eCligner® (3D digital Clear-Aligner) - Esthetic Orthodontic Appliance

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Bracket and wire treatment (Fixed Appliance) has been used in dental office for a long time to treat malocclusions since orthodontic treatment begins. Up to this moment, in general, people may think the imagination of orthodontic treatment is metallic colored wire bonded on the dental arch. Some kinds of removable appliances (Expansion Screw and Spring embedded in Acrylic resin) are used for longer history than fixed appliance in orthodontic field, even to adult patients.

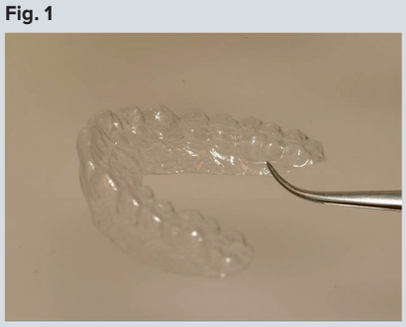
Turning up the last 20 centuries, transparent plastic orthodontic appliances was developed to treat patients who desires more esthetic and comfortable than metallic bonded appliances. It's major advantage is 'Removable Appliance', patient is enable to take out this appliance by themselves when meal time and business meeting etc. Finally, commercial company rose up to sell this kind of transparent removable appliance to dentists in the copy of 'Esthetic removable orthodontic appliance' with air media advertisement. It provoked huge sensation to the people, and provided attractive thing, removable and esthetic. In case of 2-3 mm crowding, it enables to end up the orthodontic treatment for 4-5 months with removable orthodontic appliance, eCligner®. The overall shape and structure has rounded end, no sharp edge and metallic color, it is friendly looking to the people and easy to wear, take out by themselves.

1. eCligner®

(1) Transparent removable orthodontic appliance

eCligner® is transparent plastic and removable orthodontic appliance produced by vacuum former. Its material is PET-G, similar with PET milk bottle, elastic and clear like thin film as well non-toxic biologic acceptable material. (Fig. 1) (Fig. 2) (Fig. 3)

Fig. 1



Transparent elastic orthodontic appliance, eCligner®

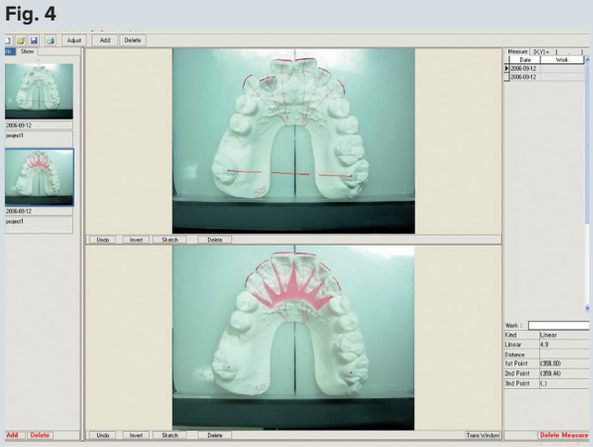
Fig. 2

eCligner® covers gingival tissue for gingival stimulation, material elasticity and comfortable fitting

Fig. 3

eCligner® wearing, easy to take out by patient.

Fig. 4



CAPRO (IV-Tech, Korea) program for handmade Clear Aligner, overlap two photos to check the movement range in 2D way

Fig. 5

One step set-up model produces 3 aligners, 0.5 mm, 0.62 mm and 0.75 mm for each week.

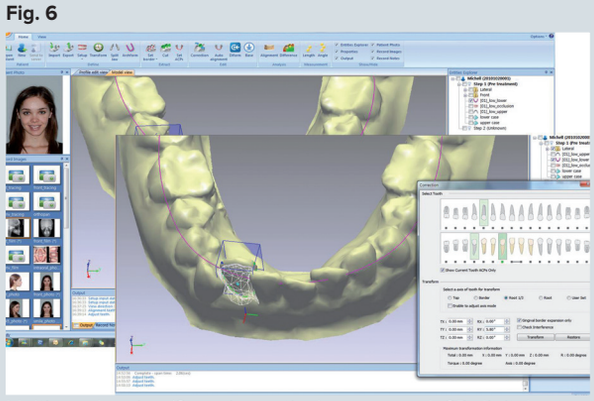
(2)Clear Aligner and e-Cligner®

At the end of Autumn 1998, I got a hint while watching the bubble from the soap in my bathroom. The beginning of this appliance was successful to treat relapse cases in a short term. The 'Clear Aligner' was born at that situation and named by me to expect to be used world widely without restriction. Recently, 'Clear Aligner' is famous name of several appliance companies without acknowledgement of namer, far east Asian.

Reviewing the journals, there are a lot of articles which declared the effectiveness of clear appliance or how to make it in the laboratory (Dr. Mcnamara, Ponitz etc.). To make Clear Aligner in laboratory, it required precise tooth movement before and after set-up model. CA-PRO (IV-Tech, Korea) is a software to overlap two digital photos at computer monitor to check the range of movement in each tooth. And 0.5 mm, 0.62 mm and 0.75 mm laminate foil are used to form the „Handmade Clear Aligner" by using heat generated vacuum former. Each thickness Clear Aligner is applied to the patient every week heading to the final goal. CAPRO-II is advanced software to use web camera enables fast set-up by technician. (Fig. 4) (Fig. 5)

