TECHNOLOGY CASE REPORT

Class I with Deep Bite and Crowding Treated with Lingual, i-CAT & SureSmile

by Dr. Ed Lin

My first experience with lingual appliances came in the late 1990s, while I was an orthodontic resident at Northwestern University. The experience was enough to convince me that I never wanted to touch another lingual case again. However, when GAC came out with their self-ligating lingual brackets (Innovation-L), it definitely stirred my interest. When I saw how low-profile the Innovation-L brackets were and how easy they were to open and close, I was definitely open to trying out lingual again but only for anterior alignment cases. As I began treating several limited U3-3 and L3-3 lingual cases and began feeling more comfortable working with the Innovation-L appliances, I was one of several SureSmile orthodontists who began lobbying SureSmile to develop their software applications for lingual as well as for labial. For those of you who might be interested in learning more about SureSmile QT, SureSmile QT went into beta testing in January of 2009. At the 2010 AAO annual meeting, SureSmile released a limited launch of SureSmile QT that was only available to existing SureSmile customers who have demonstrated a proficiency in SureSmile's software applications. Having been actively involved with the development and testing of SureSmile QT, it is incredible for me to think how far they have come in only a little more than 18 months. I truly give the SureSmile team a great deal of credit in being able to develop such an incredible product in such a short period of time. As a result, I would like to share with all of you a SureSmile-Lingual case that I just completed last winter.

Patient Information:

The patient presented at his new patient examination as a healthy 41-year-old adult male. He stated that his chief complaint was that he wanted to have a nicer smile. He also stated that he was a professional airline pilot and because of his profession he wanted to be treated with an aesthetic orthodontic treatment option in as short of treatment time as possible.

Diagnosis and Etiology

Figure 1: Intraoral examination revealed a Class I molar and canine relationship on both sides. His overbite (OB) was deep at 60 percent and his overjet (OJ) was tight at 1mm. There was an increased lower curve of spee and excess upper and lower incisal wear due to his OB and OJ relationship. Arch length deficiencies were present in 7mm of his maxillary arch and 7mm in his mandibular arch. Both maxillary and mandibular arch forms were asymmetric and tapered. Periodontal evaluation revealed normal and healthy gingival tissue with no recession present.

Frontal facial evaluation revealed a symmetrical and balanced facial pattern. Profile facial evaluation revealed a straight profile with slightly prominent chin. His nasio-labial angle was 110 degrees and both upper and lower lips were normal and competent at repose. A frontal smile evaluation revealed acceptable upper and lower smile lines with buccal corridors present.

Figure 2: Cephalometric analysis revealed a Class I skeletal relationship with ANB=2. It also revealed a brachiocephalic facial pattern with a low MPA=26. His U1-SN=99 and IMPA=99 degrees were both within normal limits.

Figure 3: Panoramic evaluation revealed that all third molars had been extracted. Alveolar bone height in both maxillary and mandibular arches looked healthy and within normal limits. There were no other significant findings present.

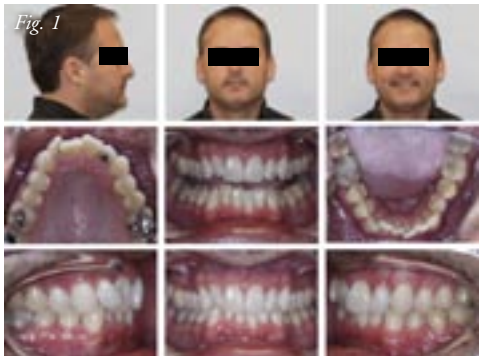
Fig. 1

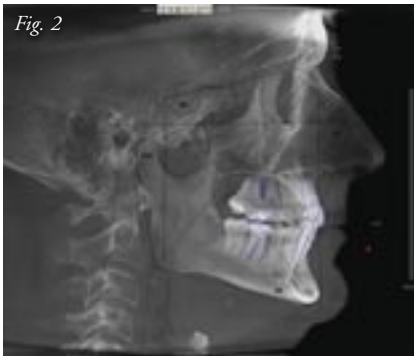
Fig. 2

continued on page 30

continued from page 29

Treatment Summary

The patient had requested to be treated with SureSmile and Innovation-L lingual fixed appliances due to his desires to be treated with an aesthetic orthodontic appliance and in the shortest treatment time possible. As a result, the lingual amalgam present for his UL2 needed to be replaced with a composite restoration by his general dentist prior to the placement of his Innovation-L brackets.

