ISSN 2372-0808 (Print); ISSN 2372-0816 (Online)

SPRING 2021

the Journal

American Academy of Clear Aligners

The Academy for Clear Aligner Therapy

Case Reports

Isiah's Multi-disciplinary Restoration

by Steven Glassman, DDS, Frank Celenza, DDS, and Ryan Wagner

Dr. Steven Glassman reached the level of Invisalign® Elite Advantage Provider in 2005 and has been treating Invisalign patients since 2003 at the prestigious New York City practice he owns with his wife. In addition to being a successful practitioner, Dr. Glassman has published several articles on Invisalign technology, implants, and restorative and laser dentistry in well-regarded publications, including *Inside Dentistry* and *Contemporary Esthetics Magazine*. He has been invited to lecture about Invisalign Clear Aligner Therapy at hospitals and universities across the country. Dr. Glassman won the Invisalign Case Shoot-out in 2005 at the GP Summit. He is a proud graduate of Brandeis University and the Columbia University School of Dental and Oral Surgery. In 2018 he was named to the Zimmer Biomet faculty, adding to the digital workflow of aligners and implants. In 2020, he received the faculty award for 15 years of service.

Abstract

This case will demonstrate the use of Clear Aligners to

1. achieve proper setup for the restoration of the patient's "peg" lateral (tooth #7) and congenitally missing lateral (tooth #10), and
2. treat the malocclusion, specifically lower left first bicuspid (tooth #21) crossbite, upper spacing, and lower crowding.

This case will also showcase digital planning for final restoration that includes minimal restorative treatment involving a crown on tooth #7, and implant restoration, abutment, and crown on tooth #10 (**Figure 1**).

Materials and methods

One of the most important challenges to this case (**Figure 2**) would be to ensure the parallel, if not divergent, root alignment of the upper left central incisor and cuspid (teeth #9 and 11), to allow proper implant placement and restoration for the missing lateral incisor. Since these are the longest-rooted teeth in the arch, and given the limitations of removable appliances for controlling root alignment, the design of the appliance and its proper implementation would be critical to success.

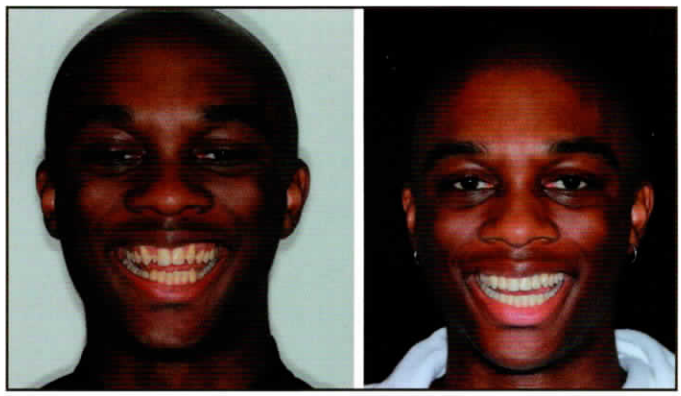

Figure 1: before and after treatment.

Of primary importance was the design of the attachments. Although the dual-spike attachment is designed to facilitate root control and is the default attachment for this purpose, greater surface area was needed to effectively distalize the cuspid and ensure that the movement did not incur tipping.

Further, throughout the course of treatment, it was necessary to monitor progress via periapical radiograph, as merely relying upon clinical crown position can often be misleading. This last point cannot be overstressed (**Figure 3**).

Consequently, the attachments used for both the central incisor and the cuspid were long vertical boxes, beveled toward the edentulous site. This ensured that an additional ledge of surface area was offered to the aligner to exert force for space opening (which in this case was largely the distalization of the cuspid). As a case like this one unfolds, the clinician must observe the engagement of these attachments by the aligners at every appointment, and if it is noted that the attachment is no longer intimately engaged, a Refinement is indicated immediately to recapture the intended movement.

