

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/jpfa



Restoring esthetics using adjunctive orthodontics – Case reports



Ankur Kaul [a,*], *Gurkeerat Singh* [b], *Sridevi Kaul* [c]

[a] *Associate Professor, Department of Orthodontics, SR-CDSR, Faridabad, India*
[b] *Professor and Head, Department of Orthodontics, SR-CDSR, Faridabad, India*
[c] *Professor, Department of Prosthodontics, SR-CDSR, Faridabad, India*

Keywords:
Adjunctive orthodontics
Pre-restorative alignment
Esthetic crowns
Excessive gingival display

ABSTRACT

Pre-restorative orthodontic alignment has definite advantages especially in patients with mal-aligned dentition seeking prosthetic rehabilitation. As adult orthodontics has gained popularity, orthodontic practices have seen a change in the patient population they encounter on a day-to-day basis. From completely dentulous adolescents, this population has widened to encompass adult dentitions with worn or abraded teeth, peg-shaped lateral incisors, fractured teeth, gummy smiles, multiple edentulous spaces, or other restorative needs that often require tooth positioning that is slightly different from non restored, nonabraded, adolescent teeth. In such instances, an interdisciplinary approach is necessary to evaluate, diagnose, and resolve esthetic problems using a combination of orthodontic, periodontic, endodontic and prosthodontic treatments. The aim of the article is to emphasize the importance of adjunctive orthodontics in such interdisciplinary treatment protocols, through two case reports.

Copyright © 2013, Pierre Fauchard Academy (India Section). Publishing Services by Reed Elsevier India Pvt. Ltd. All rights reserved.

1. Introduction

Esthetic restorations of anterior teeth are no longer restricted to teeth mutilated by caries. The reasons for which patients seek such restorations may range from minor diastemata to complex malocclusions. Trauma, intrinsic discoloration, excessive gingival display, peg laterals, unesthetic old restorations may co-exist with mal-aligned anterior teeth, calling for attention from several dental disciplines apart from the orthodontist. In such instances, an interdisciplinary approach is necessary to evaluate, diagnose, and resolve esthetic problems using a combination of orthodontic, periodontic, endodontic and prosthodontic treatments.[1] For these types of patients, it is important to establish realistic, not idealistic treatment objectives. Realistic treatment objectives fall into three categories. These objectives should be economically, occlusally, and restoratively realistic.[2,3]

Exodontia is not a popular treatment option anymore unless the clinician has to deal with teeth that are grossly infected or mutilated. Even malformed teeth are being retained and restored for an optimal esthetic result. A thorough discussion of the pre-restorative orthodontics, visualization of the end result through a diagnostic wax-up and agreeing upon a sequential comprehensive treatment plan, are all necessary steps in the diagnostic work-up of these cases. Spalding and Cohen opined that orthodontics adjunctive to fixed prosthodontics, improves tooth position and permits the dentist to place restorations that often require less natural tooth reduction during preparation, and produces results that are more esthetic, functional, stable, and durable.[4]

The aim of the article is to emphasise the importance of adjunctive orthodontics in such interdisciplinary treatment protocols, through two clinical cases.

* *Corresponding author*. 91/1, First Floor, Charmwood, Surajkund, Faridabad, Haryana 121009, India.
E-mail addresses: ankurkaul1@gmail.com (A. Kaul), gurkeerats@hotmail.com (G. Singh), sriluy@gmail.com (S. Kaul).

0970-2199/$ – see front matter Copyright © 2013, Pierre Fauchard Academy (India Section). Publishing Services by Reed Elsevier India Pvt. Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.jpfa.2013.08.002

