Restorative and orthodontic interdisciplinary management of an adult patient using modified Hawley appliance: a case report

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Abstract

This report presents a case of an adult female patient who had undergone orthodontic treatment to correct her malocclusion was referred to the Restorative Dentistry Clinic at the time when her brackets were due for debonding. The patient had presented with spacing of the anterior segments of both upper and lower arches with the upper canines in crossbite. At the end of the orthodontic correction of the occlusion the patient was referred to the restorative dentist for replacement of missing molars in the upper and lower arches. Fixed bridge prosthesis, implant-retained crowns or removable dentures were the treatment options for tooth replacement. Due to financial challenges the first two options were unavailable to the patient. The need to wear retainers made it impractical for the patient to be provided the third option of removable dentures. A modified design of Hawley retainers was then made for the patient that had pink acrylic bases and acrylic stock teeth to replace missing teeth. Thus, the functions of retainer and removable denture were combined in one appliance. The modified Hawley appliance designed for the patient in this study is a typical example of interdisciplinary management by the restorative dentist and the orthodontist to give appropriate care to the adult orthodontic patient.

Key words: Interdisciplinary management, Restorative, Orthodontics, Modified Hawley Appliance

Introduction

[1]Treatment expectations of patients have risen over the years with more demands for aesthetic dental treatment. In an attempt to satisfy their patients, some dentists are offering an "instant smile" without consideration for the long term health of dental, pulpal and periodontal tissues[1]. [3]All too often porcelain veneers, all-ceramic crowns and porcelain-fused-to-metal crown (involving extensive tooth preparations) are used to correct structural and orthodontic discrepancies (instant orthodontics)[1,2]. A lot of restorative treatment is done without taking advantage of the opportunities offered by orthodontics to enhance the restorative treatment plan[3].

The assumption that adult patients are unable to undergo orthodontic treatment or that adult teeth are immovable is an erroneous one. This is because the dentoalveolar complex has been found to be much more malleable than previously believed[4]. The remodeling and redevelopment of the patient's facial and dentoalveolar structures can be performed using a dentofacial orthopedics approach regardless of age. While adult patients desire an aesthetic and functional improvement of their dentition, they are hesitant to sacrifice healthy tooth structure[2]. There has been considerable interest in orthodontic treatment for the adult patient in the last few years with better understanding of the fact that tooth movement is possible in the adult.

Traditionally, the Orthodontist has assisted the Restorative Dentist by carrying out prerestorative orthodontic treatment such as correcting malocclusions, leveling and aligning the dental arches and straightening teeth.

As greater aesthetic and functional demands are made by patients, the orthodontist has greater opportunities to help create an optimum restorative environment[3]. Adult patients with worn or abraded teeth, peg-shaped lateral incisors, fractured teeth, multiple edentulous spaces, or other restorative needs may require tooth positioning that is slightly different from a non-restored, non-abraded, completely dentulous adolescent[5,6].

[2]Adult orthodontic patients often require restorative treatment during or after orthodontic therapy. Presently most orthodontic therapy of the adult patient is directed at the treatment of malocclusion with little input from the Restorative Dentist[3]. As Dentists we need to adopt an interdisciplinary approach to ensure optimum results for our patients. The Orthodontist and Restorative Dentist need to collaborate to offer the best treatment options to patients.

Patient education and guidance play major roles prior to initiation of orthodontic therapy in adults as many adults are not psychologically prepared to wear an orthodontic appliance or are unwilling to commit to the treatment due to the lengthy duration[7]. Common alternatives to adult orthodontic therapy are extractions, unconventional or aggressive tooth preparations for fixed restorations, or implant therapy. All of these may compromise the aesthetic and functional outcome[8].

The case is presented of an adult patient who had undergone orthodontic treatment to correct her malocclusion and was referred to the restorative dentistry clinic to ensure completeness of her treatment.

Case report

The patient is a 29 year-old female Nigerian who presented at the Orthodontic Clinic of the Department of Child Dental Health, Lagos University Teaching Hospital, (LUTH), Lagos,

in June 2008. The chief complaint was that her teeth were not well aligned. She did not have any compromising medical history. Her dental history included two previous extractions (upper left first molar and lower right second molar), fillings and scaling and polishing. Patient had good oral hygiene, clinically healthy periodontium and no dental caries.

Extra-oral examination showed that she had competent lips, a straight profile, good facial proportions, a skeletal pattern 1 and exhibited a lisp on talking. Intra-oral examination revealed all teeth were present in all quadrants except the upper left first molar and the lower right second molar. The patient had all first permanent molars present except the upper left first permanent molar. THE patient presented with an Angle's class 1 molar relationship, a normal overjet of 2.5mm, and a normal and complete overbite. There was moderate spacing in the upper anterior segment and mild spacing in the lower anterior segment. There was no habit or any dental anomalies. The upper canines were in crossbite, but rotations and scissors bite were absent. The orthodontic summary was: Angle's class 1 molar relationship on skeletal pattern 1 complicated by crossbite (palatal displacement) of upper canines; moderate and mild spacing in the upper anterior and lower anterior segments respectively; lisping on talking; and missing upper left first permanent molar and lower right second permanent molar.