Moreover, anticipating that challenges to the desired movements might be incurred, we included other features in the design from the very outset. This included the provision for a left side Class II elastic, by virtue of a precision cut at the cuspid and a button cutout at the lower left first or second molar (**Figure 4**). Additionally, our design called for the movements of the central incisor and cuspid to be overcorrected by 5 to 10 degrees of root tip, as the aligners might not fully express. However, although we designed these features in from the outset, as the case unfolded we chose not to implement the Class II elastic, as the movements proceeded satisfactorily without it.

In cases such as this, when the space opening for the lateral incisor is judged to be sufficient, the clinician can proceed with implant placement. This requires that

- the midlines are coincident,
- the left cuspid is in a Class I relation, and
- the roots are observed to be parallel, if not divergent, as observed radiographically.

Further details in other areas of the dentition need not be completed if these goals are achieved. Implant placement (and osseointegration) can proceed as the last details of the orthodontic sequence are accomplished simultaneously with implant management. In other words, therapy of various specialties can be overlapped, and it is not necessary to complete each modality before initiating the next. This makes it possible to complete the case faster.

We achieved further expedition of the case through acceleration technology. The patient applied micropulsation

Dr. Frank Celenza is a second-generation dentist, son of an internationally acclaimed teacher, author, and speaker in the field of prosthodontics. Dr. Celenza Jr. is uniquely dual-certified in both orthodontics and periodontics.

This dual specialty positions him to a deeper appreciation and understanding of the adult dentition, from treatment planning to treatment execution. He has been involved in postgraduate teaching for over 20 years, is widely published in the dental literature, and has written many textbook chapters. Dr. Celenza has pioneered techniques and innovations in his field, and his work combining implant dentistry with orthodontics was groundbreaking.

Outside of dentistry, Dr. Celenza is passionate about motor sports, cycling, and bass guitar. He was raised on Long Island, New York, resides in New Jersey, and has 3 children.

Dr. Celenza has offices in New York City and Westchester County, New York.

Figure 2: before treatment. Note peg-shaped #7, missing #10, crossbite #21, upper spacing and lower crowding.

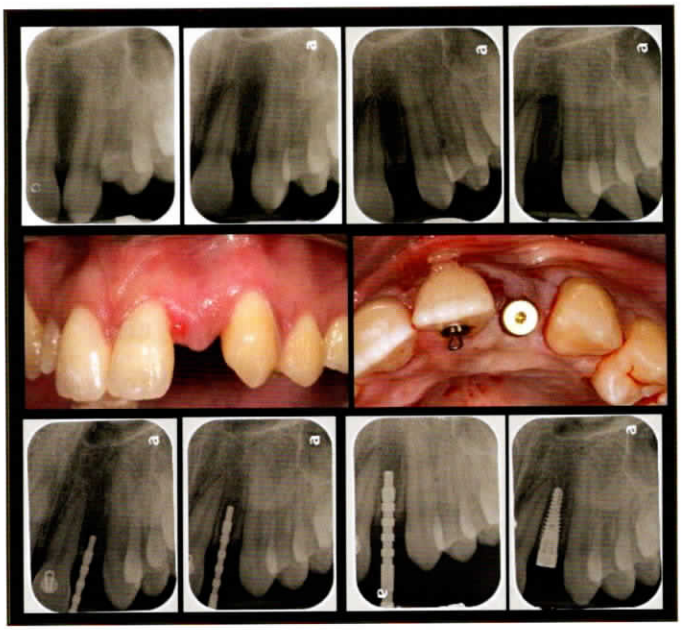

Figure 3: creation of sufficient space and placement of implant #10. Note the importance of radiographic monitoring as the space develops. Merely relying upon clinical crown position can often be misleading.