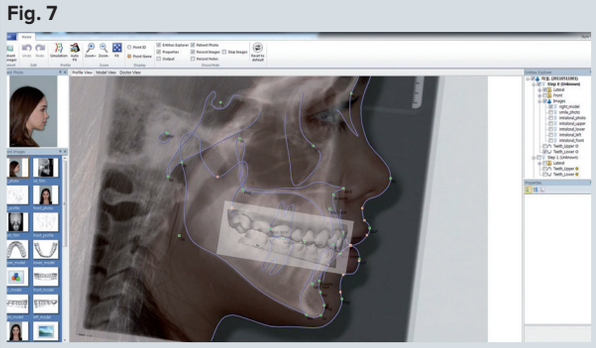
However, there has been a limit to make 'Handmade Clear Aligner' in the clinical application. The quality of Handmade Clear Aligner depends upon technicians experience, even CAPRO software exists. It happened tooth necrosis due to heavy orthodontic force, otherwise, it does not move the teeth at certain stage due to incorrect tooth movement. To overcome those problems, it is necessary to develop new eCligner® software with several conditions to distribute qualified aligners worldwide.

Fig. 6



Multi-overlapping (Superimpostion) among each 3D digital set-up model, enable to measure the distance and angle directly on the monitor. Each tooth shows current torque and angulation as to progress. Also it is possible to make it animation function to compare the each movement pattern. Color, tone change function is helpful to recognize complicated tooth movement among the steps.

Fig. 7



It is eCligner® program's advantage that doctors enable to make expected final set-up model by themselves, at the site, Doctor view. (eCligner® Dr. Program)

Fig. 8

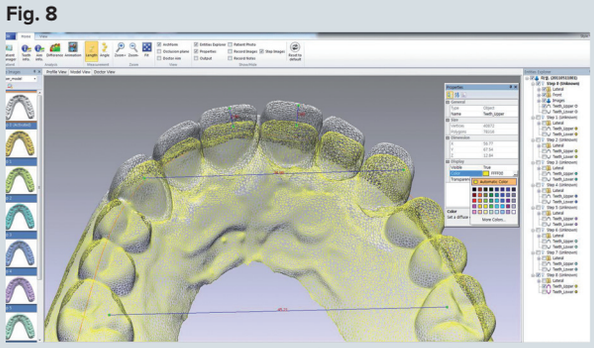


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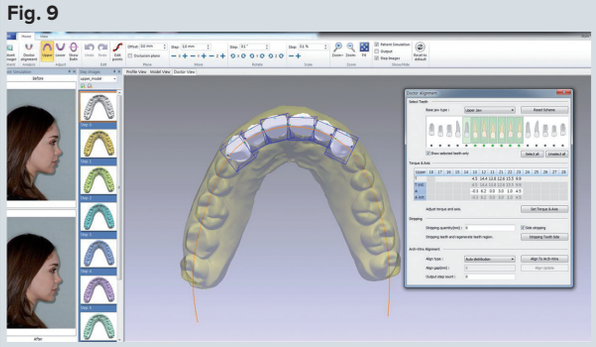
Fig. 9



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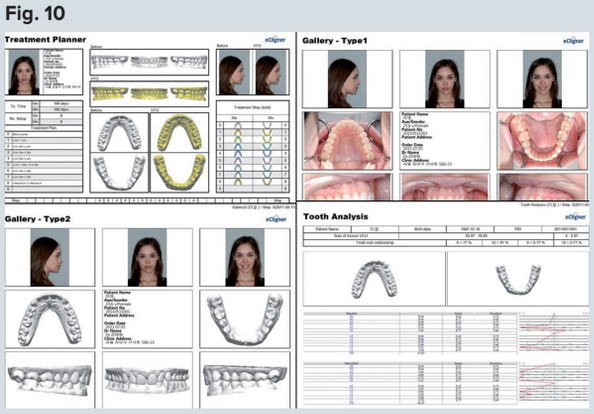
1. Basic principle is the same as Handmade Clear Aligner
2. Requires precise tooth movement in 3D motion (3D CAD/CAM)
3. Full 3D control for tooth movement.
4. 3D digital diagnostic data which provides to dental clinic.
5. Provides expected result, treatment time, profile change and number of appliance.
6. Solution when lost, intermission and relapsed case.
7. Website application through global internet.

New software, eCligner® main program has been developed under above conditions in 2011 by using advanced technology (eClear International, Korea), enables to control 3D tooth movement by digital adjustment (ser more at www.ecligner.com). (Fig. 6) (Fig. 7) (Fig. 8) (Fig. 9) (Fig. 10) (Fig. 11)

(3) Mechanic of eCligner®

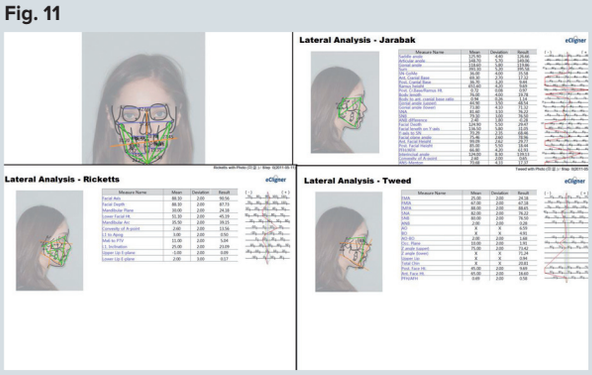
eCligner® System is to make aligners from printed set-up model by using eCligner® program. Each set-up model produces 3 pieces of different thickness laminate foil, each piece for one week use.(eq 5 set-up model produce 15 aligners for 15 weeks use.) Patient wears eCligner® for 17 hours a day except meal or hot drink. Therefore, patient wear time is important to reach expected result as designed at the beginning. Treatment Planner is a brief guideline throughout the whole treatment progress like road map. It includes expected treatment time, expected result, profile change and the amount of stripping when, where. Treatment Planner is also available to compare the border line case whether extraction or non-extraction at consulting period before treatment.

