

Traumatic Overbite: A Restorative Solution

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Abstract: Deep overbite is frequently seen in the adult dentition. Although the condition is usually asymptomatic, certain factors may lead to the development of deep traumatic overbite, and in partially dentate patients loss of posterior occlusal support may be a contributory factor. Several treatment modalities, including orthodontics, orthognathic surgery and prosthodontics have been used but, as some adult patients with this problem are unwilling to avail themselves of treatment involving either orthodontics or orthognathic surgery, a restorative approach using a combination of fixed and removable restorations may provide a satisfactory solution. This paper details a case report on the restorative management of a partially dentate adult patient with a deep traumatic overbite.

Dent Update 2002; 29: 136–140

Clinical Relevance: An appropriately designed combination of fixed and removable restorations may provide a satisfactory solution to the problem of traumatic deep overbite in the adult patient.

Overbite may be defined as 'The vertical overlap of the incisor teeth in centric occlusion'.¹ This is essentially a differential relationship between the level of the anterior and posterior teeth in one or both arches. In an ideal relationship, the lower incisors contact the cingulum plateau of the palatal surface of the upper incisors when in maximum intercuspation, with the upper incisors overlapping approximately one-third of the height of the lower incisors.

Overbite may be classified as increased, average or reduced.² Deep or increased overbite is much more common

than reduced overbite, with a reported prevalence in the adult population of 13%.³

Deep overbites may remain asymptomatic and not cause the patient any specific concern. However, certain factors may precipitate the development of a deep traumatic overbite resulting in trauma to the hard tissues of the teeth or to the adjacent soft tissues.

The factors implicated in the progression of an asymptomatic deep overbite to a traumatic relationship include:⁴

- loss of posterior support;
- periodontal disease; and
- injudicious orthodontic or restorative treatment.

Akerly has classified traumatic overbite into four categories:⁵

- Type I: The palatal mucosa is at risk

of trauma from the impinging lower incisor (Figure 1a).

- Type II: The upper palatal marginal gingiva is at risk of trauma from the impinging lower incisor (Figure 1b).
- Type III: Trauma may arise either in the palatal soft tissue of the upper incisor, or in the labial gingiva/alveolar mucosa of the lower incisor, or in both regions simultaneously (Figure 1c).
- Type IV: The lower incisor causes progressive attrition of the palatal surface of the opposing incisor (Figure 1d).

The possible pathological changes associated with traumatic overbite include trauma to the palatal tissues, temporomandibular joint dysfunction, gingival stripping and wear faceting of the palatal aspects of the upper incisors and labioincisal aspects of the lower incisors.⁶

Since extensive vertical overlap can result in significant damage to the teeth and supporting structures, a number of strategies have been advocated for the correction of deep traumatic overbites:

- orthodontic treatment;
- orthognathic surgery ± pre and post surgical orthodontics;
- prosthodontic/restorative treatment;
- combinations of the above.

The case report that follows describes the restorative management of a patient in whom a pre-existing deep overbite in combination with the loss of posterior occlusal support had resulted in the development of a traumatic overbite

