Arijit Ray-Chaudhuri

Richard J Porter and Martin GD Kelleher

A Restorative Approach to the Clinical and Aesthetic Management of Adult Patients with Class II Division 2 Incisor Malocclusions

Abstract: A Class II division 2 incisor malocclusion may be a cause of aesthetic and/or functional concern for some affected patients. Their particular concerns may include dark spaces around the misaligned teeth or uneven gingival contours. Orthodontic and/or orthognathic treatment can address some of these problems but frequently involves lengthy and expensive treatment in the adult dentition. Sadly, such treatment often produces an unstable result, with significant drawbacks such as the requirement for long-term retention. This article aims to describe alternative strategies for managing patients with this incisor malocclusion.

Clinical Relevance: This paper outlines a quicker, pragmatic and minimally destructive restorative treatment alternative to conventional orthodontic treatment and the associated long-term retention.

Dent Update 2012; 39: 684–693

A Class II division 2 incisor malocclusion may be defined as:

'The permanent mandibular incisors occluding posterior to the cingulum plateau of retroclined permanent maxillary incisors.'[1]

Arijit Ray-Chaudhuri, BDS, MFDS RCS(Ed), MJDF RCS(Eng) LLM, AHEA, Specialist Registrar in Restorative Dentistry, King's College Dental Hospital, London, SE5 9RW and St George's Hospital, London, SW17 OQT, **Richard J Porter**, BSc, BDS, MFDS RCS(Eng), FDS RCS, Consultant in Restorative Dentistry, St George's Hospital, London, SW17 OQT and **Martin GD Kelleher,** BDS, MSc, FDS RCPS, FDS RCS, Consultant in Restorative Dentistry, King's College Dental Hospital, London, SE5 9RW.

The purpose of this paper is to discuss some of the perceived undesirable features of this malocclusion and demonstrate a sensible restorative solution, with some clinical examples being given.

In addition to retroclined maxillary central incisors, the Class II division 2 (II/2) patient typically presents with maxillary lateral incisors which are proclined and mesio-labially rotated (Figure 1).

Less commonly, all four maxillary incisors may be retroclined, which may result in retroclination of the mandibular incisors and relative prominence of the maxillary canines (Figure 2).

The features of this malocclusion often give rise to a minimal overjet and, together with an increased overbite, may be deemed to be traumatic to the palatal and/or lower labial gingivae (Figure 3).

Poor dental aesthetics may be

Figure 1. Retroclined upper central incisors with mesio-labially rotated upper lateral incisors.

Figure 2. Retroclined upper central and lateral incisors with prominent upper canine teeth.

Figure 3. 'Traumatized gingivae' on the labial aspects of the lower anterior teeth due to poor oral hygiene and an increased overbite.

Figure 4. A patient with a Class II division 2 malocclusion and significant tooth surface loss affecting the upper incisors prior to restorative dental treatment.

Figure 5. The same patient after restorative dental treatment. The benefit to the patient is that he/she gets rid of perceived aesthetic problems at minimal biologic cost and a reasonable financial cost.

a significant concern for patients with a Class II division 2 incisor malocclusion. It has been observed in some studies that an uncrowded and symmetric anterior dentition is considered to be visually pleasing to those rating the smiles.[2] Not only is a harmonious dental relationship considered attractive, but it is also known to be important in how others observe personality, success, and even how patients view their 'self image'.[3]

Orthodontic therapy has often been provided to correct these aesthetic concerns, followed by retention, with an overall aim to improve patients' and others' perceptions of dental attractiveness. Treatment usually involves the use of sophisticated fixed appliances for a considerable period, depending on the severity of the malocclusion, followed by long-term or indefinite retention, sometimes referred to (erroneously) as 'permanent retention'.

Many patients elect not to undertake this type of treatment, either because they do not find it acceptable or because they are unable to access such care. For these, and indeed for all such patients, it is reasonable to consider an acceptable cost-effective alternative solution, one of which is restorative.