On February 24, 2009, 0.018 Innovation-L (GAC) fixed appliances were placed for U7-7 and L7-7 using our practice's indirect bonding technique. The UR2, LL1 and LR3 were not bonded due to significant rotations. Lingual 0.016 CuNiTi wires (G&H) were placed in both maxillary and mandibular arches with open coil NiTi springs placed for his UR2, LL1 and LR3. Bite turbos were also placed utilizing Herculite for his LL4, LL3, LR3 and LR4. On April 25, the patient was seen for his regular appointment and a bracket was placed on his UR2 (not in an ideal position) and the open coil NiTi springs were activated for his LL1 and LR3 (Fig. 4). Lingual 0.016 CuNiTi wires were replaced in both maxillary and mandibular arches. On June 24, the bracket for his UR2 was repositioned to a more ideal position and the lower bite turbos were removed as his bite had opened significantly (Fig. 5). Lingual 0.016 CuNiTi wires were replaced in both maxillary and mandibular arches.

On July 28, the patient began the SureSmile process. His upper and lower arch wires were removed and the Innovation-L bracket doors were closed. Upper and lower incisal manicuring was performed to give balance and symmetry to his incisal edges. An i-CAT-SureSmile scan (8cm height at 0.2 voxel setting) was then taken with a wax bite with the condyle seated in the glenoid fossa and leaving the patient's bite open 3mm. Because of the amalgam restorations present in his upper right and upper left posterior quadrants, and the root canal in his lower right posterior quadrant, a supplemental SureSmile ora-scan was also necessary for these three quadrants due to concerns with scatter with the i-CAT. Lingual 0.016 CuNiTi wires were replaced in both maxillary and mandibular arches (Fig. 6). On August 8, the patient's SureSmile plan was completed and his wires were ordered to be bent utilizing SureSmile's proprietary software and robots (Fig. 7).

On September 14, 0.016x0.022 SureSmile CuNiTi wires were inserted in both maxillary and mandibular arches. Clear plastic buttons were bonded on his UR3, UL3, LL3 and LL3 and 3/16in, 3.5oz vertical elastics were given to the patient to be worn at nighttime. On November 7, the patient returned and photos were taken (Fig. 8). 0.017x0.025 SureSmile CuNiTi wires were inserted in both maxillary and mandibular arches. The same vertical elastics were continued at nighttime only.

