Conservative approach to multidisciplinary aesthetic dental treatment

By Konstas Giannakeopoulos, Greece

The aesthetic performance of dental restorations has always been a factor of utmost importance in the success or failure of the treatment. Lately, as aesthetic awareness of the population increases and the evolution of dental materials has made new techniques possible, optimal aesthetics can be achieved following less invasive restorative procedures. In many cases, multidisciplinary treatment is necessary so that the best possible outcome is achieved with a minimum degree of compromise between invasiveness and aesthetics. Every complex case should be treated planned by a team of specialists, so that every detail and limitation from each point of view is taken into account. The restorative dentist usually designs the smile and oversees each phase of the treatment by all other specialists.

Congenitally missing lateral incisors are a common dental problem that can be ethically dealt in three different ways: 1. canine substitution, 2. tooth supported restoration, and 3. implant supported restoration. Tooth auto transplantation (usually premolar) and removable partial dentures are other, less commonly applied treatment options. In the case of only one lateral incisor missing, an additional problem of symmetry between the right and left side usually exists and needs to be addressed.

Peg shaped lateral incisors pose another aesthetic problem that is usually restored with as follows: 1. all ceramic crowns, 2. porcelain veneers, and 5. direct or indirect composite veneers. Additionally to the inadequate width and length of the peg shaped lateral, many times there is also a gingival aesthetic problem that can lead to a square looking restoration and too much gingival tissue display if not properly treatment planned with either orthodontic intrusion or gingivoplasty/gingivectomy before the restoration is fabricated.

In this article, a case is reported of a young patient with one congenitally missing and one peg shaped lateral incisor. The patient was treated with a combination of orthodontics, periodontal surgery and aesthetic – restorative dentistry interventions.

Case report

A 22 year old Caucasian female presented to the clinic asking for aesthetic improvement of her smile. The patient was single and a student of law school. The medical history was unremarkable with no pathologies and no known allergic reactions reported to any kind of medication. No medications were taken on a systematic basis by the patient. The dental history was also unremarkable with only preventive and minor operative dentistry interventions and prophylaxis in the past. The patient mentioned a history of congenitally missing teeth in her family.

The chief complaint of the patient was spaces between the teeth and specifically the missing upper left lateral incisor tooth, the irregularly shaped upper right lateral incisor, and the diastema between teeth #11 and 21. Also, she was concerned about asymmetries in her smile and misalignment of her teeth. Finally, the patient stated she would like to have a brighter smile (Figures 1-5).

The dental examination revealed no pathological findings or signs of dental disease. The DMFT was low and the comprehensive periodontal examination was within normal limits; soft tissue examination resulted in no pathological findings; radiographic betweening examination revealed no pathological findings as well.

The aesthetic evaluation of her smile resulted in the following issues that would need to be addressed in the treatment plan: 1. peg shaped lateral incisor #12, 2. congenitally missing lateral incisor #22 with diastema between #11 and 21, 3. dental midline shift, 4. asymmetry between the left and right side especially in the space between #11-13 and #21-23, 5. gummy smile, especially on the area of #12 and the missing tooth #22, and 6. the gingival zenith was asymmetrical between #11 and 21 (Figures 4-6, Table 1). The occlusion was Class I. The base shade of the teeth was A5 on the upper central incisors and A3.5 on the upper canines with the Vita Classical shade guide (Vita Zahnfabrik, Bad Sackingen, Germany).

Photographs and alginate impressions were taken in the exam appointment to fabricate study models. Then the team of aesthetic/restorative dentist, orthodontist and periodontist treatment planned the case. The recommended treatment plan was accepted by the patient in favor of the alternative treatment plans.

Orthodontic phase

The orthodontic treatment goals were as follows: 1. intrude #11 to align the incisal edges of the centrals, 2. equalize the spaces between #11-15 and #21-25, 3. transfer the dental midline to the left, and 4. correct misalignments and minor rotations in different areas. Some composite resin was bonded on the facial surface of tooth #12 to facilitate bracket placement. The composite was white in shade to

Table 1: Teeth and spaces between them were measured. The proportions of the teeth (length to width ratio) and the arrangement of the spaces are crucial information in treatment planning, especially in patients with a high lip line.
A multi-disciplinary approach to minimally invasive functional aesthetic dentistry

By Dr. Tif Qureshi, UK

Simple tooth alignment is rapidly becoming accepted as the norm in cases that previously would have been treated with porcelain veneers. However, patients often present with a mix of problems such as previous metal ceramic work, the treatment of which should be integrated as part of the treatment plan. Timing becomes a vital part of the treatment when mixing restorative care, alignment, tooth whitening and occlusal planning. The following case illustrates an effective approach to treatment.

Case report
A patient presented complaining that “his two front teeth [old upper anterior crowns] felt as if they were too large and were always hitting the lower teeth”. In addition, his bite never felt “right” (Figure 1). He also wanted to try to make the best of his own teeth.