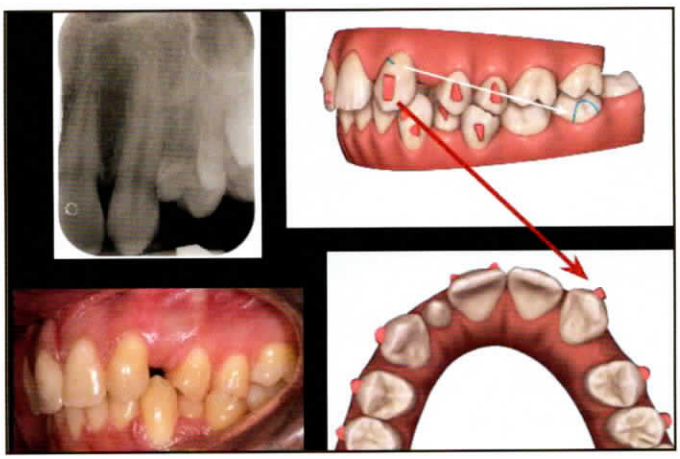

Figure 4: provision for a left side Class II elastic. Movements proceeded satisfactorily without it.

stimulus to his teeth on a daily basis throughout the treatment, using the AcceleDent device according to the manufacturer's direction.

We performed implant placement under local anesthesia, using a largely flapless approach, and again monitoring the procedure radiographically. Implant procedure is as follows: The first 2.5 mm diameter drill is introduced to the osteotomy site to 1/3 depth, and checked radiographically with a guide pin in place. This is followed by drilling to half depth and correcting for any directional needs, and again taking a periapical radiograph with a guide pin placed. If the clinician is confident that the angulation is correct, the osteotomy can be completed to full depth and diameter, and a tapered profile implant (Thommen SPI Contact RC Inicell 3.5 × 11.0) placed. Proper coverage (by healing abutment) is followed by any necessary tissue closure, and the aligner is checked to ensure that there is no contact with the head of the fixture. Further