Fig. 10



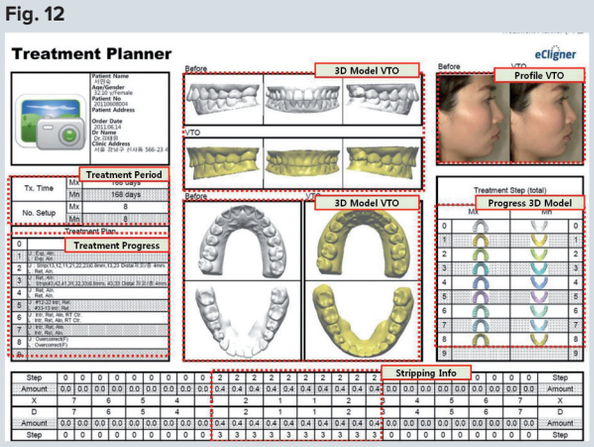
Various print function, photo galleries. Model analysis data is useful to determine the amount of stripping.

Fig. 11



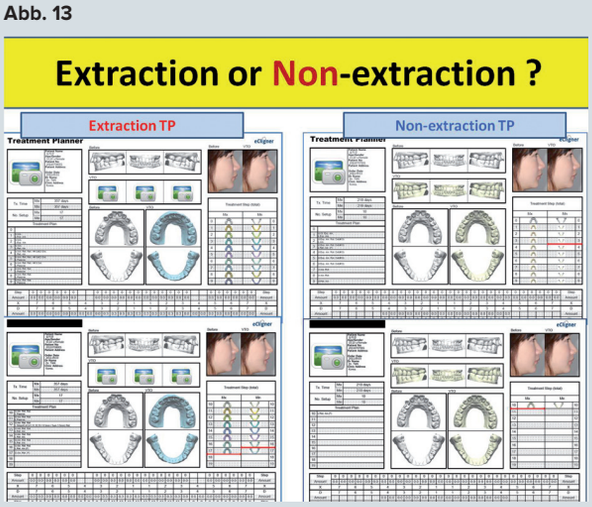
eCligner® diagnostic data, cephalo analysis (Tweed, Ricketts, Jarabak, Grummon), P-A view analysis.

Fig. 12



eCligner® Treatment Planner(TP), provides summarized data for expected result, treatment time, costs, movement pattern in each set-up and amount of stripping as well profile change.

Abb. 13



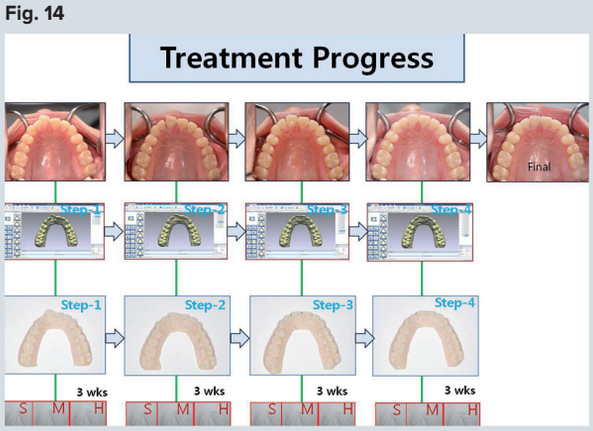
13 In border line case, eCligner® provides two TP, extraction and non-extraction, to compare the difference to consult with patient.

eCligner® is comfortable for patient to fit tightly and clear looking without pain. And different thickness aligners promote tooth movement gradually to avoid pain and uncertain irritation to periodontal ligament tissue, that is biological acceptable tooth movement. (Fig. 12) (Fig. 13) (Fig. 14) (Fig. 15) (Fig. 16) (Fig. 17) (Fig. 18)

A. Adult Treatment

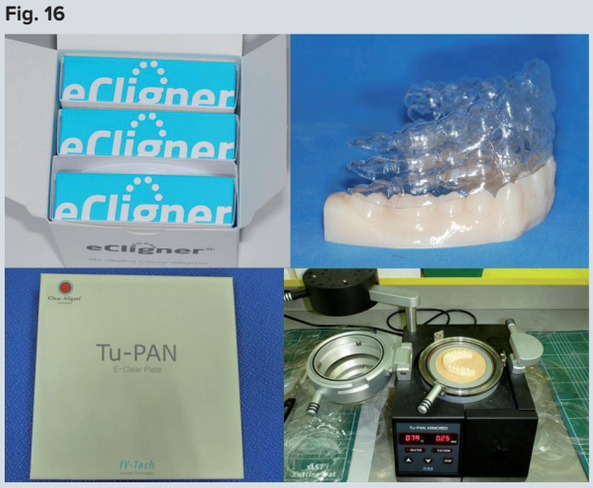
For adult patient, it requires 17 hours wearing time a day except meal time or hot drinking. Patient must wear the eCligner® every night time, clean the aligner with toothbrush every day. eCligner® is available to create a space for prosthodontic implant, extrusion treatment for periodontal purpose.