This restorative solution has the advantage of requiring a much shorter active treatment and, importantly, as the option presented is minimally destructive of dental hard tissues, comes at a very low 'biological cost' (Figures 4 and 5).

A summary of Class II division 2 malocclusions

Prevalence

The Class II division 2 incisor set-up had not been reported to be common within any study population. Class I and Class II division 1 relationships are the most frequently encountered malocclusions, with Class II division 2 having a prevalence of 9–13% in Caucasian children and adults.[4-6]

Aetiology

The precise aetiology of a Class II division 2 malocclusion is not always clear but appears to be multi-factorial. A summary of the common causative and associated factors is described below. This is not an exhaustive list for which the reader is referred to the standard textbooks.

Skeletal relationship

Modern radiographic imaging has added to the debate on the existence of a 'pathognomic skeletal pattern' and this is still the subject of discussion, although some tentative conclusions may be drawn from the literature.

Children and adult patients who develop a Class II division 2 incisal relationship usually have a normal or a mild Class II skeletal relationship due to mandibular retrognathia (Figure 6).[7]

Figure 6. An adolescent patient with mandibular retrognathism.

A more severe discrepancy tends to produce a Class II/1 relationship because the lower lip cannot contact the upper incisors to retrocline them, as described below.

Soft tissue characteristics

Class II division 2 patients are known to present with different lip shapes, positions and thicknesses by comparison to patients who have a Class I malocclusion (Table 1). Class II division 2 patients are also reported to have an elevated lower lip-line, as well as increased lip to labial surface contact with the maxillary central incisors, thereby providing a significant and constant retroclining force.[8] The authors of this study found that an average of 5.1 mm of the upper central incisors were covered by the lower lip in the Class II division 2 group, by comparison to 2.7 mm in the control group. For some patients this is the prime aetiological factor, whereas in others it appears that this is a function of the skeletal abnormality.

Patients who have a Class II division 2 incisor malocclusion tend to have different:
1. Lip shapes
2. Lip positions
3. Lip thicknesses

Table 1. Soft tissue differences between Class II division 2 and patients with other malocclusions.

Dental-alveolar appearance

The Class II division 2 patient has a characteristic clinical and radiographic dento-alveolar appearance when viewed from the front. The lateral incisors often appear to be shorter than the central incisors because they escape the control of the lower lip and stay proclined. The upper labial segment is often imbricated and the lateral incisors tend to be crowded out and frequently have mesio-labial rotations. This dental set-up, coupled with a Class 2 skeletal relationship, often means that upper and lower incisors do not contact effectively in the intercuspal position and sometimes continue to over-erupt until they contact the opposing soft tissues. In the presence of poor plaque control, this can help to exacerbate gingival inflammation, although not necessarily symptoms or periodontal disease. This may increase the tendency for the local gingival margins to become inflamed or sometimes recede, but it is not, in itself, a cause of progressive periodontitis.

It has also been reported that maxillary central and lateral incisor teeth in these individuals have relatively longer crowns, shorter roots, reduced labio-palatal thicknesses and altered crown to root angles.[9] These dental features, in particular, may present significant limitations to the amount of torque forces that may be placed on teeth, the rapidity of movements and limit the overall orthodontic result that may be achievable. In such cases, a restorative solution could be a viable alternative to orthodontics if a patient wishes to avoid undesirable consequences, such as possible root resorption or a sub-optimal unstable aesthetic outcome.

The above section provides a short summary of likely clinical observations, although patients are unlikely to notice, or express concern, for all of these, even if present.

Patients' commonest concerns relate to:
- Retroclined upper central incisors;
- Prominent upper lateral incisors;
- Sore and inflamed upper and/or lower 'gums';
- An overall lack of satisfaction with their smile.