Figure 1. Maxillary arch with full fixed appliance wear and missing upper left first molar.

Figure 2. Mandibular arch with full fixed appliance wear and missing lower right second molar.

The orthodontic treatment objectives for the patient were: to align the palatally displaced upper canines; to close residual spaces; to correct speech; and to improve patient's profile. The treatment plan adopted for the patient was that of a non-extraction policy with fixed orthodontic appliance using pre-adjusted edgewise appliance. The treatment was started in November 2008 using pre-adjusted edgewise appliance (Roth 0.022 x 0.028) and 0.014niti wires were placed in both arches. The bite was propped up using glass ionomer cement on the molars to remove occlusal interference and allow the displaced canines to align. The wire sequence progressed from 016 niti to 018 stainless steel, then to 020 stainless steel and finally to rectangular wires in August 2009. Anterior spaces were closed using elastic chain from canine to canine on both arches and posterior spaces were closed using active tie backs from the crimpable hooks on the wires between the canines and the first premolars. The spaces for the upper left missing first molar and the lower right second molar were maintained with coil springs. Kobyashi hooks were placed on upper left lateral incisor and first premolar and also on the lower left first premolar and box elastic was placed to close the lateral open bite[9]. During the finishing stage the wires were dropped to lighter wires to allow the teeth settle in the arch. The treatment spanned a period of four years due to the patient's limited ability to finance the treatment.

The patient was referred to the Restorative Dentistry clinic for the first time in February 2012 just as the orthodontic brackets were due for debonding **(Figure 1).** The patient was referred for replacement of the missing upper left first molar and the lower right second molar **(Figures 2 & 3)**. The treatment options offered for the missing upper left first molar included an implant-retained crown or a fixed-fixed bridge which would have the upper left second premolar and the upper left second molar as abutments. The options given for the missing lower right second molar were either an implant-retained crown or a fixed-fixed bridge which would have the lower right first and third molars as abutments.

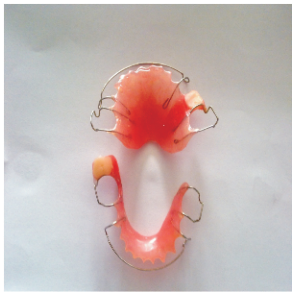

Figure3. Modified upper and lower Hawley Retainers with pink acrylic bases and upper left first molar and lower right second molar acrylic stock teeth fabricated to act as retainers and partial dentures.

Figure 4. Modified upper and lower Hawley retainers in place in patient's mouth.

The patient expressed the concern that she did not have the finances for any of the treatment options offered. Removable partial dentures were offered as an affordable option, however, the need for the patient to wear a retainer to maintain the result of the orthodontic treatment precluded the prescription of removable dentures for this patient. An alternative treatment option was then designed for the patient. The Hawley retainers were modified to incorporate acrylic stock teeth to act as space maintainers, to aid mastication and maintain periodontal health until the patient could secure the finances for the definitive treatment **(Figure 4).**

Upper and lower alginate impressions were taken for the fabrication of an upper and a lower modified Hawley retainer. The patient was debonded at the end of February 2012 and the modified Hawley retainers fitted satisfactorily. The upper Hawley retainer had an upper left first molar acrylic stock tooth incorporated and the lower Hawley retainer had a lower right second molar acrylic stock tooth incorporated. Furthermore, the base plates of both retainers were fabricated in pink acrylic. The patient was placed on recall visits to monitor the treatment outcome. During the recall visits the patient still expressed financial difficulties as a barrier to commencing definitive tooth replacement. At the sixth-month recall visit the patient was still using the modified Hawley retainers satisfactorily.

Discussion

The patient in the case study presented was referred to the restorative clinic only at the point when the orthodontic brackets were due for debonding. The restorative dentists thus did not have the opportunity to contribute to the treatment planning for the patient at inception of treatment. Treatment options for the replacement of teeth in the edentulous spaces would have been proffered right at the beginning of treatment. Considering the length of time the patient spent on the orthodontic treatment and the financial challenges expressed by her, the patient would have had ample time to plan for the payment of the restorative phase of the treatment. An alternative treatment plan would have been the movement of the molars to close up the edentulous spaces so that the patient would have benefitted from a shortened arch option. This would have eliminated the need for fixed restorative prostheses, but may have necessitated the removal of all unopposed third molars to prevent their supra-eruption. Moreover, maintaining the new positions of the molar teeth involved would have posed a challenge in this adult patient unlike in child and adolescent patients where the dynamics of growth can easily take care of the new positions of teeth.