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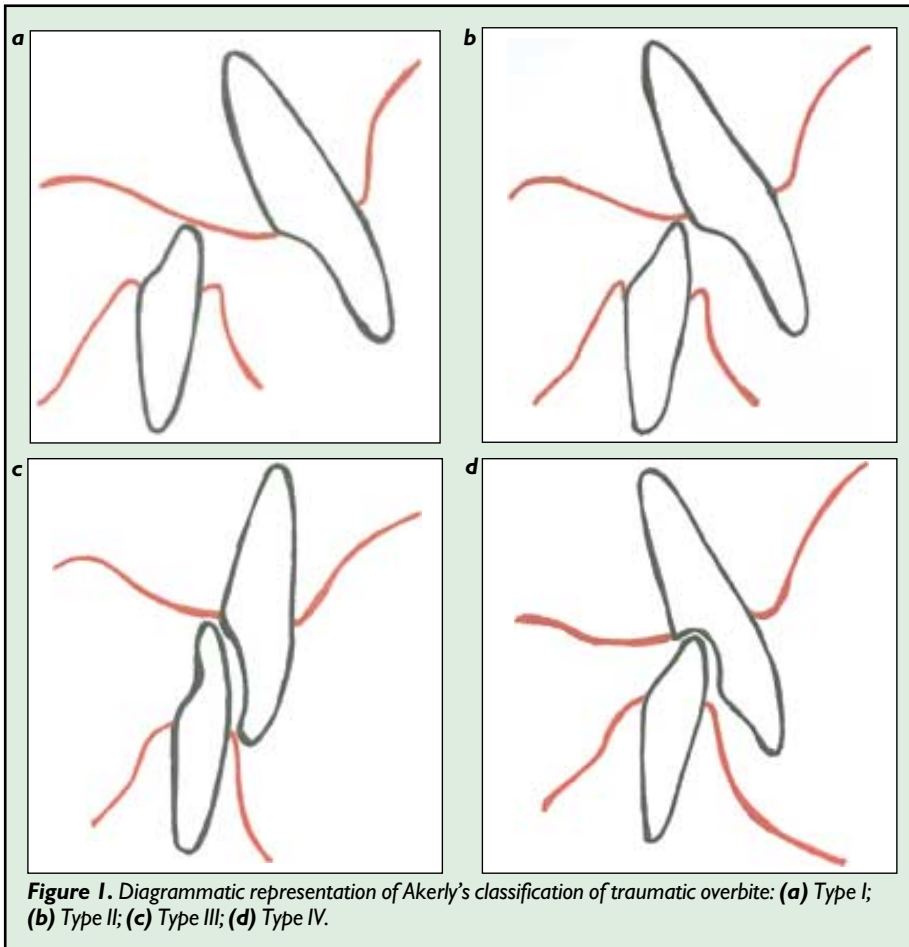


Figure 1. Diagrammatic representation of Akerly's classification of traumatic overbite: (a) Type I; (b) Type II; (c) Type III; (d) Type IV.

with the lower incisors impinging on the palatal gingiva.

CASE REPORT

A 53-year-old woman presented to the restorative clinic complaining of 'biting on the roof of her mouth'. Although the patient had been aware of the problem for a number of years, she had only recently become concerned about the risk of soft tissue damage. The patient's medical history was insignificant, and she was an irregular dental attender.

Examination

Extra-oral examination revealed that the patient had a skeletal II dental base relationship with a reduced lower facial height and a reduced Frankfort mandibular plane angle. The patient appeared overclosed, as evidenced by eversion of the lips and a reduced nose to chin distance.

The patient was partially dentate, with 3 2 1 / 1 2 3 and a broken down lone-standing molar (7/) present in the upper arch, and 7 4 3 2 1 / 1 2 3 4 5 6 in the lower.

She had a Class II division 1 incisal relationship with a deep and complete overbite, the lower incisors impinging on the upper palatal marginal gingivae (Akerly Type II traumatic overbite).⁵

The gingiva on the palatal aspect of the upper labial segment appeared erythematous and oedematous, with evidence of minor recession. There was gross calculus deposition on the lingual aspect of the lower anterior teeth with an associated localized chronic marginal gingivitis.

The 7/ was not in occlusal contact with the broken down 7/ when the teeth were in the maximum intercuspal position; 4/5 6 were also unopposed. When the teeth were maximally intercusped the occlusal surfaces of 5 6 were in close proximity to the upper edentulous alveolar ridge. As the teeth in the lower buccal segments were unopposed (and thus non-functional), the patient's posterior support was greatly compromised. Manipulation of the patient's mandible on the retruded arc of closure did not reveal any deflective contacts (Figure 2).

It was concluded that the loss of posterior support in this case resulted in the progression from an asymptomatic deep overbite to a traumatic overbite.