Smile concepts and assessment in Class II division 2 patients

A detailed clinical examination is required prior to any treatment in the 'aesthetic zone'. Sadly, while opinions are common in this field, there are few objective criteria for the assessment of smiles and the lip-to-teeth relationships. This lack of reliable biometric data sometimes means that clinicians have little choice but to rely heavily on past clinical experience and their 'subjective judgement'.

It is important to gain an in-depth understanding of **the concerns of the patient** from his/her detailed history as it is he/she who will be the ultimate arbiter of 'success'. Indeed, research has indicated that orthodontic treatment need does not always correlate well with patients' perceptions of their malocclusion.[10,11] It is worth remembering that, in several studies, patient and lay perceptions of treatment need have actually been minimal, which is sometimes in conflict with the considered opinions of dentists and orthodontists. In fact, a patient's presenting complaint may be very different from that envisaged by a clinician and may relate more closely to self-image than an objective diagnosis.

The authors have found that a meaningful evaluation of the potential result of treatment can be achieved quickly by using direct composite resin to provide an immediate and entirely reversible temporary composite 'mock-up' directly in the patient's mouth. The patient, or others concerned about the appearance, can then quickly evaluate the proposed changes and have a direct input into how they feel about those possible changes.

A Class II division 2 patient who has expressed a desire for change can gain a tangible and meaningful representation of the end result which can be created by temporarily applying, sculpting and curing composite material on to the problem areas. It allows the patient and the practitioner to make subtle changes because this composite mock-up can be left in position for quite a number of hours before it falls off. This allows the patient to discuss the potential aesthetic result with friends, family and others. The authors favour this approach to the alternative, which is to use articulated diagnostic wax-ups of models of the teeth made in a laboratory. These suggested changes are then transferred to the mouth using a putty matrix of the wax-up to create a removable chairside mock-up in an appropriately coloured bisacrylate resin. This alternative may be the preference of some clinicians, although it requires an additional appointment and a laboratory fee is incurred before the patient has any real understanding of the proposed treatment.

It is also important to consider that a Class II division 2 relationship is not necessarily unaesthetic *per se* and can be compatible with different individual's ideas of attractiveness. One should remember that restoration of a smile following modern European or American images may well not be acceptable to everyone, especially if they are a member of an ethnic minority.

It is beyond the scope of this paper to demonstrate all the components of aesthetic smile design and, instead, it will focus on the aspects relevant to the Class II division 2 malocclusion.

For this purpose, smile diagnosis will be divided simply into aspects of soft and hard tissue aesthetics. In the case of a Class II division 2 patient, both components are likely to play a role in the overall harmony of a successful result.

Soft tissue aesthetics

The lips have an important role in not only contributing to the creation of a Class II division 2 relationship, but also in drawing attention away from it. It is interesting to note that Scott *et al* concluded that an increased thickness of the vermilion border had a significant positive effect on the perception of an individual's malocclusion.[12] They also demonstrated that subjects with thicker vermilion borders and mild occlusal abnormalities were deemed to be more

attractive, intelligent, honest and successful than others with thinner lips and more noticeable malocclusions.[12]

The lips not only frame a smile but also define the boundaries of the 'aesthetic zone'. Lip-lines are classically described as being high, medium or low. The medium lip-line is often considered to be the most desirable in western culture and this exists when the lower border of the upper lip, when smiling, is approximately level with the maximum height of the gingivae (the gingival zenith or apex) of the upper anterior dentition.[13] Therefore, almost the entire labial surfaces of the teeth are displayed as well as a small amount of the interdental papillae (Figure 7).

The Class II division 2 patient typically differs from this and often has a high lip-line and consequently an increased amount of gingival display. A relaxed smile may show little or nothing of the over-erupted upper central incisors and ample free and attached gingivae, producing the characteristic 'gummy smile' (Figure 8). The obvious display of the cervical portions of the teeth may be deemed by some patients to be unaesthetic. These areas are readily visible post-treatment and may well require careful management to optimize the margins of any restorations.