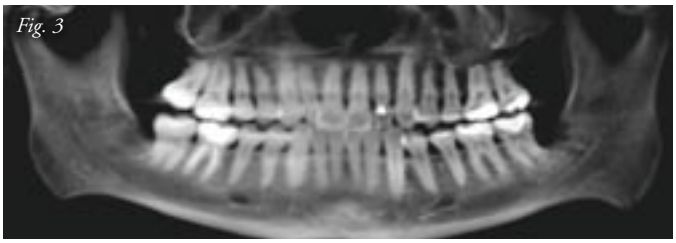
Fig. 3

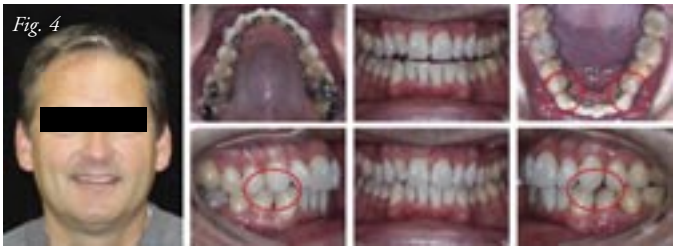
Fig. 4

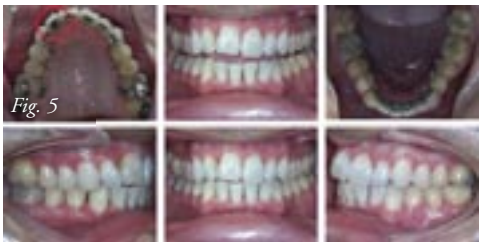
Fig. 5


Fig. 6

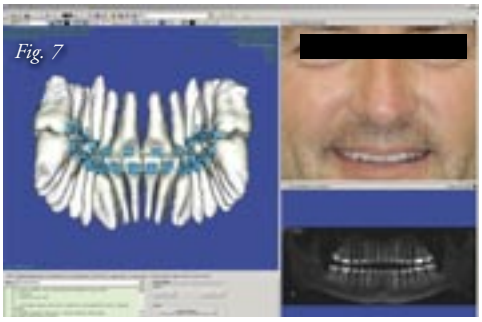
Fig. 7

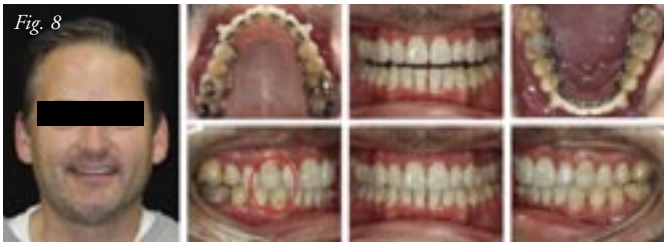
Fig. 8

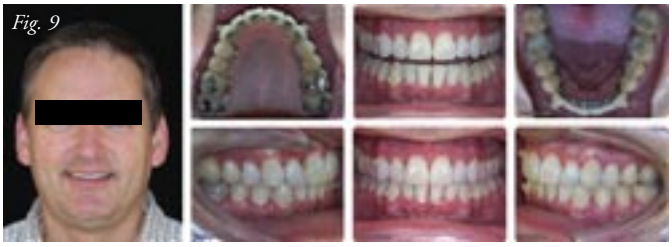
Fig. 9

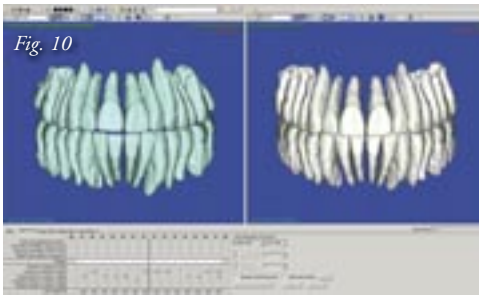
Fig. 10

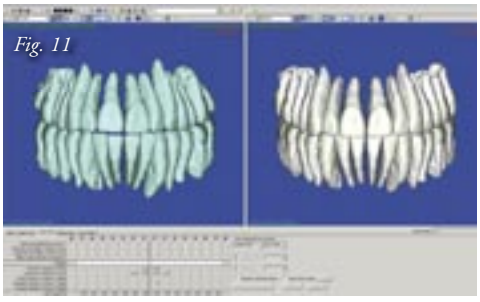
Fig. 11

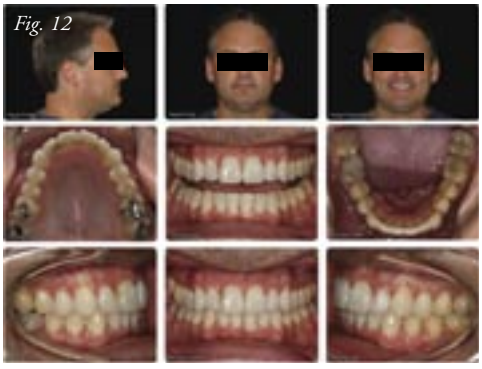
Fig. 12

On January 5, 2010, photos were taken again to track treatment progress and virtual wire bends were ordered using SureSmile's proprietary software to address some minor tooth alignment issues (Figs. 9-11). The plastic buttons were removed and vertical elastics were discontinued. On January 26, the patient returned to have his .017x0.025 SureSmile CuNiTi finishing wires inserted. On March 9, the patient returned to have his Innovation-L lingual fixed appliances debonded and moved him into retention with an Essix ACE retainer with full-time wear and a L3-3 fixed lingual splint. On July 27, the patient returned for final records, and retention wear of his Essix ACE retainer was reduced to night-time only (Figs. 12-14).

Summary and Conclusions

Total treatment time for this patient was 12.5 months. Total number of appointments from the initial bonding appointment to the debond appointment was 10, including one emergency appointment. I am truly amazed at the efficiencies of these phenomenal technologies of Innovation-L, SureSmile QT, and i-CAT and the fact that I can give my patients a completely aesthetic option for treatment in a significantly decreased treatment time.

I currently have approximately 75 SureSmile QT cases that are in treatment. Approximately two-thirds of my cases are in treatment with SureSmile QT in the upper arch and SureSmile for labial in the lower arch and approximately one-third of my cases are in treatment with SureSmile QT for both arches. I personally feel that SureSmile QT will be a great option for all of our patients, especially for those patients looking for a truly aesthetic option for orthodontic treatment and want to have their treatment completed in a shorter treatment time. Are there still lingual issues with SureSmile, such as inter-bracket distance? Absolutely. However, so far I have been impressed and what I do know is that technology only keeps getting better. ■

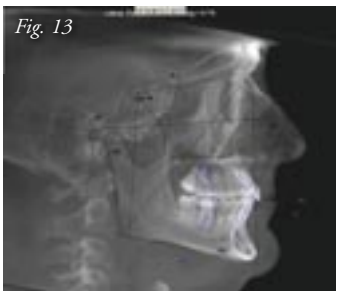
Fig. 13

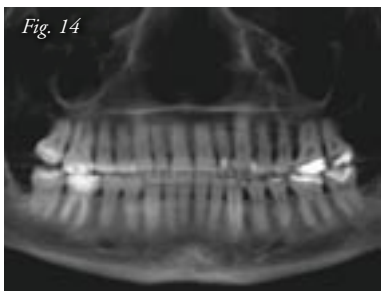
Fig. 14

Author's Bio

Internationally recognized speaker, **Dr. Ed Lin,** is a full-time practicing orthodontist and partner at both Orthodontic Specialists of Green Bay (OSGB), in Green Bay, Wisconsin, and also Apple Creek Orthodontics (ACO) in Appleton, Wisconsin. Dr Lin received both his dental and orthodontic degrees from Northwestern University Dental School ('95 - DDS and '99 - MS).