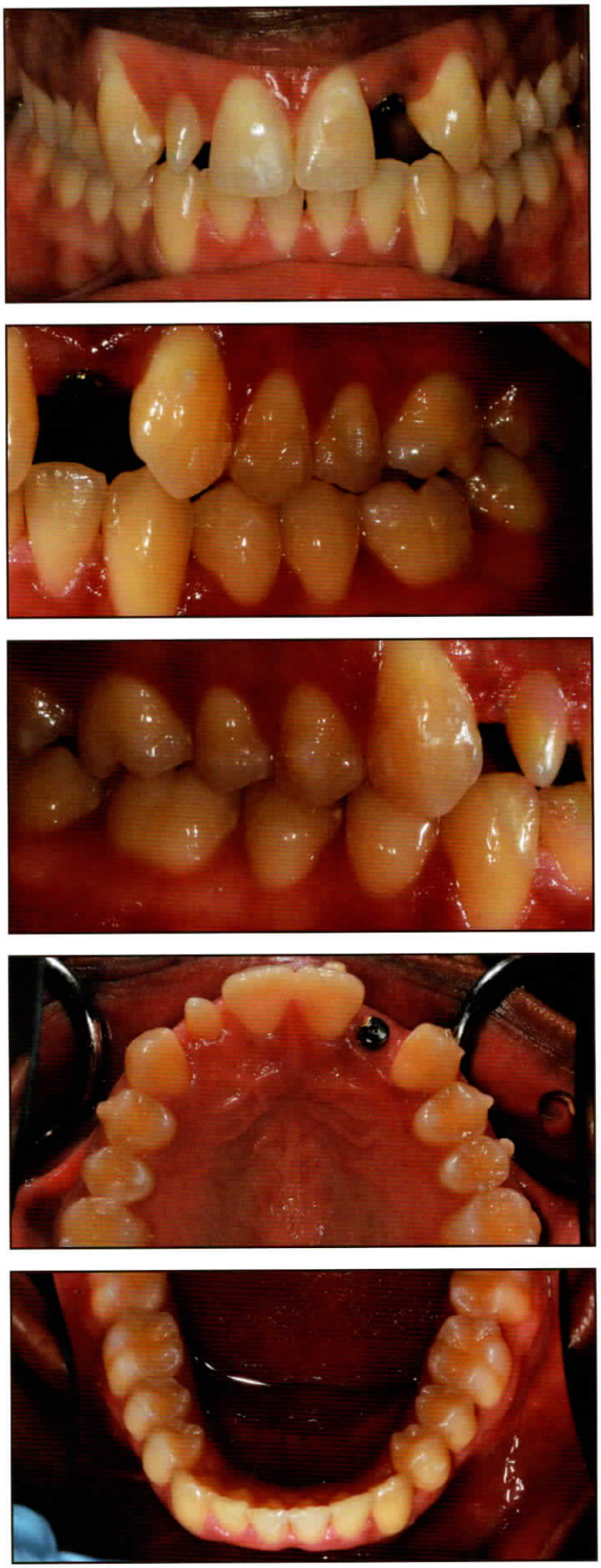

Figure 5: after Invisalign movement and after implant placement.

and finishing aligner treatment steps can ensue, as proper time for osseointegration is allowed to elapse. The time needed is a function of the bone quality, initial stabilization, soft tissue maturation, and other factors.

In this case we allowed 10 to 12 weeks. Following that time, we directed the patient back to the restorative dentist for restoration (**Figure 5**).

The orthodontic treatment required 44 sets of initial aligners, which the patient wore with weekly changes in conjunction with acceleration, for a total of 44 weeks. This was followed by 10 sets of Refinement aligners, for an additional 10 weeks.

Final restorative treatment

The patient returned to the general dental office after the implant had integrated and the Invisalign treatment was completed. After taking photos and an iTero scan, we worked the case up digitally through a dental lab that used the 3Shape software program to plan the restoration on the peg lateral (tooth #7) and the implant restoration (tooth #10). The laboratory printed a model from the designed case along with a clear matrix.

Ryan Wagner is a senior at Elon University in North Carolina, in pursuit of attending dental school in the fall of 2021. He has conducted behavioral research, tutored, and volunteered both at local clinics and in the greater Elon community. Ryan spends his free time traveling, painting, and participating in real estate renovation projects. He has honed his technical and personal skills working at Dr. Glassman's New York City dental practice, and is eager to join the wonderful profession of dentistry.

The patient returned a week later, and we prepared teeth #7 and #10 for the next step in final restoration. We anesthetized the patient and prepared #7 for a full crown. We used the temporary metal abutment at #10 to support a screw-retained bisGMA provisional restoration to develop the soft tissue for optimal soft-tissue esthetics.

We explained to the patient that we would continue to monitor the esthetics of the case and adjust the provisionals as needed. The patient also underwent in-office whitening at this point. Photos of the provisionals were taken and evaluated.

After 2 months, the patient returned for final evaluation. We took final scans of the prep on tooth #7 and (using a scan body) of the Thommen implant at #10. It was important to capture the developed gingiva and emergence profile of #10. iTero offers the ability to take a pre-scan of the provisional, which the

Figure 6: after treatment.

lab can use to determine the outline of the provisionals of the prepped teeth and soft tissue of the implant.

At this appointment, we discussed with the patient any possible changes from the provisionals to the final restoration, and also final color changes after the whitening. One of the challenges in making a natural implant restoration is masking any metal from the implant platform subgingivally so that a greyness will not show through the gingiva. The restorations we chose were lithium disilicate, with a gold-hue custom CAD abutment. The lithium disilicate crown would be cemented (using Improv cement) to the abutment. The patient then returned to the ortho/periodontist to be scanned for Vivera retainers (**Figure 6**).

Conclusion

The authors have presented the treatment of a commonly encountered case type: namely, a congenitally missing maxillary lateral incisor, which is frequently accompanied by a misshapen (or peg) contralateral incisor. A challenging treatment plan was carried out using modern digital technologies and planning strategies. The case was first set up orthodontically, using aligner appliances in conjunction with acceleration technology. The next phase was surgical implant placement, followed by digital restorative methodology. The clinicians attained a pleasing result both esthetically and functionally, in a very reasonable time frame, with no untoward side effects.

With the movement from analog to digital technology, this has become our mantra: "In order to plan, we must first digitally scan." ■