

Clinical Section

Interdisciplinary approaches to adult orthodontic care

SONIL KALIA

Specialist Orthodontic Practice, Sheffield, UK

BIRTE MELSEN

Department of Orthodontics, Royal Dental College, Faculty of Health Sciences, University of Aarhus, DK-8000 Aarhus C, Denmark

Abstract *The orthodontic treatment of adult patients is most frequently just one component of a more complex treatment involving several dental disciplines. This report discusses the potential problems related to the establishment of a treatment plan and the necessity for the patient's full acceptance, and understanding of the pros and cons related to different treatment approaches. In addition, the case report underlines the importance of a well-defined treatment goal. We have illustrated the team approach and the treatment principles in this combined perio-, ortho-, and prosthodontic patient.*

Index words: Adult Orthodontics, Interdisciplinary Treatment, Pre-prosthetic, Segmented Mechanics.

Introduction

An increasing number of adult patients are becoming aware of the possibilities for orthodontic treatment. They present with a need for treatment related to one or a few symptoms, which have worsened over time, but the patient's chief complaint is often only the tip of the dental 'iceberg' (Küseler and Melsen, 1999).

The first visit to the orthodontist may result in a number of conflicts, which may develop between the orthodontist and the general dentist, between the patient and the orthodontist, or even between the patient and the general dentist. The orthodontist may approach the general dentist for information on the patient and the general dental care, and enter into a diplomatic discussion as to the aetiology of the orthodontic problem. The general dentists may be unaware that orthodontic solutions to many malocclusions are available. The patient may react negatively to the information about the problem and may consider accepting the situation. Patients may also wonder why no one explained what was happening with their dentition and reproach the general dentist. In fact, the general dentist may have earlier broached the subject, but the patient does not wish to remember the details of the discussion.

A crucial step in any orthodontic treatment of patients who develop malocclusion due to tooth migration is the level of information on aetiology, the complexity of the malocclusion, and the prognosis with and without treatment (Melsen and Klemm, 1997). In addition, the patient should also be informed about the long-term maintenance needed following treatment in terms of retention and periodontal care.

The initial phase of any treatment is the work up of a problem list combining the findings of a functional, extra-

oral, and an intra-oral clinical examination. The contents of the problem list depend upon the knowledge and the diligence of the clinician. A general dentist may well overlook a malocclusion and the orthodontist may likewise underestimate the periodontal problems of the patient. The co-operation of the patient depends on the insight and understanding the patient has of their dental status, and the prognosis depends on the meticulousness of both the examination and also the communication of the problems to the patient. The general dental practitioner may have failed to explain consequences of tooth extraction clearly to the patient. As a result, the missing tooth may not be replaced and collapse of the bite develops. Migration of teeth due to progressive periodontal breakdown and the additive effect of myofunctional habits (lip trap) to the teeth should also be explained to the patient (Akin-Nergiz, 1997; Roblee, 1998; Sanders, 1999; Willems, 1999).

Once a problem-list is achieved the treatment goals have to be agreed by all the dentists involved in the case. In defining the treatment goal, the limitations of the individual case should be taken into consideration to avoid unrealistic expectations. The orthodontic treatment goal can be simulated three-dimensionally on a combination of a cephalogram and an occlusogram. This image can serve as the basis upon which the necessary force systems can be expressed in mathematical terms, and then the selection and design of the appliance can be formulated.

At the end of treatment an evaluation should be carried out comparing the outcome with the objectives. A precondition is, therefore, that the treatment goals have been specified. This can sometimes be difficult in growing individuals, but is usually possible in adult cases. This case report will present an example of the progression through the different phases of an orthodontic treatment with consideration of an inter-disciplinary approach.

E-mail: sonilkalia@hotmail.com

Case report

This 56-year-old woman presented at the orthodontic department because of flaring of upper incisors, and increased horizontal and vertical overlap. She reported that the malocclusion had started during her thirties, during which time she had continuous periodontal problems. The general appearance of the teeth and face had deteriorated slowly to a point that the patient had requested treatment to stabilize the situation. At the time of referral, she had successfully completed periodontal treatment and had been given intensive oral hygiene instructions. The dentition now showed generalized gingival recession, but no pockets above 4 mm (Figure 1). A problem list was developed (Table 1) and a treatment goal illustrated in a 3-D treatment plan (Figure 2).

Problem list (Table 1)

A problem list should be worked up in a standard manner, which may vary between different clinicians. Always following the same sequence helps the clinician not to overlook certain not so obvious, but important problems. Based on the problem list, the orthodontist can consider possible ways of solving each problem and how these solutions interact with each other.