Treatment Options

Given the patient's age, the severity of

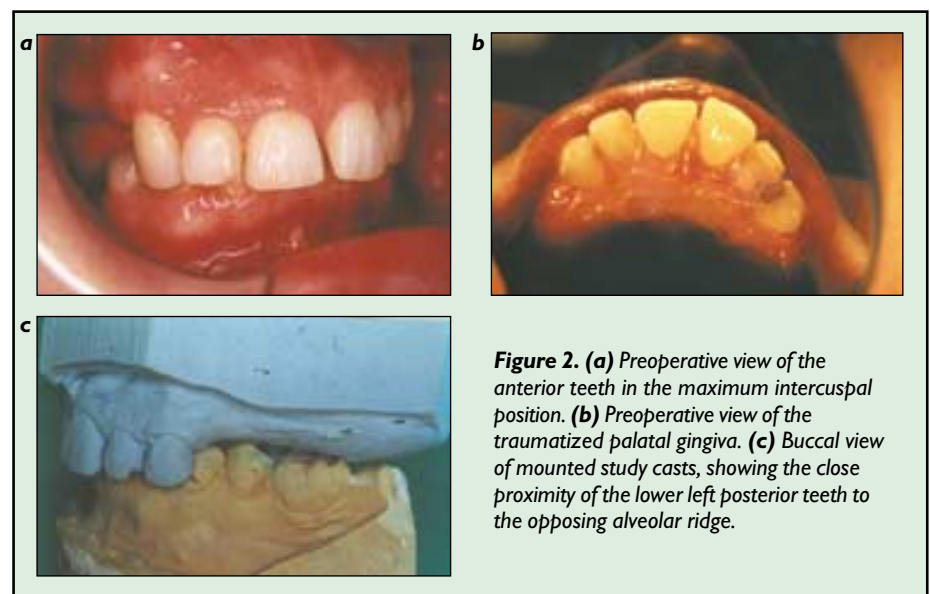


Figure 2. (a) Preoperative view of the anterior teeth in the maximum intercuspal position. (b) Preoperative view of the traumatized palatal gingiva. (c) Buccal view of mounted study casts, showing the close proximity of the lower left posterior teeth to the opposing alveolar ridge.



Figure 3. Palatal view of the horseshoe-shaped major connector of the upper cobalt chromium removable partial denture, extending from the palate onto the cingula of the upper incisors.

the overbite and the lack of posterior support in the upper arch, it was considered that orthodontic treatment alone was not feasible. Surgical correction of the interincisal relationship would necessitate a combination of mandibular ramus surgery and a reduction genioplasty; however, the patient wished to avoid surgery and so this treatment option was rejected. Thus, a restorative treatment option was chosen to treat the traumatic overbite.

The restorative treatment plan involved the following steps:

1. Oral hygiene instruction, supragingival debridement of the lower anterior teeth and full mouth prophylaxis.
2. Restoration of $\overline{7}$ using a full gold crown to re-establish occlusal contact with $\overline{7}$ in the patient's existing intercuspal position. Features were incorporated into the design to accommodate a removable partial denture, including mesial and palatal guide planes to create a more specific path of insertion and a buccal undercut to aid direct retention.
3. Wearing of the upper removable partial denture metal framework only for a trial period to verify the relief of palatal soft tissue trauma, test the patient's tolerance of the partial palatal coverage by the major connector, and test her tolerance of the slight increase in the occlusal vertical dimension.
4. Fitting of gold crowns on $\overline{5}$ $\overline{6}$ to lower the occlusal plane.
5. Attachment of artificial teeth with

metal occlusal surfaces to the removable partial denture framework.
6. Review.

Treatment and Follow-up

Restorative treatment using a combination of crowns and a cobalt chromium removable partial denture was used for this patient. As an initial measure $\overline{7}$ was restored using a pinned amalgam core and a full gold crown. Occlusal contact was established with $\overline{7}$ in the patient's intercuspal position.

The partial denture design included a horseshoe-shaped major connector, which extended from the palatal area onto the cingulae of the upper incisors (Figure 3). This design allowed minimal coverage of the palatal tissues as the patient had been unable to tolerate all previous partial dentures owing to the extent of palatal coverage. It also ensured that the lower incisors occluded on the major connector and prevented their impingement on the palatal marginal tissues, thus alleviating the soft tissue trauma. The design also permitted an increase in the occlusal vertical dimension at the incisal level by an amount equivalent to the thickness of the major connector. The patient's retruded arc of mandibular closure was chosen as a treatment position.