Fig. 14



Schematic view for eCligner® treatment progress

Fig. 16

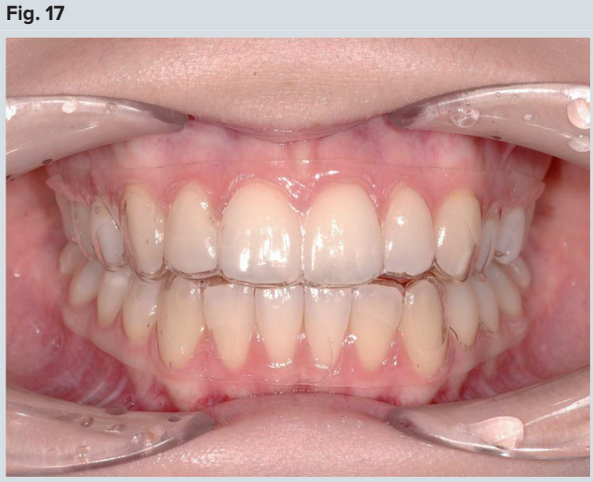


In case of trouble, just find the set-up model which is close to patient's present situation. And stamp the aligners in dental clinic without any special instruments. TuPan®(IV-Tech) is certified material for eCligner®. TuPan® Armored (IV-Tech) is vacuum former (needless air-pump connection)

Fig. 15

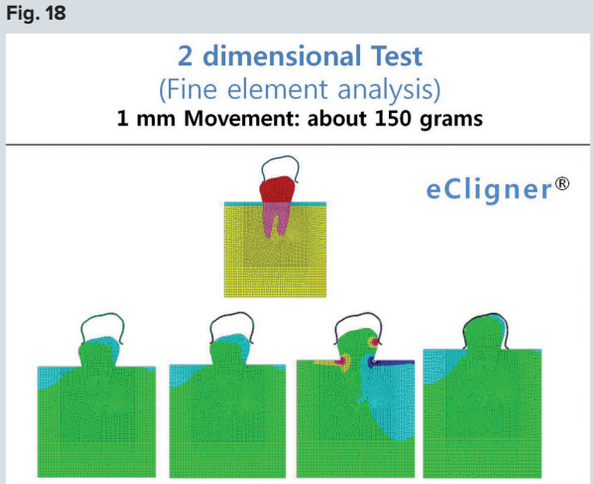
eCligner® supplies aligner and printed plastic set-up model both to doctor. It has advantages to manage the potential troubles (Lost, intermission and relapse etc.)

Fig. 17



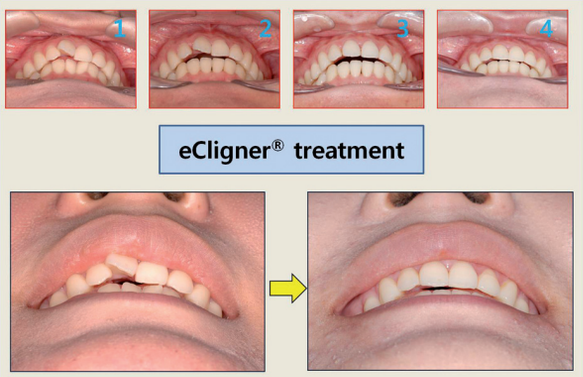
eCligner® enables to move the target tooth 1 mm per month. Because it has 3 different thickness aligners to create optimum force from light force progressively.

Fig. 18



2D fine element experiment study resulted in 150 grams generated from 1 mm tooth movement on 0.75 mm thickness TuPan®

Fig. 19



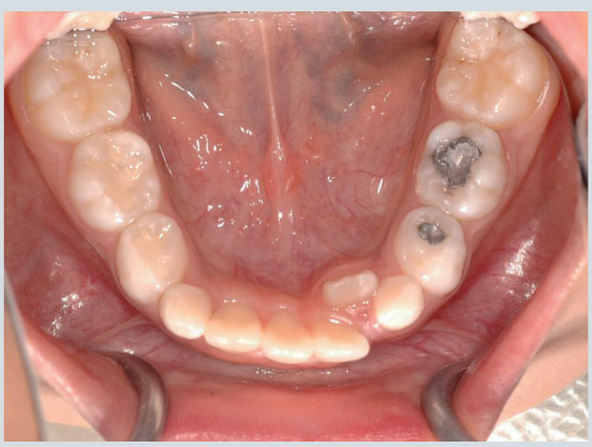
Crowding case. Treatment progress, finally smile was improved as to esthetic incisor position

3D simulation and data by eCligner® program will enhance the treatment agreement with patient. (Fig. 19)

B. Adolescent patient Treatment

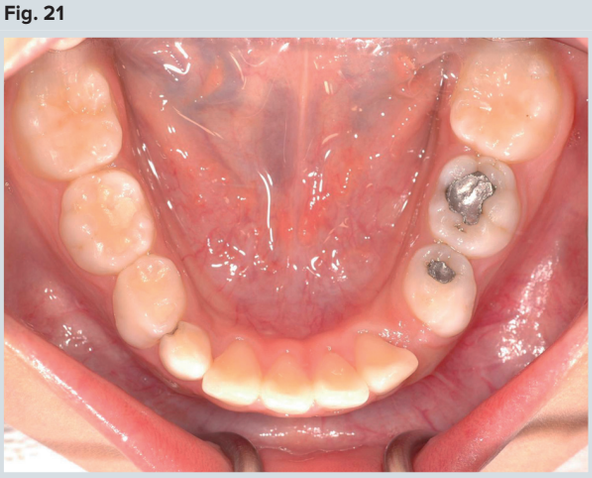
eCligner® is possible to apply to children under 14 ages for the purpose of interceptive orthodontic treatment. The roles of eCligner® are space maintaining, space regain, eruption guidance and growth control. Apart to adult patient, children must wear eCligner® 8~10 hours during sleep time. This means eCligner® does not bother and disturb their day life with comfortable and effectiveness for orthopedic control (growth hormone secretion is peak during the midnight for children). (Fig. 20) (Fig. 21)

Fig. 20



Adolescent patient showed lingually erupted lateral incisor, has been treated in a short term (5 months, night time wear)

Fig. 21



Newly positioned lateral incisor. It is not necessary to continue the orthodontic treatment at this stage. It is recommended to let the patient have natural eruption mechanic by patient itself.