Indication for treatment

A problem list is necessary before orthodontic treatment can be considered and the cost-benefit evaluated. In this case correction of the malocclusion is necessary in order to prevent further tooth migration. At the same time treatment will reduce the possibility of further bite deepening



FIG. 1 (a-c) Extra-oral view characterized by the increased overjet leading to insufficient lip closure. (d-h) Intra-oral view. Note the clear signs of palatal trauma.

3-D TREATMENT OBJECTIVE

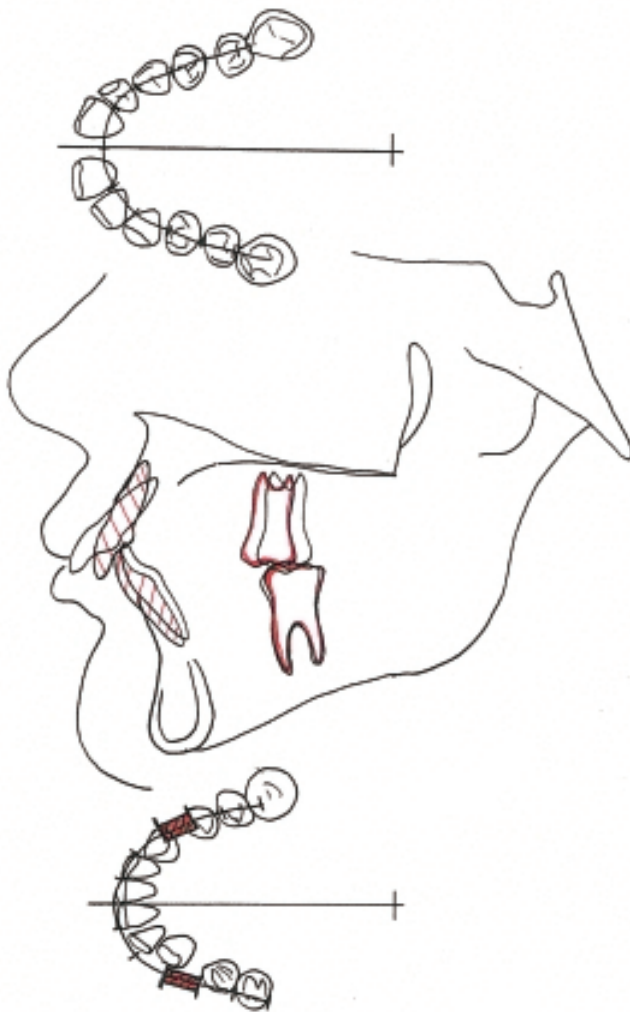


FIG. 2 Treatment goal.

and alleviate palatal trauma. It must be emphasized, however, that a very strict protocol of periodontal care must be provided before during and after treatment, and prosthetic replacement of the missing teeth in the lower jaw is required.

Treatment goal (Table 2)

The next step is to formulate the treatment goals in a summarized version and to produce the 3-D illustration through the combination of a lateral head film and an occlusogram. At this stage, discussion with the dentist responsible for the prosthodontic part of the treatment is essential. Once individual tooth movements are defined the force diagram can be added unambiguously (Fiorelli and Melsen, 1999). The 3-D imaging of the treatment goal will help the clinician avoid 'roundtripping'. The correct force system can be

TABLE 1 *Problem list*

Chief complaint: 'My teeth have migrated forward are spaced and sticking out'

Analysis	
<i>Objective</i>	
Facial appearance	Convex profile proclined flared upper teeth Mandibular retrognathia with increased labio-mental fold
Periodontal status	No pockets > 4mm, but 10–15% marginal bone loss on upper front teeth Inflamed gingiva on the lingual aspect of the upper incisors due to palatal impingement
Function	Lower lip-trap/palatal impingement
Dentition	Missing teeth: 18, 16, 26, 28, 38, 37, 36, 46, 48 Mesial rotation 17, 27, 34, 44 Distal rotation 15, 14, 24, 25
Occlusion	Over eruption of upper and lower front teeth Sagittal–bilateral disto-occlusion. Overjet 10 mm Vertical–8 mm overbite with palatal impingement Transverse–scissors bite 14/44. Cross bite 35/45
Space analysis	Generalized spacing, upper arch: 12 mm, lower arch: 11mm. 6mm median diastema.
Anterior ratio	74.4% Mean: 77.2% SD: ± 1.65
Arch form	V-shaped in the upper and lower
<i>Cephalometric</i>	
	Increased sagittal jaw relationship due to mandibular retrognathia proclined upper incisors dento-alveolar deep bite

TABLE 2 *Treatment goals*

Aesthetics:	Eliminate lip-trap and generate muscle balance.
Function:	Eliminate the palatal impingement. Improve the lip competence and generate a stable occlusion bilaterally.
Occlusion:	Establish neutral canine relationship and reduce overbite and overjet for normal incisor relationship. Prepare for prosthetic replacement of the missing teeth in the lower jaw.
Spacing	Close diastema, and open up for two spaces 35 and 45 area.

superimposed onto the 3-D image, making it easier to separate the treatment into phases and to design the correct appliance for each phase.