2. Description of cases

2.1. *Case report 1*

A 23-year-old female reported to the practice with a complaint of unsightly spaces in her front teeth .She wanted an improvement in her smile. Her medical history was non-contributory and presented no conditions that contra-indicated dental treatment. She had been orthodontically treated as a teenager, but never wore retainers. Extra-oral examination showed symmetric, brachycephalic face, with a straight profile .TMJ examination revealed no click or deviation. On smiling, the maxillary incisor visibility was 2 mm with no gingival display. Intra-oral examination revealed peg-shaped lateral incisors in the maxillary arch (Fig. 1a). Spacing was present distal to the peg laterals (Fig. 1b) and between the maxillary central incisors. In the mandibular arch, spacing was present distal to the central incisors and canines. The molar and canine relation was bilaterally Angle's Class I. The overjet and overbite were normal. The mandibular midline was shifted to the right by 1.5 mm. A simple tongue thrust was observed. The case was diagnosed as a Class I mal occlusion with diastemata, microdontia (peg laterals) and simple tongue thrust. The maxillary central incisors had previous composite build-ups which we had advised her re-restoration; but she was reluctant to do so.

The aim of the treatment was an improvement in the smile which was proposed to be achieved through the following objectives:



Fig. 1 – a: peg lateral incisor. b: spaces distal to peg laterals on either sides. c: Orthodontic treatment to distalise peg laterals. d: closure of diastemata in mandibular arch. e: bonded retainer after cementation of crowns. f: Procera crowns on lateral incisors. g: Pre treatment frontal view. h: post treatment frontal view.

- Controlling the tongue thrust which was aggravating the diastemata and was a potential deterrent to long-term retention of the orthodontic treatment,
- Distalising the peg laterals, that would permit esthetic crowns of natural dimensions and
- Closure of the spaces in the mandibular arch along with a correction of the deviated midline.

A tongue crib was given to control the tongue thrust, following which fixed appliance orthodontic treatment was initiated. The spaces in the maxillary and mandibular arches were closed leaving restorative space for crowns on lateral incisors (Fig. 1c,d). The prosthodontist decided upon Zirconia (Procera, Nobel Biocare) crowns for the lateral incisors. The prosthodontic phase was executed after debonding of brackets. After a minimal preparation of lateral incisors, impressions were made in polyvinyl siloxane. Provisional composite build-ups were done on the lateral incisors. A Hawley's retainer was given in the maxillary arch till the crowns were fabricated. A fixed lingual retainer was bonded in the mandibular arch. Procera crowns were cemented using luting GIC (GC Fuji), following which a fixed bonded retainer was placed in the maxillary arch (Fig. 1e,f). The patient was advised to wear Hawley's retainer with tongue crib at night for six months.

2.2. *Case report 2*

A 20-year-old female presented with a complaint of fractured front teeth .She was also concerned about her gummy smile (Fig. 2a). She gave a dental history of trauma to her front tooth for which she had a root canal treatment 4 years ago. The tooth was not restored with a crown. Extra-oral exam revealed a symmetric, mesocephalic, convex facial profile. On smiling, there was maxillary anterior gingival display of 6–7 mm. The right central and lateral incisors (tooth #7, 8) were fractured



Fig. 2 – a: Pre-treatment intraoral view. b: Miniscrew in the alveolus apical to incisors. c: right lateral view with miniscrew in molar region. d: left lateral view showing miniscrew. e: gingivoplasty done after orthodontic treatment. f: Empress crowns on teeth # 7 and 8 after gingival healing. g: Pre-treatment frontal view. h: post treatment frontal view.

with almost half their coronal structure remaining. The gingival zenith of #8 was shifted 1 mm apically relative to the adjacent central incisor. The IOPA showed obturated teeth # 7, 8 and there was no evidence of ankylosis, radiographically. The case was diagnosed (after a cephalometric analysis) as a Class I Bimaxillary protrusion with vertical maxillary excess, and fractured teeth #7and 8.

