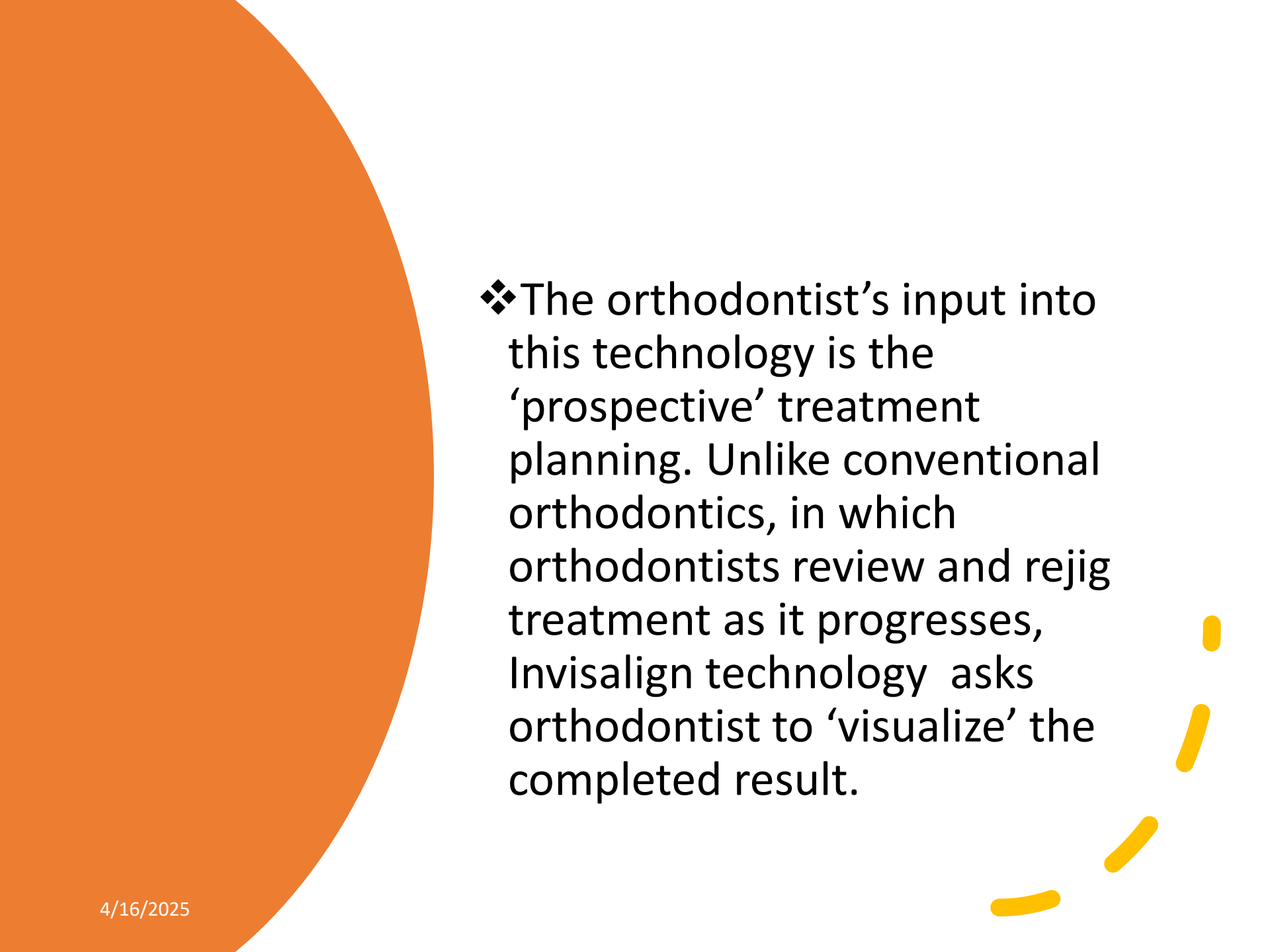
Arches with multiple missing teeth.