At the end of treatment the achieved tooth movements should be compared with the treatment goals, whereby the effects of the treatment can be evaluated.

Treatment (Table 3)

The first phase of treatment comprised retraction of the upper premolars, disto-palatal rotation of the upper molars, and simultaneous intrusion and retraction of the upper incisors (Figure 3). In the lower jaw levelling, proclination, and intrusion of the anterior teeth was performed. Bite opening was obtained by occlusal onlays made in light-cured acrylic.

The second phase of treatment included the alignment of

TABLE 3 Treatment phases

	Lower	Upper
Phase I	Alignment of the lower arch Bite opening by occlusal on-lays	Distal movement of the premolars and disto-palatal rotation of the molars: intrusion, retroclination and retraction of anterior teeth, space closure:
Phase II	Labial translation of lower front teeth Space opening for replacement of one tooth bilaterally	Further alignment and intrusion of front teeth Intrusion of the canines whilst holding the front.
Phase III	Removal of occlusal coverage: Establishment of inter-digitation	Finishing and arch co-ordination

the upper teeth. A labial bodily movement of the lower front teeth (Figure 4) continued the treatment in the lower arch.

The third and last phase of treatment included removal of the occlusal onlays and attainment of suitable inter-digitation of the teeth (Figure 5).

Evaluation

The result corresponded well with the treatment goals, although mesialization of the upper molars was less than had been predicted (Figure 6). The posterior mandibular rotation that occurred as a result of the extrusion of the upper and lower molars was unforeseen.

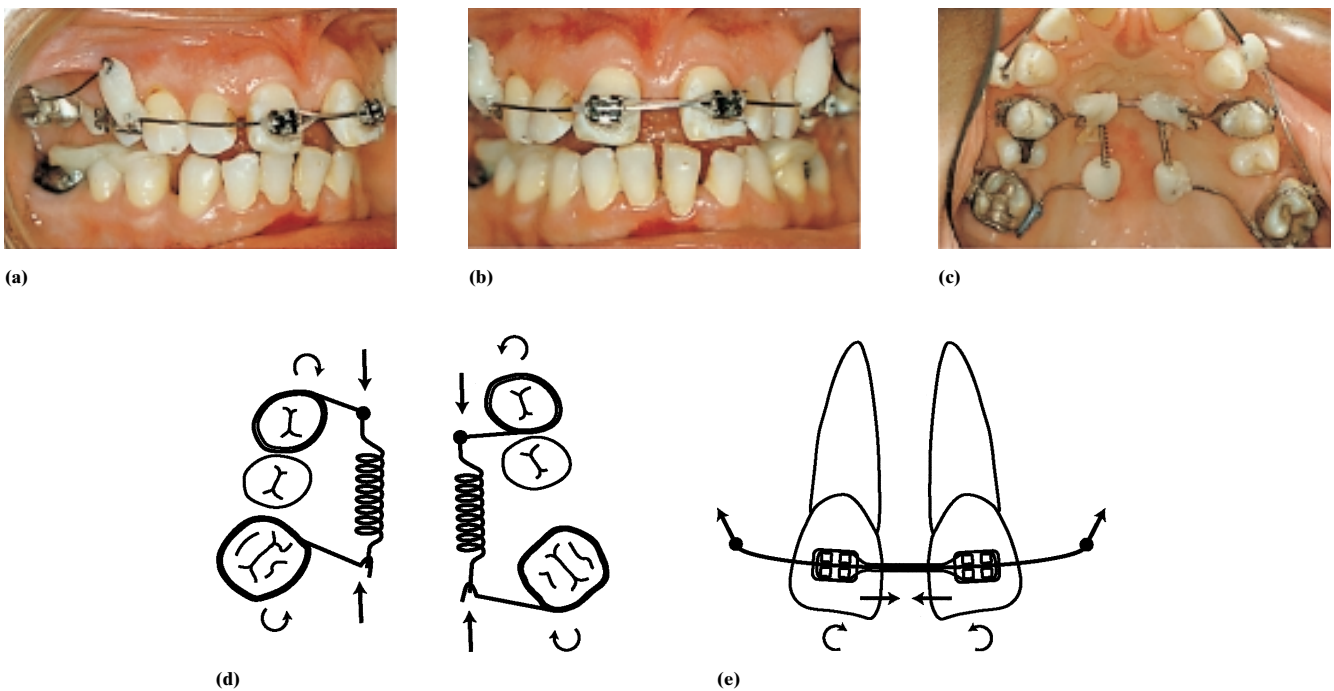


FIG. 3 (a-c) Upper incisors retracted and intruded by two cantilevers with a curved configuration as described by Dalstra and Melsen (1999). (d-e) Simultaneously buccal segment teeth approximation with Sentalloy® springs in the palate. The force system generated is indicated on the drawing.



