Conservative approach to multidisciplinary aesthetic dental treatment

By Kostis Giamakeiopoulos, 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 have 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, especially in the area of #12 and the missing #22 with diastema between #12 and #22 with diastema between #11 and #21, 3. dental midline transmission to the right by 4mm, 4. asymmetry between the right and left side usually exists and needs to be addressed.

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 1-3).

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 bitewing 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, 5. dental midline transmitted to the right by 4mm, 6. asymmetry between the left and right side, especially in the spaces 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 A3 on the upper central incisors and A3.5 on the upper canines with the Vita Class 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 #11-13 and #21-23, 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

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**Table 1. Teeth and spaces between them were measured. The proportions of the teeth (length to width ratio) and the arrangement of the spaces were crucial information in treatment planning, especially in patients with a high lip line.**

<table>
<thead>
<tr>
<th>Tooth (#)</th>
<th>Length (mm)</th>
<th>Width (mm)</th>
<th>Spaces</th>
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<tbody>
<tr>
<td>11</td>
<td>8.1</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>21</td>
<td>6.9</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>23</td>
<td>8.5</td>
<td>6</td>
<td>3</td>
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<tr>
<td>24</td>
<td>8.5</td>
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<td>3</td>
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</tbody>
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Notes

Peg shaped lateral incisor. Overeruption

Dental midline

5.5mm incisally

10-21

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**Figure 1 - 3: The unaesthetic smile of the patient before treatment.**

**Figure 4 - 6: Retracted view of the teeth before treatment. Note the peg shaped #12, the missing #22 and the asymmetry of the spaces between teeth #11-13 and 21-23.**

**Figure 7 - 9: Photographs of the patient during the orthodontic phase of the treatment.**
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 improve the appearance of his teeth. He was aware of what could be done with porcelain veneers, but 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 of crowns - 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.

Alternative options
Alternative options 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 description 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 knowing how much we were likely to need, with Inman Aligner treatment, we never completely all the IPR in one go. 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 was adjusted on this single visit. The contacts are smoothed and fluoride gel is applied each time.

Three weeks later the patient returned. Two upper IPR and lower IPR were completed. Upper Inman Aligners were removed because the treatment could be completed over a few months.

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.

2. Thickness/aesthetics of crowns - 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. Whitening of teeth - 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 A5/A5.5 and the natural teeth had darkened a little with age.

5. 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.

6. Colour - The old crowns had been made at A5/A5.5 and the natural teeth had darkened a little with age.

7. Whitening of teeth - 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.

8. Colour - The old crowns had been made at A5/A5.5 and the natural teeth had darkened a little with age.

9. Whitening of teeth - 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.
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 infant was removed for eating and 16-20 hours per day with the patient returned. A retainer wire was bonded to the lower incisor teeth using a preformed wire and two weeks after cessation of use the Inman Aligner worldwide.

Acknowledgements
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References

Discussion
The case is another example of why a process of removing 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 concentrating 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 Ormco Corporation*As compared to Damon Clear, data on file. Standard torque, upper 3-3 brackets.

Conclusion
In each of our practices, there must literally be hundreds of patients who have issues similar to this gentleman’s complaint. Previously, conventional solutions often placed a barrier to treatment, adding time and cost into what was already an expensive 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 effective. 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 compliance and get an even better result. Of course, case selection is absolutely vital! Understanding what is treatable and what should be referred to a specialist 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 Bradstock-Smith and lectures on the
make it easier to distinguish and completely remove it after the orthodontics was completed. After treatment, the goals set were accomplished (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- wear position and then would be treated restoratively. The goals of the periodontal surgery were:

1. Align the gingival zeniths of teeth #11 and 21, gingivectomy with osseous reduction on #12 to reduce as much as possible the gingival display without compromising the long term progression of the tooth due to loss of periodontal support, 5. gingivectomy in mostly all the upper teeth to bring the gingival display to a more pleasing appearance, 6. After surgery, a healing period of 8 weeks was recommended by the periodontist before the restorative procedures start (Figures 10, 11). The option of a single implant placement for the missing lateral incisor #22 was rejected before surgery, as an additional bone grafting procedure would be required and this was not accepted by the patient (Figure 12).

Aesthetic/Restorative phase
Six weeks after the periodontal surgery, in office whitening was performed so the patient’s desire for brighter teeth is met (Phillips Zoom, Philips Oral Healthcare, Stamford, 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 13).

After proper healing of the periodontal issues was confirmed with the periodontist, tooth #21 was prepared for an all ceramic lithium disilicate crown and #11 and 25 were prepared for an all ceramic lithium disilicate Maryland type bridge with wings (e.max, Ivoclar Vivadent, Schaan, Lichtenstein). The latter was selected because of the conservative approach and the minimal preparation required only on the palatal surfaces of the abutment teeth, as the occlusion was favorable and the patient had no parafunctional habits. This type of restoration appears to be a viable solution in selected cases, as it does not have the problems of the conventional Maryland bridge with frequent dehiscences and the marginal show- ing through thin and translucent central incisors. After gingival retraction with a retraction paste (Astringent Retraction Paste, 3M ESPE, Seefeld, Germany), a final impression was taken with poly- ether heavy and light body impression material (Permadyne, 3M ESPE, Seefeld, Germany) on a full arch metal tray. The bite registration was recorded and an alginate impression was taken of the opposing dentition. Temporization was performed conventionally for #12 with an adjusted and relined prefabricated acrylic crown and for the abutment teeth #11 and 25 with spot etching in the middle of the preparations and clear from the margins and pink composites so it could be distinguished easily when removed before try-in so it did not affect the fit of the restoration. A temporary for #22 was added in the Essix orthodontic retainer after a denture tooth was fitted on the model and glued in the retainer.

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 glycercin 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 (3M ESPE 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 (Durellin, 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 occlu- sion and polishing were performed with finishing diamonds (KOMET, Lomag, Germany), rubber points (Astropol, Ivoclar Vivadent, Schaan, Lichtenstein) and finishing strips (Dollex, SM ESPE, Seefeld, Germany), finally a diamond polishing paste was used (Ultradent Products Inc, South Jordan, UT, USA) on a Flexiluff (Cosmedent, Chicago, IL, USA). An alginate impres- sion was taken to fabricate a new Essix orthodontic retainer in the in-house lab within 1 hour. Oral hygiene and maintenance instructions were given to the patient and a follow up appointment 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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