As the increase in occlusal vertical dimension resulted in loss of occlusal contact between $\overline{7}$ and $\overline{7}$, the cobalt chromium framework design included an overlay component on the occlusal surface of $\overline{7}$, which maintained occlusal contact with $\overline{7}$ at the increased occlusal vertical dimension. The patient wore the



Figure 4. Occlusal view of gold crowns placed on $\overline{5}$ $\overline{6}$ to reduce the occlusal plane of the lower left posterior teeth.

metal framework of the removable partial denture during waking hours only for a trial period of 4 weeks. (The cobalt chromium framework was chosen in preference to a simple acrylic appliance to test the increase in the occlusal vertical dimension. Given the history of poor patient tolerance to all previous upper acrylic removable partial dentures, it was considered that the metal framework would be more readily acceptable in terms of thickness, stability and extent of palatal coverage.)

On reassessment, there was an obvious improvement in the status of the palatal soft tissues and the patient had no apparent difficulty in tolerating the appliance. Given the positive indications of patient tolerance of the appliance in terms of both palatal coverage and the increase in occlusal vertical dimension, and given the signs of improvement in the palatal tissues, the occlusal plane was lowered by placing gold crowns on $\overline{5}$ $\overline{6}$ (Figure 4). Gold crowns were chosen as these provided maximum latitude in the alteration of the occlusal plane and in the development of occlusal and proximal contact points.

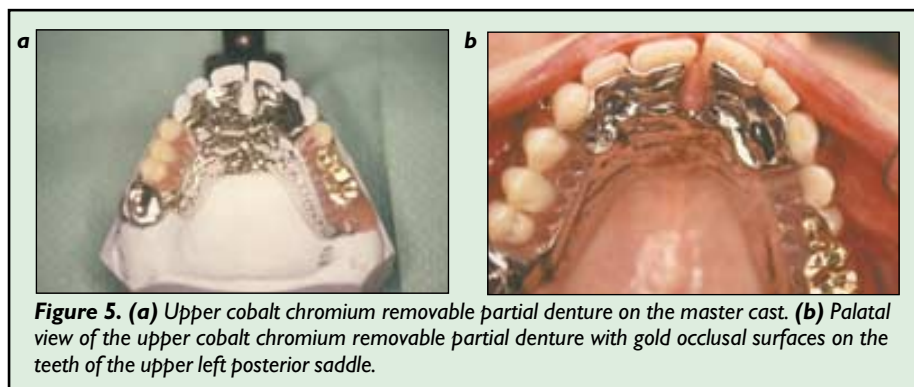


Figure 5. (a) Upper cobalt chromium removable partial denture on the master cast. (b) Palatal view of the upper cobalt chromium removable partial denture with gold occlusal surfaces on the teeth of the upper left posterior saddle.

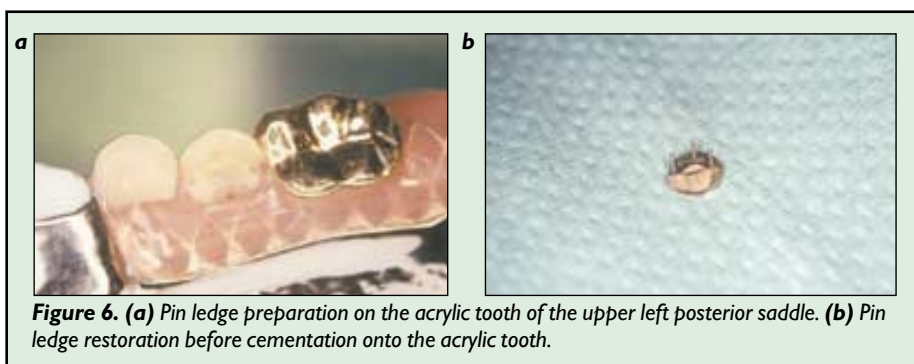


Figure 6. (a) Pin ledge preparation on the acrylic tooth of the upper left posterior saddle. (b) Pin ledge restoration before cementation onto the acrylic tooth.