Examination
On inspection, it was clear there were several issues:
1. Occlusion - The irregular alignment of the lowers and the thickness of the upper old crowns were adding to the problem of unbalanced anterior contacts. The back of the crowns, especially the upper left central, were hitting the front of his lower teeth, in particular the lower left central.

A heavy, not long centric contact was present in MIP, which was causing slight deflection of the central. This meant that the upper central crown had been placed quite labially and because it was metal ceramic, made it feel particularly thick.

2. Thickness/aesthetics - The occlusion meant that the upper crowns had been placed quite labially and because they were metal ceramic, made them feel particularly thick. They also appeared rather opaque.

3. Lower crowding - The patient was also keen to improve the aesthetics of the lower teeth as the incisors had an irregular outline. The incisal edges appeared to be of different heights. This was down to the varying anterior-posterior position.

4. Colour - The old crowns had been made at A3/A3.5 and the natural teeth had darkened a little with age.

Treatment plan
A combination of techniques and good timing can make sure we optimize the opportunity for treatment. In this case, the treatment plan was as follows:

1. Remove the two upper crowns and replace them with temporary composite crowns.

2. Simultaneously fit a lower Inman Aligner to align the lower incisors into a better functional position, while using bespoke clear aligners to slightly tilt the uppers into better alignment. The rationale for using upper clear aligners and a lower Inman was that only 1 mm of movement was needed for the uppers and about 2.5 mm of movement was required for the lowers. Inman Aligners are much faster than clear aligners with these kinds of movements. And 2-3 clear aligners can be just as quick with very small movements of 1 mm and be a little more cost effective if made bespoke. It would also allow us to treat both arches more or less simultaneously.

3. Whitening the teeth (during last phase of alignment). 4. Change the composite temps to all ceramic crowns to match.

5. Retain the lower arch.

Alternative options
Alternative options were discussed. Fixed braces were discounted because of the cost, the difficulty in simultaneous whitening and added difficulty in having the crowns as temporary through treatment. The patient’s posterior occlusion was also good. Full anterior veneers were discussed, but after the patient understood how simply and quickly the alignment could be done, seemed a completely ridiculous and unethical solution.

Treatment
On the initial appointment the two old crowns were removed (Figure 2). The preps were merely cleaned and treated as conservatively as possible. Temporary crowns, which could be adjusted, were placed (Figure 5). Upper and lower impressions were taken for upper clear aligners and for a lower Inman Aligner. A prescription of the tooth movement using Spacewize® software was given to the technician so they were aware of exactly where we wanted the teeth to be moved. Spacewize also calculates a figure for the amount of crowding present giving us an idea of the total amount of space that would need correcting and whether the case is suitable for Inman Aligners or not.

Two weeks later, the patient returned. The Inman Aligner and clear aligner were fitted on the lower and upper teeth respectively. Minimal interproximal reduction (IPR) was started. Despite calculating the amount of crowding present, the IPR is never carried out in one go. Only IPR strips or discs are used. This gives the opportunity to ensure the stripping is far more anatomically respectful than using burs or heavy discs. This massively reduces the risks of excess space formation, gouging or poor contact anatomy. No more than 0.15 mm per contact on the anterior teeth were adjusted on this single visit. The contacts are smoothed and fluoride gel is applied each time.

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The patient was then sent home. The Inman Aligner was worn for 16-20 hours per day with the patient removing it for eating and rest. 20 hours a day is the maximum needed wear and this in-termittent wear reduces the risk of root resorption. On return 2 weeks later, it was clear that the contacts had closed tight and the teeth had moved a little.

More IPR was carried out on both the upper and lowers. The occlusal contacts of the upper temporary crowns were adjusted to allow clearance for the lower teeth to move and the lower left lateral to advance 2-3mm. The temporary crowns were also facially contoured to ensure they were flush with the natural teeth. On the subsequent return visit, it was clear that the teeth were aligning rapidly and especially well (Figures 4 and 5). We then decided to start some simultaneous tooth whitening. Impressions were taken, even though the result was still 25% from completion. Sealed, rubber trays were made and careful instructions given to the patient. While the patient is concentrat- ing on using the Inman Aligner, they are always highly receptive to using bleaching trays. It adds greatly to motivation and often means they achieve a far better result. DayWhite from Oral Healthcare (formerly Discus Dental) is used so that the patient only needs to wear the bleaching trays 55-45 minutes a day.

The patient returned after another 3 weeks and was happy with the progress. Now, step 3, whitening, was achieved. Upper and lower alignment was now complete. An impression was taken for a lower retainer wire to be fitted later. The temporary crowns were removed, the prep cleaned with CII, and new impressions were taken after some minor adjustments to the incisal margins.