A specially designed appliance combining the Hawley appliance for retention of the orthodontically established positions of the teeth and a removable denture replacing the upper left first molar and the lower right second molar was designed for this patient. This would overcome the challenges posed by the desire to ensure retention of the orthodontic results as well as provide tooth replacement for the missing teeth. The appliance was fabricated with a pink acrylic baseplate for improved aesthetics of the tooth bearing areas and to ensure that the flanges mimic gingival tissue. The need to have the patient wear retainers for a long period of time made it impractical to give the patient separate removable partial dentures. The design of modified Hawley retainer was made to solve the problem of wearing two separate appliances.

Malocclusion is a condition where there is a deviation from the acceptable normal occlusal relationship for a given population. The maxillary permanent canines are important for an attractive smile as well as for functional occlusion. Displacement of the maxillary canines is therefore expected to have detrimental effect on facial aesthetics. The aetiology of palatally displaced canines are classified into two; the guidance theory and the genetic theory[10]. The guidance theory refers to an excess of space in the apical region due to hypoplasia or aplasia of the maxillary incisors and peg-shaped laterals[10]. The genetic theory suggests that palatally displaced canines have a complex of genetically determined tooth anomalies with reported familial recurrence of canine displacement and reported associations between canine displacement and other dental anomalies, with 33% of patients with displaced canines reported to have other congenitally missing teeth[10]. Retained deciduous teeth and deficiency in maxillary width are also considered as local mechanical causes for displaced canines[10].

Modern lifestyles and improved patient awareness have caused an increased demand for adult orthodontic treatment. Multidisciplinary dental therapy allows better management of the more complicated and unique requirements of adult patients, thereby greatly improving the quality of care and treatment prognosis. The majority of adult patients require interdisciplinary treatment planning and treatment execution. It is rare for an adult to be treated orthodontically without the need to collaborate with another specialist[6]. Good communication with other oral health care professionals is therefore important when treating the adult orthodontic patient.

The orthodontist needs to clearly understand the restorative treatment goals before the commencement of treatment and should maintain communication with the restorative dentist throughout the treatment[3]. Specific restorative treatment goals for orthodontic therapy include: stable occlusion; positioning teeth in the face; orthodontically assisted gingival contouring; enhancing the restorative recipient site. The sequence of procedure in adult patients may then follow the following trend: eliminate all pathology (e.g. caries, abscesses, periodontal disease, retained roots, etc); carry out orthodontic treatment; periodontal re-evaluation (and therapy if necessary); carry out restorative treatment; orthodontic retention; and provide periodontal maintenance.

The interdisciplinary approach to treatment which combines orthodontics and restorative prostheses help in obtaining good, predictable results which are stable over time, aesthetic as well as functional in adults with edentulous spaces and orthodontic problems in dental arches[11-13].

Conclusion

The Orthodontist and Restorative Dentist need to collaborate to offer the best treatment options to patients. The modified Hawley appliance designed for the patient in this study is a typical example of interdisciplinary management by the restorative dentist and the orthodontist to give the adult patient appropriate care.

References

1. Kuljic BL. Merging orthodontics and restorative dentistry: an intergral part of esthetic dentistry. J Esthet Restor Dent 2008; 20:155-164.
2. Bidra AS, Uribe F, Askalsky A. Interdisciplinary approach for esthetic management of an adult patient with reverse articulation. Compendium 2011; 32:9.
3. Reikie DF. Orthodontically assisted restorative dentistry. J Can Dent Assoc 2001; 67:516-520.
4. Leonid R. Prerestorative Orthodontics to maximise aesthetics and f function. Dentistry Today 2011;30:74-77.
5. Kokich VG, Spear FM. Guidelines for managing the orthodontic-restorative patient. Semin in Orthod 1997; 3: 3-20.
6. Anita G, Asiya B. Adult Orthodontics. Indian J Dent Advancements 2010; 2:94-99.
7. Jacobson N, Frank CA. The myth of instant orthodontics: an ethical quandary. J Am Dent Assoc 2008; 139:424-434.
8. Buttke TM, Proffit WR. Referring adult patients for orthodontic treatment. J Am Dent Assoc 1999;130:73-79.
9. McLaughlin RP, Benett JC, Trevisi HJ. Systemized orthodontic treatment mechanics. Mosby, London, 2001:19-20.
10. Kazem S. Al-Nimri, Enas B. Maxillary palatal canine impaction displacement in subjects with congenitally missing maxillary lateral incisors. Am J Ortod Dentofacial Orthop 2011; 140: 81-86.
11. Jefferson Y. Facial beauty – establishing a universal standard. Int J Ortho Milwaukee 2004; 15: 9-22
12. Sarver DM. Growth maturation aging: how the dental team enhances facial and dental esthetics for a lifetime. Compend Contin Educ Dent 2010; 31: 274-283.
13. Rodiguez Flores JM. Multidisciplinary orthodontic treatment in adult patients: the future of orthodontics. Int J Orthod Milwaukee 2012; 21: 11-21