Not only does the relative over-eruption of the upper central incisors often create a wide band of observable gingivae, but it can also result in irregularity of the gingival margins. It is a frequent feature of the smile that, in such cases, the gingival zeniths of the central incisors are below that of the lateral incisor and canine teeth (Figure 9).

This is far from ideal as many clinicians agree that the gingival zenith of central incisors should be level in height with the equivalent points of the maxillary canine teeth. In addition, the supposed ideal smile would have the gingival zeniths of the lateral incisors slightly lower than, or equal to, this line, but certainly not higher than it.

On the other hand, the visibility of the gingival aesthetics may be considered a trivial concern for the patient and may be self-limiting as the oro-facial soft tissues may lose tone with age. It may be discovered that the patient prefers his/her current 'gummy' yet youthful smile over a proposed 'aesthetic' alternative. It is important to analyse, discuss and document in the notes that these discussions have taken place as part of the consultation process.

Figure 7. A patient with a medium lip-line with the upper lip approximately at the cervical margins of the upper incisors.

Figure 8. A Class II division 2 patient with a moderately restored dentition and over-eruption of the upper central incisors and the upper left lateral incisor. The patient does not display the incisal edges of his upper anterior teeth on smiling but does display the cervical portions and the associated gingivae.

Figure 9. A Class II division 2 patient with a high smile displaying the cervical aspects of her upper anterior teeth and ample gingivae. It is also of note that the gingival zeniths of the upper central incisors are more coronal than those of the upper lateral incisors.

Figure 10. A Class II division 2 patient with discrepancies of both contact points and connector zones of the upper anterior teeth.

Hard tissue aesthetics

The Class II division 2 malocculsion may have several features which mean it falls short of what is considered to be 'aesthetically ideal'.[14]

One of the aims of orthodontic treatment is to create an occlusion that has no imbrications, which is frequently found in both the upper and lower arches in this malocclusion. Imbrication of the lower incisors is often considered to be of lesser initial importance than the increased overbite and retroclination of the upper centrals, although it may become more noticeable once this aspect of treatment is addressed.

The effect of upper anterior crowding, such as mesio-labial rotation and proclination of the lateral incisors, is that other elements of an aesthetic smile are lost. For example, ideally, there should be symmetry of the contact points, incisal embrasures and connector spaces. In relation to the latter, a 50-40-30 rule should be observed, ie that 50% of the height of the central incisors should appear to be in contact (the connector space) in the midline, 40% of the height in between the central and lateral incisor and 30% between the lateral incisor and the canine.[15] This is rarely, if ever, the case in Class II division 2, where there is often no contact point or connector zone between some or all of the anterior teeth, thereby creating large unsightly incisal embrasures (Figure 10).

Crowding may also result in the following problems:

- A shift in the dental midlines causing them to be non-coincident with each other and/or to the facial midline. Johnston and colleagues found that only 56% of laypersons, but 83% of orthodontists, were able to notice a midline discrepancy of 2mm in patients with all forms of incisor malocclusion. This rose to being apparent to almost all raters if the discrepancy was 4mm

or more.[16]

- Changes to the incisal edges of the upper anterior teeth. Ideally, as a segment the tips of the upper anterior teeth should be parallel to the inter-pupillary line or follow the lower lip in a relaxed smile.[17]
- Changes to the longitudinal axes of teeth which, ideally, should be perpendicular to the inter-pupillary line and slightly mesially inclined as one looks from the apex to the crown.[18]