A new lower impression was taken of the final lower occlusion to ensure the crowns could be made with a good long con- tact contact. The tempos were replaced and impressions sent to the laboratory. The patient booked in for a shade one week later and two weeks after cessa- tion of bleaching where colour and tooth morphology was ex- plained and discussed with the patient. Two weeks later, the pa- tient returned. A retainer wire 0.014 was bonded to the lower inci- sor teeth using a preformed wire on a jig made by the orthodont- tic technician. The temporary crowns were removed and new IPS e.max HT (Ivoclar Vivadent) crowns were bonded using Var-iolk II (Ivoclar Vivadent) and Optifluid PT, (Verti). The occlu- sion against the aligned lower teeth was checked. The patient was extremely happy with the end result and felt his teeth looked natural (Figures 6-12).

Discussion
The case is another example of why a progressive form of smile design can be so essential in any case where a patient is looking to improve their smile. At every point, the patient sees their smile improving, first with the teeth being straightened, them the crowns being attached, and once they are all in place, the patient’s facial proportions change and the result is pleasing.

A new lower impression was taken for a lower permanent restoration dramatically. This makes a stable and aesthetically pleasing outcome far easier to achieve (Figures 13-17).

Conclusion
In each of our practices, there must literally be hundreds of patients who have issues similar to this gentleman’s complaint. Previously, conventional methods often placed a barrier to treatment, adding time and cost into what was already an expen- sive treatment. Most patients just could not be bothered and would live with it. Now, simple anterior alignment can be so much quicker and more cost ef- fective. I’m amazed at the sheer volume of patients who will have treatment like this done if they are suitable. Being able to combine whitening because the aligners are removable is just another bonus so we can capitalize on the patient’s current com- pliance and get an even better result. Of course, case selection is absolutely vital! Understand- ing what is treatable and what should be referred to a special- ist orthodontist is essential. This means that patients must be fully consented and understand the risks and disadvantages of not treating any posterior issues if just concentrating on anterior alignment.

Disclosure
Dr Qureshi runs courses with Dr James Russell and Dr Tim Brad- stock-Smith and lectures on the
accomplished (Figures 7-9).

After treatment, the goals set were achieved (Figures 7-9).

Surgical phase
As stated previously, the dental team decided to align the incisal edges of #11 and 21 and not intrude further #11 to align the gingival zeniths. This decision was based on the fact that the teeth showed no signs of wear, in which case the worn tooth would be intruded more to be back in its original pre-orthodontics was completed. After treatment, the goals set were accomplished (Figures 7-9).

Aesthetic/Restorative phase
Six weeks after the periodontal surgery, in-office whitening was performed so the patient's desire for brightness was met (Phillips Zoom, Philips Oral Healthcare, Stanford, USA). The shade of the teeth 10 days after the whitening was completed was A1 for the upper centrals and A2 for the canines (Figure 15).

After proper healing of the periodontal tissues was confirmed with the periodontist, tooth #12 was prepared for an all ceramic lithium disilicate crown and an e.max press Maryland type all ceramic bridge with wings are fabricated.

Extractions
The gingival asymmetries

Figure 10: After removal of the orthodontic devices the spaces are properly distributed. Note the gingival asymmetries.

Figure 11: Immediately after the periodontal surgery the gingival improvement is apparent.

Figure 12: CBCT radiograph verifies that there is not additional bone to place an implant and a GBR procedure would be needed.

Figure 13: After ZOOM whitening the smile appears significantly brighter.

Figure 14: An e.max press crown and an e.max press Maryland type all ceramic bridge with wings are fabricated.

Figure 15: The smile of the patient after completion of the treatment appears significantly improved esthetically.

Figure 16: Retracted and palatal view of the case completed.

After the restorations were fabricated (Figure 14) and the temporary crowns were removed, they were tried in and the fit and contacts were verified. Another try-in was performed with a glycerin based paste (KY Jelly) so that the shade, contour and surface texture were assessed and approved by the dentist and the patient. At the same appointment the restorations were bonded after the porcelain was etched with 9% hydrofluoric acid and silanated. (Ultradent Products Inc, South Jordan, UT, USA), and the teeth cleaned with pumice. A 5 step etch and rinse adhesive (All Bond 2, Bisco, Schaumburg, IL, USA) and a dual cure resin luting cement (Dowlink, Bisco, Schaumburg, IL, USA) were used. Spot curing was performed and excess cement was removed and after light curing for 60 sec each surface, the cement was left for 5 additional minutes to complete the chemical cure mode as well. Final finishing, adjustments of occlusion and polishing were performed with finishing diamonds (KOMET, Lomag, Germany), rubber points (Astropol, Ivoclar Vivadent, Schaum, Lichtenstein) and finishing strips (Sollex, SM ESPE, Seefeld, Germany). Finally, a diamond polishing paste was used (Ultradent Products Inc, South Jordan, UT, USA) on a Flexluff (Cosmedent, Chicago, IL, USA). An alginate impression was taken to fabricate a new Essix orthodontic retainer in the in-office lab within 1 hour. Oral hygiene and maintenance instructions were given to the patient and a follow up appointment for the porcelain was scheduled after 4 weeks (Figures 15-21).

A multidisciplinary approach in treatment planning and performance, as well as the use of contemporary restorative materials and techniques allow for a conservative, yet very aesthetic final result.

References

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