FIG. 4 (a-c) Second phase of treatment during which the lower incisors were translated labially by intrusion and buccal torque generated by a 0.017 × 0.25-inch arch. The horizontal force component was delivered by a 0.020 continuous arch above the incisal brackets, and light Sentalloy® springs between the premolars and the anterior segment.

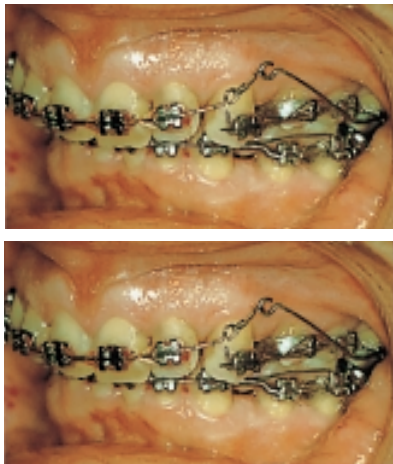


FIG. 5 (a) Final stage of treatment where all four incisors are being intruded and retracted. (b) Finishing of the lower arch.

The post-treatment occlusion was acceptable (Figure 7). The lip-trap and the palatal impingement were eliminated. After completion of orthodontic treatment prosthetic replacement was carried out for the premolar spaces in the lower arch. The patient's self-esteem has been vastly improved as has the facial.

The approach described for planning, performing, and evaluating orthodontic treatment ensures an optimal outcome for the patient with a minimum of round tripping. It also gives the orthodontist a chance for self-appraisal and thereby serves as a continuous learning process.

Conclusions

The present case report has demonstrated that a combined periodontic-orthodontic-prosthetic treatment could stop deterioration of the adult dentition. Maintenance of the treatment result will be dependent on the continuous

SUPERIMPOSITIONS

OVERALL SUPERIMPOSITION (STABLE STRUCTURES)

Hard tissues:

Distal rotation of the mandible has occurred. Tooth position changes can also be observed (see maxillary and mandibular superimpositions).

Soft tissues:

Decreased protrusion of the upper lip. Improved lip competence.

13.11.95 —
04.05.98 —



FIG. 6 Treatment analysis. This is a good result when compared to the original treatment goal.



FIG. 7 (a–c) Extra-oral view following treatment. Harmonious facial expression with muscle balance. (d–h) Intra-oral view following treatment. A neutral occlusion was established. In the right side a bonded bridge was inserted and the patient is waiting for an implant.

preservation of periodontal health and use of a fully balanced splint as removable retainer at night. Tooth movements in the lower arch would be prevented through the prosthodontic replacements of the missing units.

References

- Akin-Nergiz, N., Nergiz, I. and Schmage, P. (1997)**
Interdisciplinary concepts in treating adult patients,
Journal of Orofacial Orthopedics (Munich), **58**, 340–351.
- Dalstra, M. and Melsen, B. (1999)**
Force systems developed by six different cantilever configurations,
Clinical Orthodontics and Research, **2**, 3–9.
- Fiorelli G. and Melsen B. (1999)**
The A3-D occlusogram@ software,
American Journal of Orthodontics and Dentofacial Orthopedics, **116**, 363–368.
- Küseler, A. and Melsen, B. (2000)**
Orthodontic treatment: art or science?
Journal of Clinical Orthodontics, **6**, 371–375.
- Melsen, B. and Klemt, B. (1997)**
Adjunctive orthodontics as part of interdisciplinary treatment: a case report,
International Journal of Adult Orthodontics & Orthognathic Surgery (Chicago IL), **12**, 233–242.
- Roblee, R. D. (1998)**
Interdisciplinary dento-facial therapy (IDT): a comprehensive team approach,
Annals of the Royal Australasian College of Dental Surgeons (Sydney), **14**, 41–47
- Sanders, N. L. (1999)**
Evidence-based care in orthodontics and periodontics: a review of the literature,
Journal of the American Dental Association, **130**, 521–527.
- Willems, G., Carles, C. E., Naert, I. E. and van Steenberghe, D. (1999)**
Interdisciplinary treatment planning for orthodontic-prosthetic implant anchorage in a partially edentulous patient,
Clinical Oral Implants Research, **10**, 331–337.