

Clinical Approach to four bicuspid Extraction case

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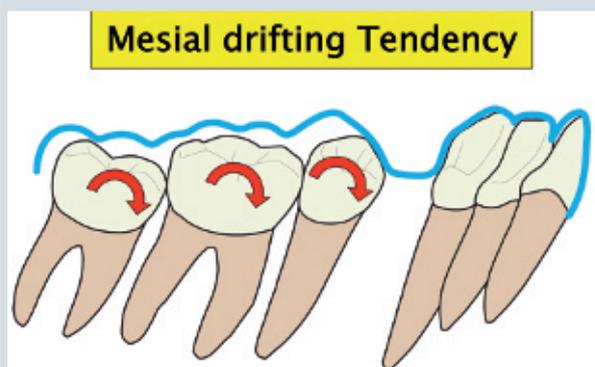
eClinger® Treatment for extraction case

For long term clinical studying, it has been observed that exclusive aligner treatment in extraction case is not able to control both incisor angulation and posterior mesial drifting tendency during incisors retraction. It is a controversy whether labial or lingual attachment is critical to achieve correctly controlled angulation in incisors at the end of treatment. Frequently, fixed appliance (bracket & wires) was applied to recover incorrect incisor angulation and/or mesial drifted posterior segment which have driven by aligner treatment since beginning. (Pic-1)

However, recently, newly developed eClinger® mechanic has been applied to prevent mesial drifting tendency on posterior segment, further, advanced clinical handling (dimple making by pliers) has a possibility to treat angulation correction in incisors during exclusive aligner treatment.

For incisor angulation control, moment created by pliers plays a role to achieve root movement in incisors during treatment. Four point dimple (labial and palatal or lingual) were added onto aligner at upper and lower point on indented tooth area, which reacts to create rotation moment to change tooth angulation. These

Abb. 1



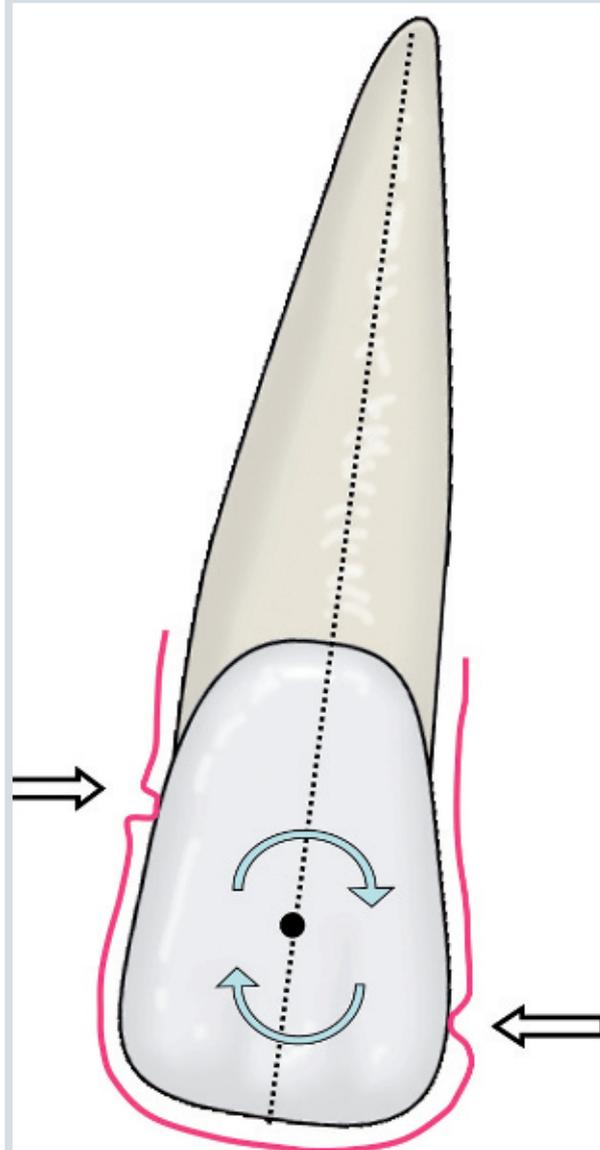
Potential side effect from aligner treatment in extraction case, posterior segment drifts forward with tipping mode, has a possibility to result in broken occlusion at final stage of treatment.