Closure of bicuspid extraction spaces

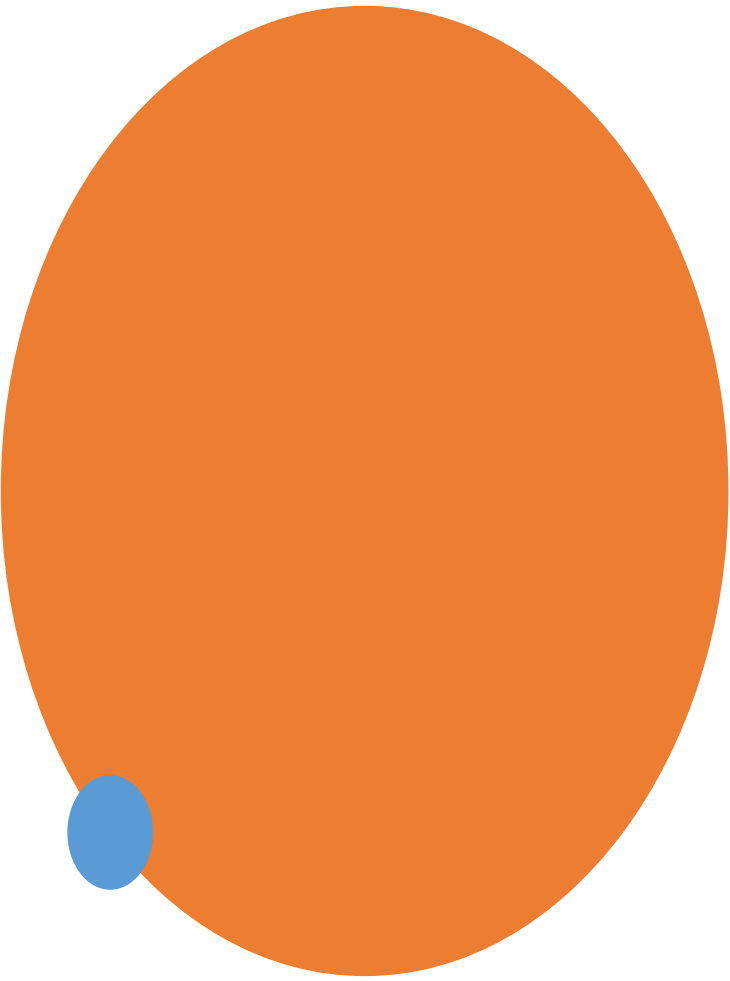
TECHNIQUE

COLLECTION OF HIGH QUALITY PRE-TREATMENT RECORDS

- It is essential to take high quality pre-treatment records— study models, panoramic radiograph and cephalometric X-rays, and photographs. The same assessment, diagnosis, and treatment planning is undertaken for Invisalign® as it is for conventional orthodontics. These records (apart from the study models) are sent to Align Technology. Digital X-rays and photographs are an advantage, as they can be transmitted ‘on-line’, but paper copies are equally acceptable.



❖ The orthodontist's input into this technology is the 'prospective' treatment planning. Unlike conventional orthodontics, in which orthodontists review and rejig treatment as it progresses, Invisalign technology asks orthodontist to 'visualize' the completed result.



Interactive treatment planning with Align Technology

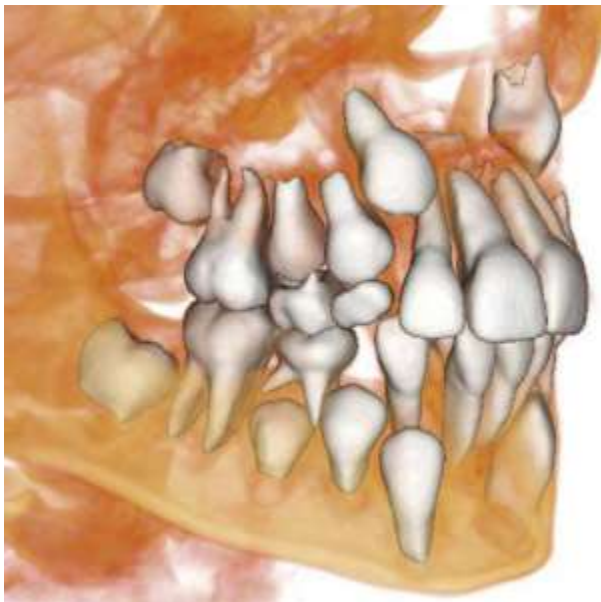
- ❖ The comprehensive treatment planning form is completed, step-by-step, and submitted either online or in paper form. At this point, the impressions and records are sent to Align Technology in hard copy form for those not submitted on-line. About 10–14 days later, the patient's 'virtual models' appear in 3-D, on domain page.



- ❖ The software ‘individualizes’ each tooth, so they can be individually repositioned, and the software relates the upper and lower teeth together so that co-ordination is kept between arches. The software is propriety to Align Technology and forms the essential core to the Invisalign® process.



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Aligner application

- ❖ The full set of aligners, from start to finish, is delivered to clinician. A patient start-up and care kit accompanies this. The manufacture process is the final computer aided technology. The 3-D 'models' of each step in the re- alignment are transformed into hard copy models through a process of laser build up. These models are then used to make the pressure formed aligners

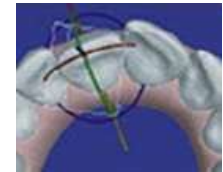
OVER VIEW



PVS impressions,
waxbite, radiographs
,photos



CT scan is made impressions
to produce a virtual model



Treat II software used to
simulate the teeth
movement



Clincheck allows Orthodontist
to reviews, modify, and
approve the treatment plan.