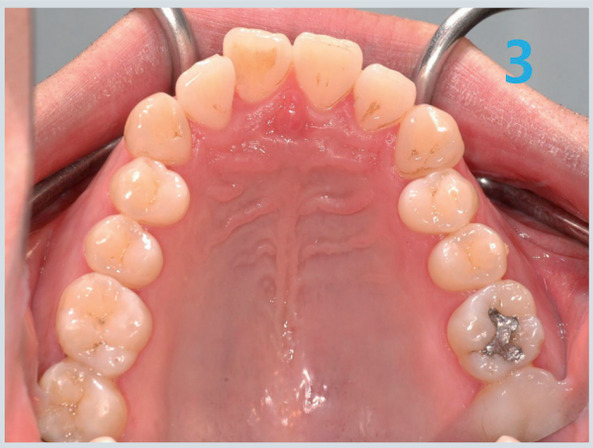
Fig. 22

Crowding case (upper jaw)

Fig. 23

Expansion movement was designed to create a space on upper anterior area.

Fig. 24



On progress.

Fig. 25

eCligner® Treatment was finished at this stage.

Fig. 26

Crowding case.(lower jaw)

Fig. 27

Anterior expansion + posterior distal movement were designed.

Fig. 28

On progress.

Fig. 29

eCligner® treatment was finished. Anterior and posterior alignment have been improved

1. eCligner® Applications

eCligner® is available to apply to minor tooth movement, crowding and spacing, and special need for prosthodontic and periodontic treatment. It is effective to retain the arch after orthodontic treatment as retainer or relapse breaker.

1. Minor Crowding (Fig. 22) (Fig. 23) (Fig. 24) (Fig. 25) (Fig. 26) (Fig. 27) (Fig. 28) (Fig. 29)
2. Spacing (Fig. 30) (Fig. 31)
3. Intrusion (Fig. 32) (Fig. 33)
4. Extrusion for detailing & occlusal seating (Fig. 34) (Fig. 35)

Fig. 30

Spacing case (59/F)

Fig. 31

Treatment was finished by eCligner® for 7 months

Fig. 32

Intrusion vector is critical movement to improve overbite situation related with the smile view (before and after)

Fig. 33

Figures Show improved smile view. Notice the upper and lower incisor relationship (before and after)

Fig. 34

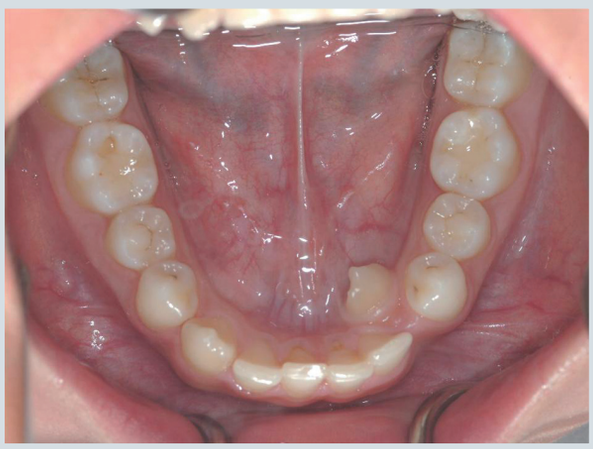
Open bite case (teen aged female)

Fig. 35

Corrected by Cow-catch eCligner® (extrusion movement for finishing and detailing)

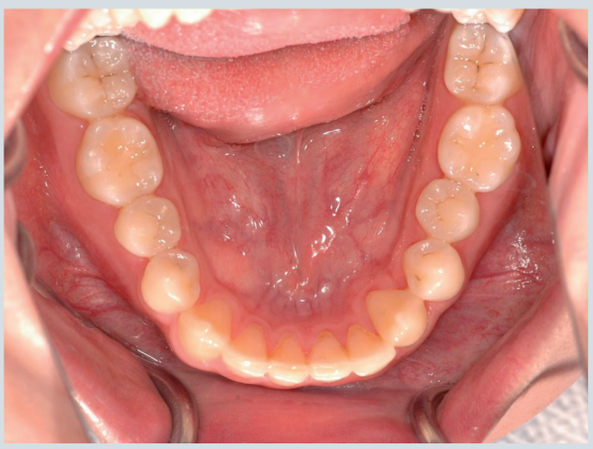
5. Children case (Fig. 36) (Fig. 37)
6. Expansion case (Fig. 38) (Fig. 39)
7. Relapse treatment (Fig. 40) (Fig. 41)
8. For prosthodontic purpose (Fig. 42) (Fig. 43)

Fig. 36



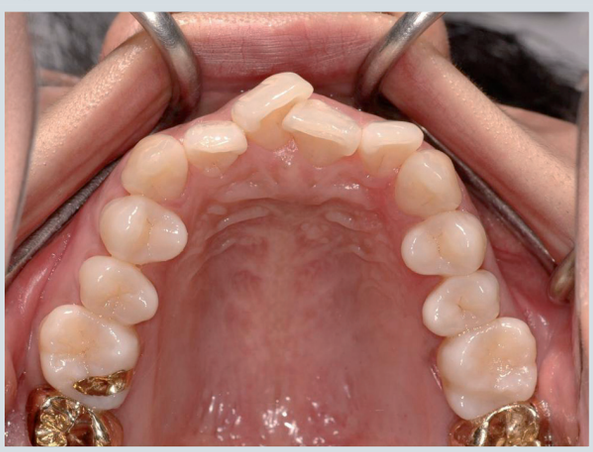
Ectopic erupted canine (14/M) It deteriorated patient's pronunciation.