Abb. 3



Dimple formation figure and pliers action to put four dimples in one tooth indented aligner. It creates rotation moment inside the aligner, inducing root movement, results in root parallel configuration.

Abb. 2



moment operates root distal movement, counteracts crown distal tipping movement. (Pic-2, 3)

Mechanical action of aligner to dentition shows loose fitting at initial wear, and then drifts to close fitting at late stage (1 week later). It means that when initial loose fit, even orthodontic force is applying through contact to target teeth, it does not grasp the whole dentition firmly. Aligner's loosely fit is not able to prevent mesial drifting tendency on posterior segment. Rather, late coming close fitting begins to operate previous mesial tipped posterior segment upright.

It is an important point that patient good cooperation (17 hours/day wear) is a key factor to prevent mesial drifting on posterior segment at late stage of aligner use.

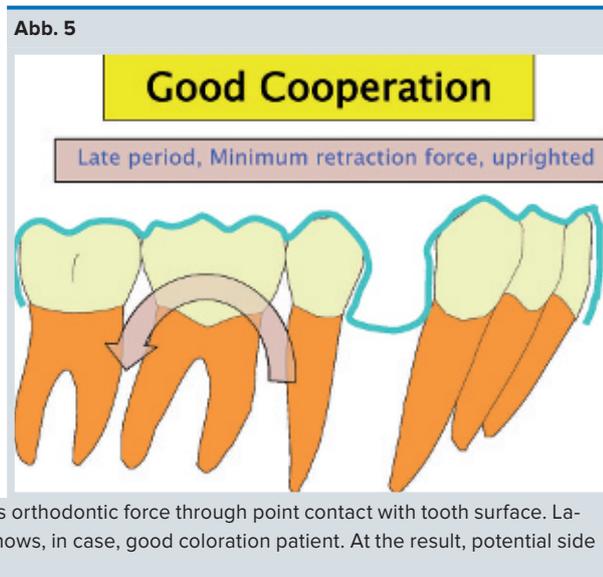
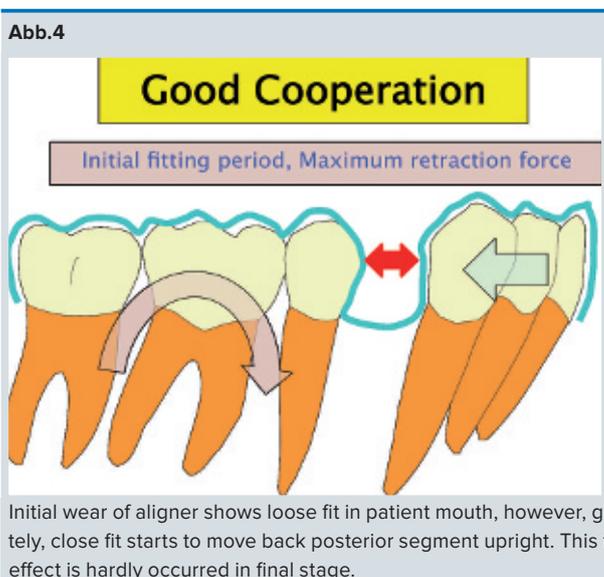
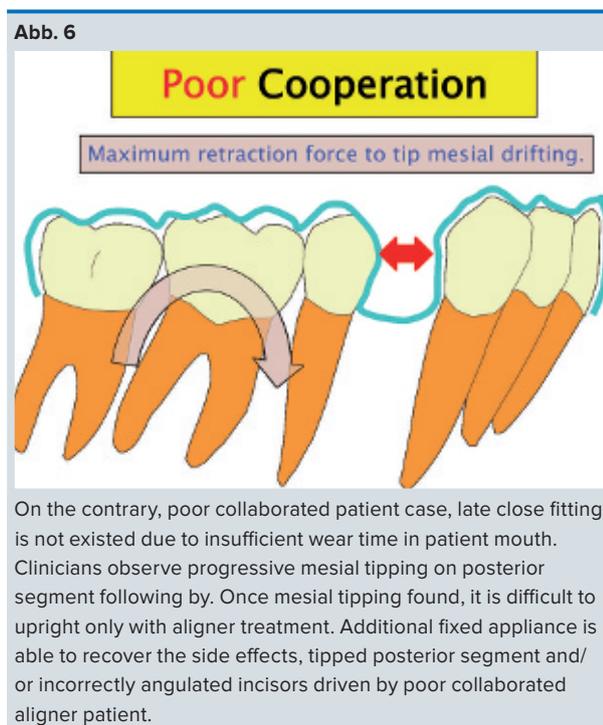
In aligner patient, therefore, mesial tipping on posterior segment in extraction case has been observed frequently in uncooperative patient group. For successful aligner treatment, patient management to keep 17 hours wearing a day is a key factor for eClinger® applications. (Pic-4, 5, 6)