As the diagnoses involved orthodontic malocclusion and fractured teeth, the overall esthetic improvement of the gummy smile could not be restricted to esthetic crowns alone. The approach had to be multidisciplinary .The fractured teeth # 7 and 8 were re-treated endodontically and built up to their full contour with direct composite restorations .All first premolars (teeth # 5, 12, 21, 28) were extracted and fixed orthodontic appliance therapy was initiated. After 1 year of conventional fixed appliance therapy, three self -tapping, titanium mini-screws (Leader Italia); one in the midline apically between the roots of maxillary central incisors and two bilaterally in the region anterior to first molars, were inserted in the buccal alveolar bone in maxilla (Fig. 2b,c,d). The mini-screws were placed under local anesthesia. These aided in intrusion of maxillary anteriors. After orthodontic phase of the treatment was completed, the gingival display was still 4–5 mm. The periodontal status of the maxillary anteriors was assessed. Probing depths were 3 mm each on the central incisors and 3–4 mm on the lateral incisors and canines. A diagnostic mock-up was done in the maxillary anteriors and a clear acrylic stent was fabricated to guide the external bevel gingivectomy. After (6 weeks) the free gingiva healed (Fig. 2e), the teeth # 7 and 8 were prepared to receive all-ceramic crowns (IPS empress). The crowns were etched with hydrofluoric acid, silanated and cemented (Fig. 2f) with Rely X U200 (3M ESPE). Fixed lingual retainers were bonded on the maxillary and mandibular anteriors and the patient was placed on an initial maintenance recall every month for 6 months. The oral hygiene maintenance was good and the treatment results were satisfactory after six months (Fig. 2g,h).

3. Discussion

The benefits of pre-restorative alignment have been well documented.[3,5,6] It is advantageous especially in patients with mal-aligned dentition seeking prosthetic rehabilitation. A common orthodontic-restorative problem is a peg-shaped or malformed maxillary lateral incisor. In some patients, the best choice for treating a peg-shaped lateral incisor is to restore the malformed tooth to its correct dimension. If sufficient space exists, a composite restoration may be placed before orthodontic treatment. However, in most situations, there is insufficient space to restore the malformed lateral incisors. Therefore, orthodontics is often necessary to create space to build-up peg-shaped lateral incisors.[1,4] In the clinical case described above, it was necessary to rearrange the diastemata and procure space for restoring the lateral incisors to their natural dimension. Procera crowns were chosen as the final restorations as aluminous porcelain is superior in esthetics and durability than most direct composites.[7,8]

The advantage of pre-restorative orthodontics is thus emphasized through this case (Fig. 1g,h) because the crowns on lateral incisors would have to be over contoured distally to close the spaces resulting not only in disproportionate crowns but also creating areas of plaque retention. Also, the lateral incisors had to be minimally prepared (especially on the mesial aspect) as there was adequate interproximal space on their mesial aspects after the distalisation.

In the second clinical case described, the excessive gingival display, the fractured incisors and the facial profile needed correction and this could not be achieved by orthodontics alone. The use of mini Ti screws has been successfully reported previously by a few authors in such cases.[9] According to the Garber and Salama classification of vertical maxillary excess, this case was identified as degree II.[10] The gingival zeniths of the maxillary anteriors were at different levels and therefore a diagnostic wax-up was used to assess the amount of tissue to be removed.[11,12] Orthognathic surgery carries with it certain risks like infection, alveolar necrosis and loss of tooth root vitality.[9] Moreover, mini-screws have been documented as effective means to intrude anterior dento alveolar segments to reduce excessive gingival display. The excess keratinized tissue was an advantage in this case. Therefore intrusion with mini-screws and a gingivoplasty were planned to deal with excess tissue prior to restoring the fractured teeth # 7 and 8 with all-ceramic crowns (IPS Empress, Ivoclar vivadent). This case underlines the importance of realistic treatment planning and reiterates the importance of a multidisciplinary approach.

4. Conclusion

Contemporary dental practices have seen a change in the patient population an orthodontist encounters on a day-to-day basis. From completely dentulous adolescents, this population has widened to encompass adult dentitions with worn or abraded teeth, peg-shaped lateral incisors, fractured teeth, gummy smiles, multiple edentulous spaces, or other restorative needs that often require tooth positioning that is slightly different from non restored, non-abraded, adolescent teeth.[13] Adult orthodontics has truly arrived and esthetic results in such cases are achieved only by teamwork wherein, orthodontics and restorations are planned in conjunction with each other respecting the periodontium. The orthodontist aligns the teeth to allow for better esthetics in the subsequently executed restorative work. When patient treatment requires a comprehensive approach, communication among the disciplines is critical in achieving improved esthetic outcomes especially in the anterior maxilla. Combined treatments based on sound diagnosis of the case and appropriate decision making to organize the therapeutic procedures in proper sequence is the best way of dealing with such situations.[14] If orthodontists and restorative dentists establish realistic objectives, create a diagnostic set-up, determine the sequence of treatment, build-up malformed teeth, position teeth to facilitate restorative treatment, evaluate gingival esthetics, take progress radiographs, and interact during finishing, the esthetic and occlusal outcome of their combined efforts will be greatly enhanced.[3]

Conflicts of interest

All authors have none to declare.