In addition to positional concerns of the teeth in the upper labial segment, the morphology of the teeth themselves can contribute to the overall aesthetic problem. Long upper central incisors next to relatively short laterals tend to violate some perceptions of beauty relating to visual tooth proportions in a smile. The desired width ratios of teeth in the 'aesthetic zone' are sometimes said to follow the 'Golden Proportion' (Phi), especially in relation to denture teeth in removable prosthodontics.[19,20] This means that the width of the maxillary central incisor should be in a ratio of 1:0.618 by comparison to the lateral and the canine should be visibly narrower than the lateral by the same proportion. However, it is essential to note that this applies to the **perception** of the visual width of these teeth as viewed from the front, as opposed to their actual anatomical width. There has been lots of research into whether this ratio is apparent in visually pleasing smiles and the results have produced mixed conclusions.[21,22]

Orthodontic management of adult Class II division 2 patients

Although the focus of this paper is on the restorative management of adult patients presenting with a Class II division 2 incisor relationship, it is important to remember that orthodontic and/or orthognathic treatment may sometimes still be the treatment of choice.

Mild Class II division 2 malocclusions without marked vertical or antero-posterior skeletal discrepancies may be amenable to treatment of the upper arch only, especially if the patient's concern is only the aesthetics of the upper anterior dentition. In such cases, the patient and clinician would have to accept the overbite, retroclination of the upper anterior teeth and any crowding in the lower arch. Thus orthodontic treatment would be aimed at relief of crowding in the upper arch and alignment of the upper anterior teeth only. Depending on the molar relationship, this can be achieved with distalization of the buccal segments or extraction of the upper premolar teeth to allow canine retraction.

In more marked cases, it may not be possible to accept the overbite and/or the upper labial segment retroclination. In these patients, fixed appliances will be required to permit palatal root torque, possibly in combination with lower incisor proclination if the lower arch has mild to moderate crowding. In cases of severe lower arch crowding, premolar extractions may also be required. Care needs to be taken with these types of movement as they are anchorage demanding, may cause root resorption and risk gingival recession.

In general terms, the greater the severity of a Class II skeletal pattern and the lower the Frankfort-mandibular planes angle (FMPA), the harder it is to achieve an ideal post-treatment result. In adult patients, growth modification is not possible and thus severe skeletal discrepancies will have to be accepted or will require orthodontics and surgery. This usually begins with pre-surgical dento-alveolar decompensation to convert the Class II division 2 into a Class II division 1 incisor relationship, and maintain the curve of Spee. Orthognathic surgery would usually involve mandibular advancement to a three-point landing (incisor and terminal molar contact only) using a bilateral sagittal split osteotomy to correct the antero-posterior skeletal discrepancy, followed by post-surgical fixed appliance therapy to level the arches by mandibular buccal segment extrusion and make final adjustments to tooth positions.

In Class II division 2 patients, poorly controlled orthodontic treatment may produce an unstable tooth position because the new positions of the teeth violate the equilibrium of the intra- and peri-oral tissues. This unstable position means that the teeth will be prone to relapse. Mild proclination, intrusion and palatal root torque of the maxillary incisor teeth allows the mandibular incisors to be proclined into the position previously occupied by the maxillary incisor crowns, thereby maintaining the incisor crowns within the zone of soft tissue equilibrium.

Retention is **always** required using either a removable retainer (eg Hawley, Essix, etc), a fixed retainer, or more commonly a combination of the two. The former is dependent on long-term patient compliance and meticulous oral hygiene to prevent plaque stagnation. A fixed retainer may debond as well as cause difficulty with flossing and therefore requires indefinite review and maintenance with all the attendant costs. There is, however, no compelling evidence that one type of retention is superior to another in preventing relapse in the incisors in Class II division 2 individuals. Though stability may be maintained with retention, a retrospective analysis by Canut and Arias illustrated that, within 3 years, 10% of Class II division 2 patients had unacceptable irregularity of their maxillary dentition.[23]

If the pre-treatment tooth position is accepted, however, and the malocclusion is masked with restorations, then the need for retention, although not maintenance, is removed.[23]

Restorative management of adult Class II division 2 patients

The broad aims of restorative dental treatment are to accept the position of the roots of the teeth but to camouflage the crowns to produce a more even and symmetrical appearance:

- The changes may involve using directly bonded layered composite to alter the incisal levels by lengthening the upper lateral incisors mainly on their palatal surfaces and by shortening the tips of the upper centrals to reduce the excessive height of the central incisors.
- Adding direct composite or porcelain to the labial contours of the upper anterior teeth in order to bring them forward to be more in line with the

lateral incisors. This reduces the effect of them being retroclined and being in the shadows of the upper lateral incisors.