Digital set-up has made to create continuous root movement in incisor teeth includes canine, and put dimples on each aligner, contributed to retract incisor segment without lingual tipping meanwhile intrusion vector keeping a balance for arch coordination in both maxilla and mandible.

Case report

Patient: 32 years old female patient
 cc: Crowding and protruded lips
 Tx. Plan: four bicuspid extraction
 Tx. Purpose: exclusive eClinger® treatment without bonding appliance.

This case shows anterior crowding with protruded lip in both upper and lower. Patient shows healthy periodontal status without systemic diseases. (Pic-7-12)



Treatment progress (Pic 13-75)

Abb. 7



Abb. 8



Abb. 9



Abb. 10



Abb. 11



Abb. 12



Abb. 13



Abb. 14



Abb. 15



After 1 month, upper and lower bicuspid extraction was performed, eClinger® was applied to move canine to make a space between incisor group.

Abb. 16



Abb. 17



Abb. 18



After 3 months, a space (1 mm) between lateral incisor and canine was observed. 4 dimples by pliers were made through this space with accessibility.

Abb. 19



Abb. 20



Abb. 21



After 5 months, upper and lower anterior dentition were almost aligned with expansion vector by eClinger®.

Abb. 22



Abb. 23



Abb. 24



After 7 months, anterior arch form has been improved and spaces retained in the arch for pliers accessibility.

Abb. 25



Abb. 26



Abb. 27



After 9 months, notice the spaces are retained at this moment still.

Abb. 28



Abb. 29



Abb. 30



After 11 months, aligner created root uprighting vector continuously.

Abb. 31



Abb. 32



Abb. 33



After 13 months, inter-canine width was still wide to avoid interruption with opposite arch.

Abb. 34



Abb. 35



Abb. 36



After 16 months, arch coordination is performed.

Abb. 37



Abb. 38



Abb. 39



After 17 months, mandibular right bicuspid found ideal position inside the arch.

Abb. 40



Abb. 41



Abb. 42



After 23 months, aligner treatment was completed.

Abb. 43



Abb. 44



Abb. 45



After 1 month, start with eClinger® with four bicuspid extraction.

Abb. 46



Abb. 47



Abb. 48



After 3 months, small gaps are found due to expansion eClinger®.

Abb. 49



Abb. 50



Abb. 51



After 5 months, alignment procedure is on going.

Abb. 52



Abb. 53



Abb. 54



After 7 months, intrusion vector reacts to anterior arch open for further retraction.

Abb. 55



Abb. 56



Abb. 57



After 9 months, it shows insufficient intrusion and angulation movement progress from insufficient wear time (poor collaboration) at this moment. Clinicians should work out to resolve this temporary trouble with encouraging the patient to get a good result as planned.

Abb. 58



Abb. 59



Abb. 60



After 11 months, it shows corrective aligner progress.

Abb. 61



Abb. 62



Abb. 63



After 13 months, extraction spaces are eliminated and picture shows slightly deep bite in current status.

