

Conservative approach to multidisciplinary aesthetic dental treatment

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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 treatment 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 esthetically dealt in three different ways:

1. canine substitution,
 2. tooth supported restoration,
 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 problem² that is usually restored with as follows:

1. all ceramic crowns,
 2. porcelain veneers,
 3. direct or indirect composite veneers.
- Additional 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 medica-

tion. 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 1-3).

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, 3. dental midline transmitted to the right by 4mm, 4. asymmetry between the left and right side, especially in the space between 11-15 and 21-25, 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 Classic 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

Tooth (#)	15	12	11	21	22	25	
Length (mm)	9.1	6	8.5	9.8	Missing	9	
Width (mm)	7.4	4	8.2	8.5		7.5	
Spaces	15 - 11: 7.1mm					25 - 21: 2.7mm	25 - 24: 2mm
Notes	Peg Shaped		Overerruption 1.4mm incisally Ging. zenith 3.5mm incisally to 21	Dental midline 4mm right			

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.



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.

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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.
2. gingivectomy with osseous reduction on #12 to reduce as much as possible the gingival display without compromising the long term prognosis of the tooth due to loss of periodontal support.
3. gingivectomy in mostly all the upper teeth to bring the gingival display to a more pleasing appearance.
4. After surgery, a healing period of 8 weeks was recommended by the periodontist before the restorative procedures start (Figures 10, 11).
5. 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).



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.

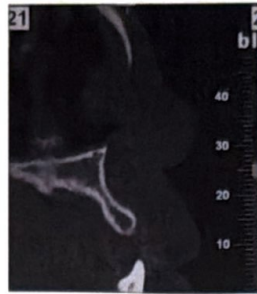


Figure 12: CBCT radiograph verifies that there is not adequate bone to place an implant and a GBR procedure would be needed.



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.

Aesthetic/Restorative phase

Six weeks after the periodontal surgery, in office whitening was performed so the patient's desire for brighter teeth is met (Philips 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 15).

After proper healing of the periodontal tissues was confirmed with the periodontist, tooth #12



Figure 15 - 17: The smile of the patient after completion of the treatment appears significantly improved esthetically.



Figure 18 - 21: Retracted and palatal view of the case completed.

was prepared for an all ceramic lithium disilicate crown and teeth #21 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 debondings and the metal showing 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 23, with spot etching in the middle of the preparations and clear from the margins and pink composite so it could be distinguished easily when removed before try-in so it did not affect the sit 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 temporaries 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 3 step etch and rinse adhesive (All Bond 2, Bisco, Schaumburg, IL, USA) and a dual cure resin luting cement (Duolink, 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, Lemgo, Germany), rubber points (Astropol, Ivoclar Vivadent, Schaan, Lichtenstein) and finishing strips (Soflex, 3M ESPE, Seefeld, Germany). Finally, a diamond polishing paste was used (Ultradent Products Inc, South Jordan, UT, USA) on a Flexibuff (Cosmedent, Chicago, IL, USA). An alginate impression 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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