- Altering the gingival contours, by raising the gingival zeniths of the upper central incisors to be at the level of the canine teeth and also restoring the appropriate gingival embrasures.

The hard and soft tissue management options available to achieve these aims include:

- Direct composite bonding;
- Gingival recontouring;
- Porcelain laminate veneers;
- Any combination of the above.

Figure 11. The patient with composite bonded on to the labial aspects for the upper central incisors.

Figure 12. The directly bonded composite should be light-cured as per the manufacturer's instructions.

Figure 13. The patient with composite bonded on to the upper lateral incisors. It is of note that in this case the majority of the composite was bonded to the disto-labial aspects of these teeth.

Direct composite bonding

Strategic use of direct composite can offer a sensible solution to some patients who are concerned about their dark spaces and a mild or moderately crowded dentition.

In order to assess the acceptability and limitations of directly bonding composite to camouflage the teeth, the unset composite material can be placed, shaped and light-cured, without etching or bonding. This gives patients a realistic and readily visible change. It is quick, reversible and a risk-free way of assessing the visual effects of the proposed smile change. It also allows the clinician to judge how such changes could affect lip posture, incisal display and phonetics. More importantly, it allows clinicians a chance to observe the patient's non-verbal reaction to these proposed changes.

Figure 14. The patient with composite bonded on to the upper canine teeth. A practical tip for directly 'mocking-up' composite is to support the material with a gloved finger palatally and to use a small brush dipped in resin to smooth the labial surfaces.

Figure 15. The composite material can be smoothed with polishing discs.

Figure 16. The completed composite 'mock-up' to illustrate what is achievable without orthodontic treatment.

Prior to undertaking this mock-up, the teeth should be cleaned and dried and then composite of an appropriate shade can be sculpted on to particular areas of the teeth to disguise the misalignment and block out the dark spaces. Most frequently, composite will need to be placed on the palatal aspects of the lateral incisors and separately on to the whole of the labial aspect of the central incisors (Figures 11–16).

To optimize the aesthetic result, the edges of the central incisors may be shortened and the visual effect of doing this can be gauged directly by using a **black permanent ink marker pen** (eg Staedtler®). Application of this felt-tip pen to the dried edges of the central incisors can illustrate to the patient the visual effect of greater or lesser shortening of the central incisor tips. This allows the patient, and any interested third parties, to assess the appearance of such temporary shortening (Figure 17). The ink can easily be removed with surgical spirit.

Once the patient is satisfied

Figure 17. A patient with 'permanent' ink drawn on the incisal edges of their upper central incisors to illustrate the effect of shortening.

Figure 18. A study cast of the 'mock-up' to aid the definitive composite placement.

Advantages	Disadvantages
Excellent aesthetics possible	May not be possible in crowded arch
Resistant to staining	May be destructive of sound tooth tissue
High tissue compatibility	Requires at least two visits
High success rates if preparation is in enamel	Requires excellent laboratory support with the associated costs

Table 2. The advantages and disadvantages of porcelain laminate veneers in Class II division 2 patients.

with the mock-up a photographic record and impressions should be taken to allow accurate reproduction of the effects (Figure 18).

In the majority of cases, the composite will be retained long enough for the patient to have a few hours with the material in position in order for him/her to seek opinions from friends and family. They may be instructed on how to flick off the composite or offered the option of returning the next working day to have this done by the dentist.