Abb. 64



Abb. 65



Abb. 66



After 17 months, aligners are generating root movement force at this moment.

eClinger® was applied to treat with recommended 17 hours wear a day and patient changed next step new aligner every one week (one step includes 3 different

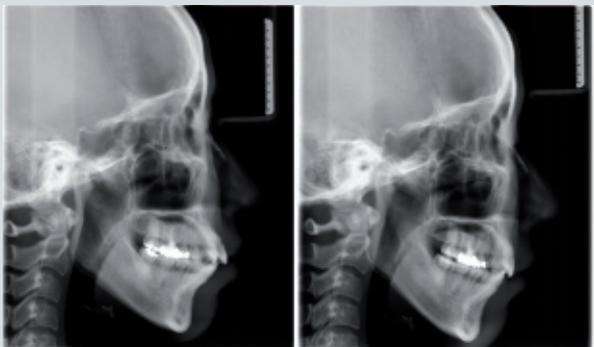
foil aligners for 3 weeks) Patient has visited every 6-9 weeks, X-ray was taken frequently to check incisor angulation.

Abb. 75



Smile change, left: before, right: after.

Abb. 73



Cephalometric x-ray, left: before, right: after. Pantomogram x-ray, upper: before, lower: after.

Abb. 74

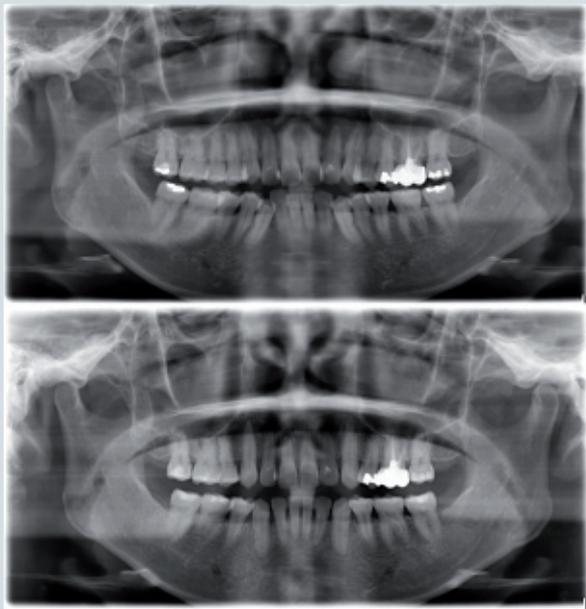


Abb. 67



Abb. 68



Abb. 69



After 21 months, to improve right posterior occlusion, CI II elastic with button (by pliers) was engaged onto eClinger® for next 3 months approximately.

Abb. 70



Abb. 71



Abb. 72



After 23 months, eClinger® treatment was completed.

For easy access by pliers, a space between lateral incisor and canine has been created and retained till the end of treatment.

For ideal occlusion on posterior segment, CI II elastic was applied for 3 months in late stage (19th month) to migrate molars into CI I relationship (CI II elastic and buttons by pliers).

Total treatment period: 23 months

Total eCligner® steps: 32 steps

Treatment result and Discussion

Four bicuspid extraction treatment with eCligner® was successfully went through no-bonding procedure in whole treatment period. Reviewing upon x-rays, incisor roots configuration is within normal range, and posterior molar occlusion is reasonable to perform masticatory function even improved pronunciations. Treatment period was delayed 3 months due to patient private life schedule. In each appointment, patient showed good collaboration to wear eCligner® approximately 14~17 hours every day. It was a main role to prevent mesial tipping continuously to the end of eCligner® treatment on posterior segment.

On cephalometric x-ray, bi-maxillary protrusion was improved through extraction, additionally result shows high anchorage value which comes from one of the advantages of eCligner® treatment, full coverage to dentition includes gingival area.

Conclusion

Aligner treatment, if it has come up with thorough manufacturing procedure under original orthodontic principle, perseveringly 17 hours wear a day, is possible to treat bicuspid extraction case with angulation control and maximum anchorage. Authors are wishing to expect further upgraded technology of eCligner® surely accomplish higher qualified result of extraction case near future.

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Abb. 76: The Authors



from left to right: Dr. Helmut Gaugel, Cologne (D), Prof. Dr. TaeWeon Kim, Seoul (Korea), Dr. Nils Stucki, Bern (CH)



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