REFERENCES

1. Kalia S, Melsen B. Interdisciplinary approaches to adult orthodontic care. *J Orthod*. 2001;28(3):191–196.
2. Francisconi LF, Freitas MC, Oltramari-Navarro PV, Lopes LG, Francisconi PA, Mondelli RF. Multidisciplinary approach to the establishment and maintenance of an esthetic smile: a 9-year follow-up case report. *Quintessence Int*. 2012;43(10):853–858.
3. Kokich V, Spear F. Guidelines for managing the orthodontic-restorative patient. *Semin Orthod*. 1997;3:3–20.
4. Spalding PM, Cohen BD. Orthodontic adjunctive treatment in fixed prosthodontics. *Dent Clin North Am*. 1992;36(3):607–629.
5. Schmitz J, Coffano R, Bruschic A. Restorative and orthodontic treatment of maxillary peg incisors: a clinical report. *J Prosthet Dent*. 2001;85:330–334.
6. Chaushu S, Becker A, Zalkind M. Prosthetic considerations in the restoration of orthodontically treated maxillary lateral incisors to replace missing central incisors: a clinical report. *J Prosthet Dent*. 2001;85(4):335–341.
7. Sadowsky SJ. An overview of treatment considerations for esthetic restorations: a review of the literature. *J Prosthet Dent*. 2006;96(6):433–442.
8. Zitzmann NU, Galindo ML, Hagmann E, Marinello CP. Clinical evaluation of Procera AllCeram crowns in the anterior and posterior regions. *Int J Prosthodont*. 2007;20(3):239–241.
9. Kaku M, Kojima S, Sumi H, et al. Gummy smile and facial profile correction using miniscrew anchorage. *Angle Orthod*. 2012;82(1):170–177.
10. Silberberg N, Goldstein M, Smidt A. Excessive gingival display—etiology, diagnosis, and treatment modalities. *Quintessence Int*. 2009;40(10):809–818.
11. Claman L, Alfaro MA, Mercado A. An interdisciplinary approach for improved esthetic results in the anterior maxilla. *J Prosthet Dent*. 2003;89:1–5.
12. Lasseigne Tyler P, Chiche Gerard, Tokutomi Hiro, Wiltz II Cramin P, Mendez Arturo J. Managing space in the anterior dentition. *Am J Esthet Dent*. 2011;1:138–157.
13. Kokich Vincent G. Esthetics: the orthodontic-periodontic – restorative connection. *Semin Orthod*. 1996;2:21–30.
14. Machuca G, Martínez F, Machuca C, Bullón P. A combination of orthodontic, periodontal, and prosthodontic treatment in a case of advanced malocclusion. *Int J Per Res Dent*. 2003;23:499–505.

JOURNAL OF PIERRE FAUCHARD ACADEMY, INDIA SECTION
AN APPEAL

The Journal Pierre Fauchard Academy of India Section has completed 26 years of uninterrupted publication. During the last 26 years of its publication the Journal of PFA has received commendable recognition in the scientific forum natoionally as well as outside the country. It's new getup and format has been appreciated and well received.
In our efforts to further improve and upgrade the Journal, we have engaged professional publisher with effect from 2013. Giving it a facelift with increase of pages to meet the increasing demand from contributors. Financial implications of this venture need not be over emphasized. Therefore. I would like to appeal all the fellows, Heads of Dental Institutions, dental manufacturers traders and allied companies to voluntarily come forward and extend their helping hand in continued publication of this journal by advertising in it. Colleges are required to subscribe to the Journal henceforth by writing to journals.india@elsevier.com. Looking forward to a whole hearted support.