Composite has the advantages of being biologically friendly. It requires little or no tooth preparation and provides a quick result. Composite is, however, susceptible to staining and this can be a problem in smokers. It has to be finished and polished carefully. It is essential to advise the patient pre-operatively that the material is likely to require repolishing or resurfacing after a few years, though this is rarely onerous for either the patient or clinician. The costs and responsibilities involved in doing this should be discussed and a record kept of these discussions.

Porcelain laminate veneers

Porcelain veneers offer an alternative to directly bonded composite and theoretically can offer excellent tissue compatibility, colour stability and aesthetics[24,25] (Table 2). The single path of insertion required for porcelain veneers, however, is often compromised by the presence of the crowded and short lateral incisors.

Porcelain veneer preparations should be confined to enamel, with minimal axial reduction so that pulpal complications may be minimized. With specific reference to the retroclined position of the central incisors, the indirect veneering technique is predominantly additive and avoids the need for much, if any, labial axial reduction. Preparation is often only needed with a small chamfer finish line at the cervical region to guide the ceramicist, but allowing for sufficient thickness of material and an appropriate emergence profile. However, preparation of proclined lateral incisors can be destructive, unlike the approach with direct composite. With regard to aesthetics and contour, there should be clear instructions on length, translucency, micro-anatomy, etc, assisted by the technician being given models and photographs of the direct or indirect mock-up.

Gingival contour

Much can be achieved with composite or porcelain veneers alone for Class II division 2 patients with cosmetic concerns, particularly in relatively mild cases. Some patients with a low lip-line may have little perceived benefit or desire to have aesthetic improvements undertaken to their gingival contour.

As mentioned above, a feature of ideal gingival architecture is that the gingival zeniths of the central incisors, the canines and, possibly, the lateral incisors should lie on a line joining these zeniths. This line is known as the gingival aesthetic line (GAL). For example, a large vertical discrepancy from the GAL of the lateral incisors in a Class II/2 patient may have a detrimental effect on the overall aesthetic result, producing the appearance of inappropriately narrow teeth.[26]

In this malocclusion, however, the area that requires most gingival recontouring is often the labial aspect of the upper central incisors. The margins of these teeth may be well below the GAL. This soft tissue change can be achieved with either soft tissue sculpting (Figures 19–21) or both soft tissue and alveolar bone recontouring, using a conventional flap technique, electro-surgery or a soft tissue laser.

The concept of biological width should be considered when undertaking restorative dental procedures which encroach on gingival tissues, and this is especially important when recontouring bone.

Figure 19. A patient with a Class II division 2 incisal relationship with missing upper lateral incisors and retained upper deciduous canine teeth.

Figure 20. The patient receiving a simple gingivectomy of the upper central incisors.

Figure 21 The patient with definitive porcelain laminate veneers on her anterior and premolar teeth.

Conclusion

Restorative dentistry may be able to offer an alternative to orthodontics for Class II division 2 patients who have aesthetic and functional concerns. Such treatment is both time- and cost-effective and comes at a very low biological cost. Such a visual benefit is of at least equal, if not greater, value to the patient who is concerned about a prolonged course of orthodontic treatment which, at the end, may have poor long-term stability.

Acknowledgements

The authors would like to thank Mr Neil Poyser, Mr Jamie Gwilliam, Mr Farhad Naini and Ms Thushala Ubaya-Naranyanage for the use of their clinical photographs.