Fig. 37



Night time wearing of eCligner® has improved crowding as well pronunciation

Fig. 38

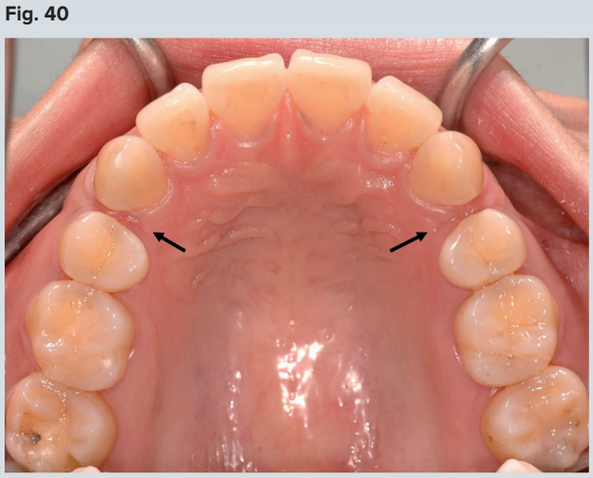


Crowding case.

Fig. 39

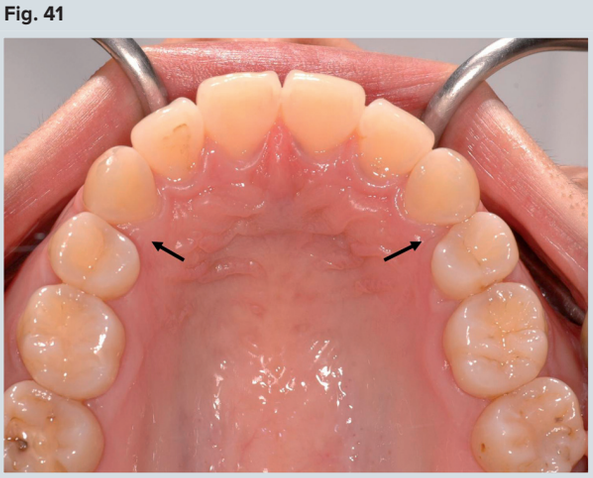
Expansion movement was settled to improve the anterior crowding by eCligner®.

Fig. 40



Relapse case on extracted area both left and right side.

Fig. 41



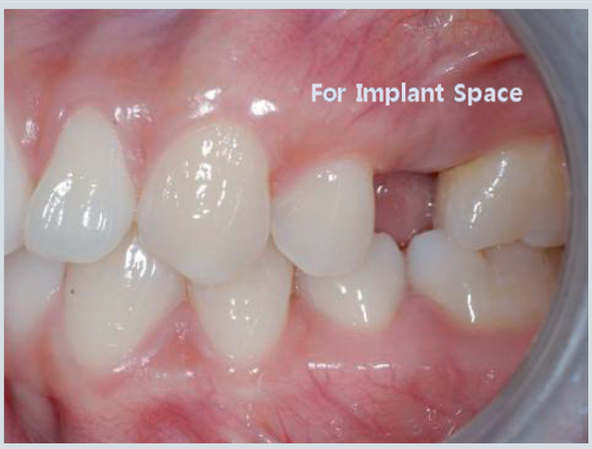
3 steps eCligner® has corrected relapsed space

9. For esthetic smile (Fig. 44) (Fig. 45) (Fig. 46)
10. Combination with whitening treatment (Fig. 47)

Fig. 42

Insufficient space for prosthodontic implant on second bicuspid area. Anterior spacing was shown (before treatment)

Fig. 43



A space was regained for implant and anterior spacing problem was solved

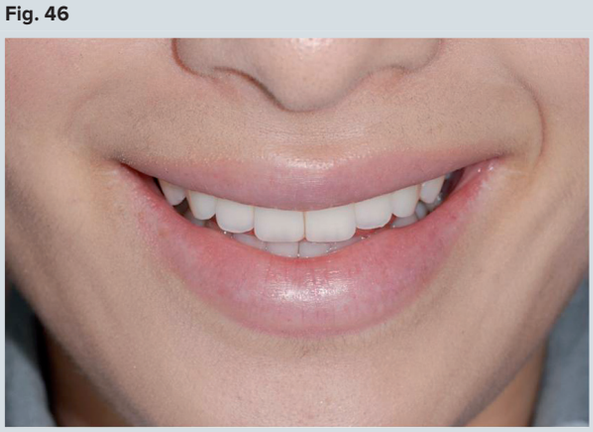
Fig. 44

One of the eCligner® goal is to improve patient smile view throughout the treatment. Ideal and esthetic incisor position and relationship lead to change the smile. It must be considered before eCligner® treatment to determine the treatment goal.