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Stereolithography

to build precise
molds

of teeth at each stage



Individualized, custom-
created clear aligners are
made from these models



On the first visit, fit the initial aligners, checking for fit and comfort. Any interproximal reduction (IPR) is started, depending on the schedule delivered by Align Technology, and the patient is given the necessary wearing and cleaning instructions.



Recall patient after 2-3 weeks



At visit 2, patient is comfortable and happy using the aligners on a full-time basis. IPR is checked using floss and continued if needed

Fit aligner 2 and give aligner 3 to the patient so they can replace aligner 2 after two weeks use.



Thus, the patient is seen every 4 weeks. A typical Invisalign® treatment will take around 25 aligners and 50 weeks of treatment, but can vary from 10 to 50 aligners, depending on the severity of the problem

ADVANTAGE

- Ideal aesthetics: the aligners are relatively invisible, apart from a slight sheen to the teeth in close-up. This is the biggest draw card for the patient seeking orthodontic correction and should not be under-estimated when it comes to compliance and cooperation.







- Ease of use for the patient: the aligners are easy to insert and remove.
- Comfort of wear: wearing time and compliance is not a problem. Speech is usually only affected for around 24 hours.



- Simplicity of care and better oral hygiene: the aligners need no special treatment. Brushing with a toothbrush and toothpaste at tooth cleaning times is all that is needed.



Limitations

Primary among them is compliance. Because the aligners are removable, the orthodontist must rely on the patient's motivation and dependability to achieve the desired results. The removability of Invisalign is an advantage to the patient but not to the clinician. So, its biggest advantage becomes its biggest disadvantage.



All permanent teeth should be fully erupted for treatment using this appliance, as it is difficult to achieve retention of the appliance on short clinical crowns. The treatment procedures do not allow for continued eruption of teeth, or significant dental arch changes during growth that may occur during the mixed dentition phase.



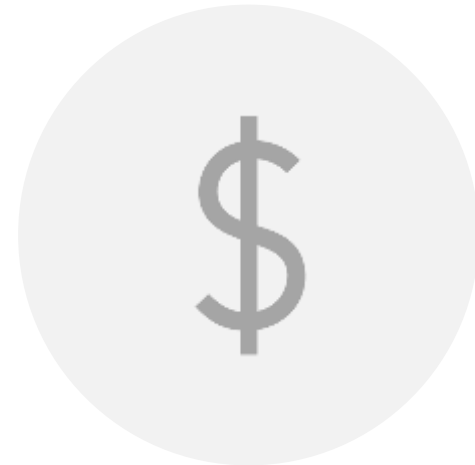
There is currently no capability to incorporate basal orthopedic change with this appliance system, thus restricting it to malocclusions requiring purely dental movement.



Lack of operator control - Unlike fixed or other types of removable appliances, the treatment plan cannot be changed once the appliance series has begun. If change in treatment goals is desired, the current series may be completed and a new plan and appliances made, or the current series may be stopped. Either scenario, however, will lead to increased cost for treatment and increased treatment time.



INABILITY TO INTEGRATE HARD AND SOFT TISSUES OF THE HEAD INTO THE COMPUTER TREATMENT. THUS, THE CLINICIAN HAS NO DIRECT INDICATION OF WHERE TEETH ARE IN RELATION TO BASAL BONE OR IN RELATION TO THE LIPS OR OTHER SOFT TISSUES OF THE HEAD



THE COST TO PATIENTS IS GREATER FOR THIS APPLIANCE THAN FIXED APPLIANCES. THEY TYPICALLY COST \$3,000 TO \$9,000 (AVERAGE IS ABOUT \$5000) DEPENDING ON THE NUMBER OF ALIGNERS NEEDED FOR TREATMENT. THIS IS DUE TO THE COST OF THE TECHNOLOGY USED TO SCAN IN MODELS AND TO DEVELOP A VIRTUAL TREATMENT, IN ADDITION TO MANUFACTURING, PACKAGING, AND SHIPPING COSTS FOR AS MANY AS 40 TO 80 APPLIANCES

- At present Align Technology is using Exceed-30 (EX30) as aligner material as it is more flexible (easier to use with attachments), moreover it rarely breaks and remains clear.
- Exceed-40 (EX40) is used as retainers.



CONCLUSION



With Invisalign a new system for orthodontic tooth movement using the established methods for minor correction to achieve greater magnitudes of correction has been introduced.



The major advantage of the system is the esthetic, hygienic, low discomfort and removable nature of the appliance.



There are currently limitations to this appliance in terms of case selection, increased cost, experience required for computer treatment planning, difficulty obtaining certain tooth movements, and the lack of potential in cases involving mixed dentition or impacted teeth.



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