The space created by increasing the occlusal vertical dimension and lowering the occlusal plane enabled posterior teeth to be placed on the upper removable partial denture. Gold occlusal surfaces were incorporated in an effort to customize the posterior occlusal contact relationships and to provide more stable occlusal conditions over time (Figure 5).

The use of gold occlusal surfaces on prosthetic teeth has been recommended in combination fixed/removable cases when constructing a partial denture that will oppose a posterior occlusion of fixed restorations with gold occlusal surface;⁷ it has been suggested that the favourable wear resistance properties of gold to gold and the flexibility to customize the occlusal morphology make it the most desirable material when restoring the occlusion in a combination case.⁷ However, while cast gold occlusal surfaces have favourable wear properties and permit the creation of an individualized occlusal scheme, possible disadvantages include the increased expense involved, the additional laboratory procedures required for their fabrication and the possible objection from the patient on aesthetic grounds. In this case, the gold occlusal surfaces were incorporated on the removable partial denture by processing a gold crown into the acrylic-work in the $\overline{6}$ position and by cementing a pin ledge-retained gold onlay to the upper left acrylic premolar using a resin-based cement (Figure 6). The final results of the treatment are shown in Figure 7.

Re-examination of the patient at regular intervals reveals that the

removable partial denture continues to be well tolerated and remains satisfactory in terms of fit, stability and occlusal function. No recurrence of the palatal soft tissue trauma has been observed.

CONCLUSION

In the case described here the traumatic effect of the deep overbite on the palatal gingiva was managed using a restorative approach. This involved the combination of crowns and an upper removable partial denture.

The inclusion of an anterior bite platform in the upper removable partial denture design prevented the lower incisors from impinging on the palatal tissues, thus relieving soft tissue trauma and providing stable occlusal contacts for the lower anterior teeth, while permitting a slight increase in occlusal vertical dimension. Full-coverage indirect restorations in the lower left quadrant enabled the lowering of the occlusal plane.

Using this combined approach the

space created by the increase in occlusal vertical dimension, together with that achieved by lowering the occlusal plane, created adequate clearance for restoration of the upper posterior saddle area using a removable partial denture, which was well tolerated by the patient. Occlusal function to the lower posterior teeth helped to restore the posterior occlusal support and thus permitted a more even distribution of occlusal loading.

While a deep overbite in a partially dentate adult patient may present a challenge to the clinician in terms of treatment planning, this case report indicates that an appropriately designed combination of conventional fixed and removable restorations can provide an acceptable solution.

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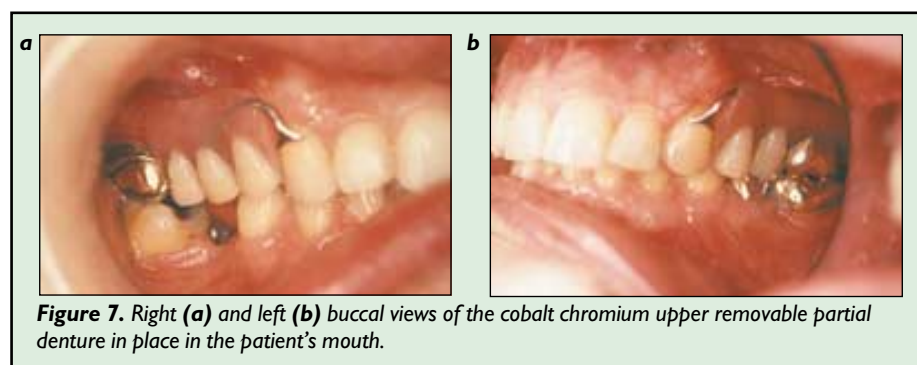


Figure 7. Right (a) and left (b) buccal views of the cobalt chromium upper removable partial denture in place in the patient's mouth.