Fig. 45

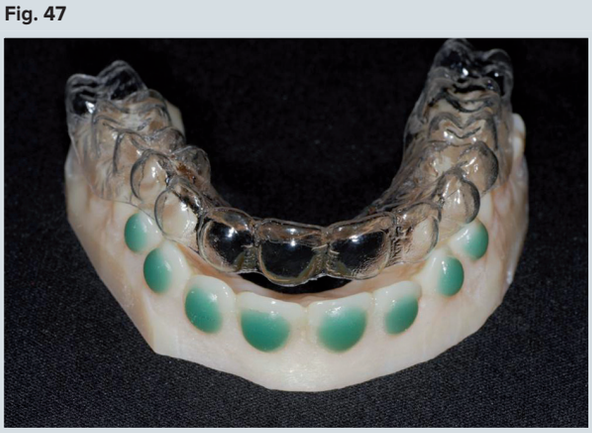
Double folded upper lip. (before)

Fig. 46



Improved smile by eCligner®.(after) Incisor position and relationship were improved with stripping procedure

Fig. 47



Whitening tray from each set-up model. eCligner® Orthodontic treatment and whitening treatment enable to combine simultaneously

How to Start

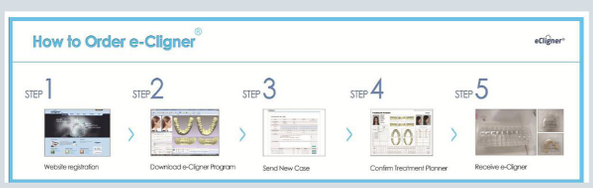
First of all, website registration is your first step to start eCligner® treatment.

1. Send plaster model to laboratory (agency), upload patient photo to website.
2. Treatment Planner will be sent back, consult with patient.
3. Confirm the case.
4. Receive the eCligner® with printed whole set-up-model. (Fig. 48) (Fig. 49) (Fig. 50)

Fig. 48

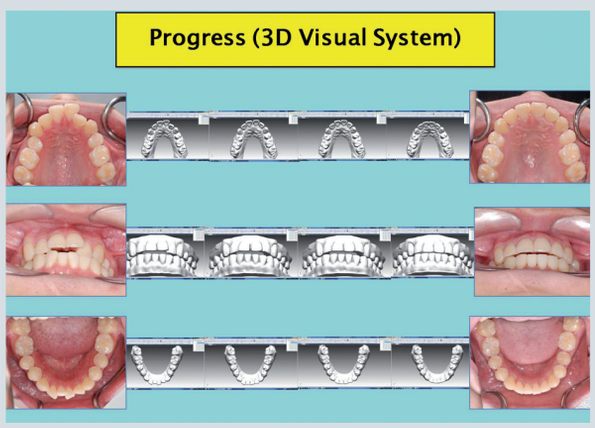
eCligner® website. (www.ecligner.com)

Fig. 49



Schematic view for 'How to Order'.

Fig. 50



Treatment progress view. Whole 3D progress (set-up) was established before eCligner® treatment.

Fig. 51

Check point: notice the transparency and eCligner® fitting before and after. It depends on patient cooperation upmostly.

Fig. 52

High transparency and just fitting shows the sign, previous good cooperation. Upon patient wearing time every day, optimal progress heads to final planned result.

Fig. 53

Check point: keep watching patient handling the eCligner®. It is helpful to recommend the patient how to insert or take out by eCligner® remover(IV-Tech).

2. eCligner® Patient Management

(1) Patient wear time

The recommended way is to confirm the transparency on current step aligner when patient visits. It is good co-operation when just fitting and transparency in patient mouth. Otherwise, it needs more time to wear current aligner till good transparency comes. (Fig. 51) (Fig. 52)

(2) Solution for lost, intermission and relapse

eCligner® provides aligners and plastic set-up model all together to dental clinic. If patient lost the aligners, just stamp the present step set-up model in dental clinic to provide it to patient. If patient stops aligner for a while, just find the set-up model similar to present arch form and stamp to restart the treatment.

Relapse after whole treatment, it is a solution to find matched set-up to patient present arch form and stamp the aligners from that step to the final. Also it is smart idea to show whole series of set-up model to the patient to realize the treatment progress before start eCligner®. (Fig. 53) (Fig. 54)

(3) Retain the treated arch after eCligner® treatment

eCligner® retainer retains the arch form after treatment. The first year after orthodontic treatment, patient must wear the retainer every night time. Since the second year, 3 nights per week wear is sufficient to prevent relapse. Since the third year, patient must wear the retainer one night per week. Retainer is exchanged every year when patient visit for follow up check annually. (Fig. 55)

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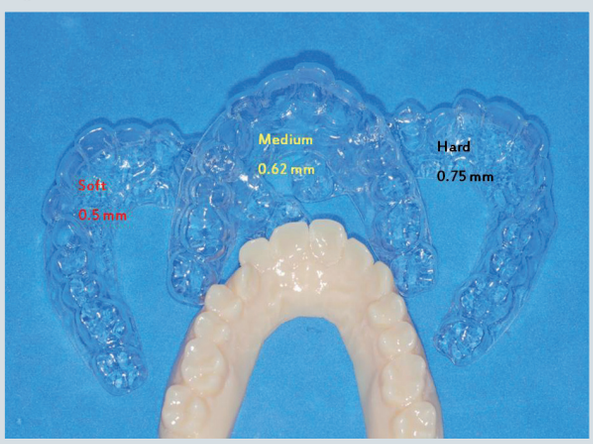
Fig. 54



Printed whole series of set-up models are useful to supply newly stamped eCligner® when trouble happens

Fig. 55

Removable eCligner® retainer combined with fixed retainer. eCligner® retainer does not always accompany the fixed retainer