References

1. Daskalogiannakis J. *Glossary of Orthodontic Terms*. Berlin: Quintessence, 2000.
2. Kerosuo H, Hausen H, Laine T, Shaw WC. The influence of incisal malocclusion on the social attractiveness of young adults in Finland. *Eur J Orthod* 1995; **17:** 503–512.
3. Klages U, Bruckner A, Zentner A. Dental aesthetics, self-awareness, and oral health-related quality of life in young adults. *Eur J Orthod* 2004; **26:** 507–514.
4. Todd J, Dodd T. *Children's Dental Health in the United Kingdom.* London: Office of Populations Census and Surveys, 1985.
5. Salonen L, Mohlin B, Gotzlinger B *et al*. Need and demand for orthodontic treatment in an adult Swedish population. *Eur J Orthod* 1992; **14**: 359–368.
6. Proffit WR, Fields HW Jr, Moray LJ. Prevalence of malocclusion and orthodontic treatment need in the United States: estimates from the NHANES III survey. *Int J Adult Orthod Orthognath Surg* 1998; **13**: 97–106.
7. Karlsen AT. Craniofacial characteristics in children with Angle Class II div 2 malocclusion compared with extreme deep bite. *Angle Orthod* 1994; **64**: 123–130.
8. Lapatki BG, Mager AS, Schulte-Moenting J, Jonas IE. The importance of the lip line and resting lip pressure in Class II division 2 malocclusion. *J Dent Res* 2002; **81**: 323–328.
9. McIntyre GT, Millett DT. Crown-root shape of the permanent maxillary central incisor. *Angle Orthod* 2003; **73**: 710–715.
10. Holmes A. The subjective need and demand for orthodontic treatment. *Br J Orthod* 1992; **19**: 287–297.
11. Shaw WC, Lewis HG, Robertson NR. Perception of malocclusion. *Br Dent J* 1975; **138**: 211–216.
12. Scott C, Goonewardene M, Murray K. Influence of lips on the perception of malocclusion. *Am J Orthod Dentofacial Orthop* 2006; **130**: 152–162.
13. Hunt O, Johnston C, Hepper P, Burden D, Stevenson M. The influence of maxillary gingival exposure on dental attractiveness ratings. *Eur J Orthod* 2002; **24**: 199–204.
14. Andrews LF. The six keys to normal occlusion. *Am J Orthod* 1972; **62**: 296–309.
15. Sarver DM. Principles of cosmetic dentistry in Orthodontics: Part 1. Shape and proportionality of anterior teeth. *Am J Orthod Dentofacial Orthop* 2004; **126**: 749–753.
16. Johnston CD, Burden DJ, Stevenson MR. The influence of dental midline discrepancies on dental attractiveness ratings. *Eur J Orthod* 1999; **21**: 517–522.
17. Ahmad I. Anterior dental aesthetics: dentofacial perspective. *Br Dent J* 2005; **199**: 81–88.
18. Morley J, Eubank J. Macroesthetic elements of smile design. *J Am Dent Assoc* 2001: **132**; 39–45.
19. Lombardi RE. A method for the classification of errors in dental esthetics. *J Prosthet Dent* 1974; **32**: 501–513.
20. Levin E. Dental aesthetics and the golden proportion. *J Prosthet Dent* 1978; **40**: 244–252.
21. Bukhary SMN, Gill DS, Tredwin CJ *et al*. The influence of varying maxillary lateral incisor dimensions on perceived smile aesthetics. *Br Dent J* 2007; **203**: 687–693.
22. Ahmad I. Anterior dental aesthetics: dental perspective. *Br Dent J* 2005; **199:** 135–141.
23. Canut JA, Arias S. A long-term evaluation of treated Class II division 2 malocclusions: a retrospective study model analysis. *Eur J Orthod* 1999; **21**: 377–386.
24. Dumfahrt H, Schaffer H. Porcelain laminate veneers. A retrospective evaluation after 1 to 10 years of service: Part II – Clinical results. *Int J Prosthodont* 2000; **13:** 9–18.
25. Fradeani M, Redemagni M, Corrado M. Porcelain laminate veneers: 6 to 12 year clinical evaluation – a retrospective study. *Int J Periodont Restor Dent* 2005; **25**: 9–17.
26. Ahmad I. Anterior dental aesthetics: gingival perspective. *Br Dent J* 2005; **199**: 195–202.