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Fig. 56

e-Cligner-Zertifikatkurs in München

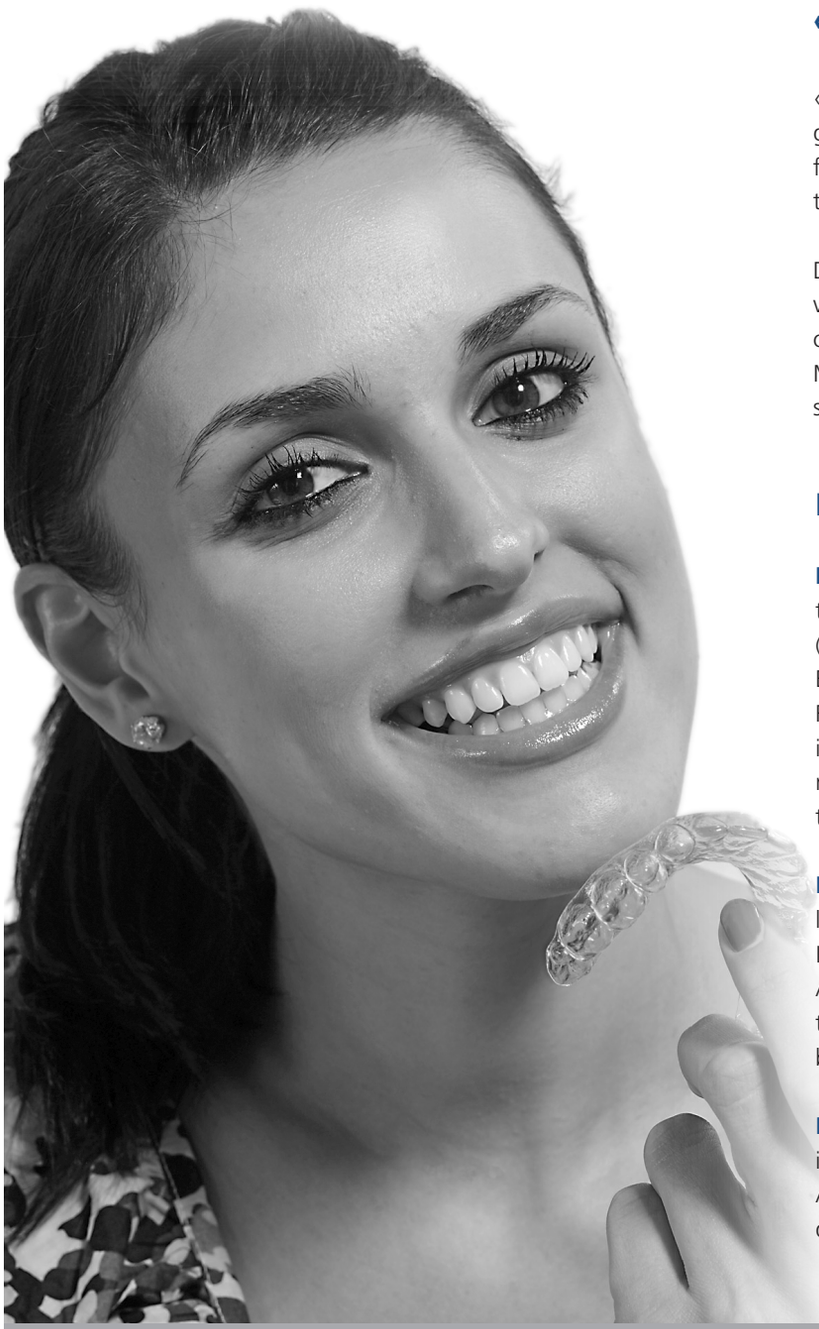
Fig. 57

Die Referenten beim e-Cligner-Zertifikatkurs in München und dann auch in 2012 in Köln,Berlin & Frankfurt: Dr. Helmut Gaugel, Prof. Dr. TaeWeon Kim, Dr. Nils Stucki (v.l.)

eCligner Zertifizierungskurse: 02.03.2012 Köln, 03.03.2012 Berlin, 07.09.2012 Frankfurt

Kursinhalt: Anwendung und Anwendungsbereich des eCligner Alignersystems und der eCligner 3D Technik

«eCligner 3D Aligner-Technologie – von Spezialisten für Spezialisten entwickelt»



«Willkommen in der Zukunft der Zahnschienen»

«Die Zukunft der nahezu unsichtbaren Zahnkorrektur hat längst begonnen. Wenn es darum geht, Zähne effizient, schnell und erst noch fast unsichtbar zu bewegen, setzt die neue eCligner 3D Behandlungstechnologie neue Maßstäbe in der modernen Kieferorthopädie.

Die Möglichkeit, Zahnfehlstellungen mit ästhetisch hochwertigen und vollständig digital hergestellten Schienen zu korrigieren, eröffnet Kieferorthopäden und Zahnärzten mit kieferorthopädischer Erfahrung die Möglichkeit, den größten Teil aller Zahnfehlstellungen bei Erwachsenen, Jugendlichen und Kindern zu behandeln.»

Referenten

Prof. Dr. TaeWeon Kim, Seoul, Südkorea gilt als eigentlicher Begründer der Aligner Schienentechnologie (Clear Aligner). Sein Wissen im Bereich von lingualen Behandlungssystemen und Minischrauben sowie seine Forschungen um die Alignertechnologie haben ihn zum international geschätzten Dozenten gemacht. Seine neuste Entwicklung, der 3D eCligner vereint alle wichtigen Komponenten der modernen Alignertechnologie.

Dr. Helmut Gaugel, Kieferorthopäde, Köln, Deutschland, von Beginn an Weggefährte von Prof. TaeWeon Kim, gibt gemeinsam mit ihm weltweit Seminare zu Alignerbehandlungen, auch bei Teens, und war wesentlich an der Verbreitung des Clear Aligner in Europa beteiligt.

Dr. Nils Stucki, Kieferorthopäde, Bern, Schweiz, internationaler Dozent, ausgewiesener Spezialist und Aligner Anwender der ersten Stunde mit über 1300 durch behandelten Patientenfällen.