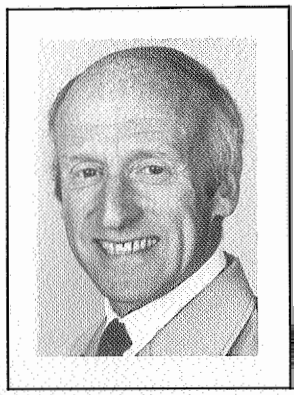
sciendo DOI: 10.2478/aoj-1986-0012



The uprighting of tilted molar teeth and the intrusion of over-erupted posterior teeth

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Abstract: The uprighting of tipped molars and the intrusion of over-erupted individual teeth by the orthodontist prior to bridge construction can be of considerable assistance to the dental practitioner. Often uprighting and intrusion are necessary in the same mouth and these two movements are discussed and illustrated by some case histories. The uprighting mechanism is identical to that of some other authors and the fixed intrusion appliance is an adaptation of the uprighting mechanism. However the removable intrusion appliance is a fresh approach to the problem of over-erupted teeth.

Reference: Aust.Orthod.J. 9(4): 329 - 334 (1986)

MeSH words†: Orthodontic appliances; orthodontic appliance/removable; denture/partial/fixed; molar; case report

Key words: Uprighting, intrusion, bridgework, fixed appliance, removable

INTRODUCTION

A. Uprighting of tipped molars

Burns (1973) described the advantages of correcting the axial inclination of tipped molars prior to their use as abutments.

It permits parallelism in abutment preparations, decreases the danger of pulp exposure, improves hygiene on the inclined proximal surface, creates adequate osseous contouring that may prevent infrabony lesions and improves the distribution of occlusal forces to the supporting bone. He also discussed the diagnostic considerations to be evaluated before uprighting the tipped tooth. Some of the diagnostic considerations apply to all orthodontic treatment e.g. the need for patient co-operation and the absence of dental pathological conditions whilst other considerations, such as the evaluation of the occlusion of opposing molars, are more specific to malocclusions with tipped molars.

Norton and Lopes (1980) in a clear and comprehensive article on the specific mechanisms for abutment uprighting outlined the advantages of fixed appliances, usually segmented arches, compared to removable appliances for uprighting. The authors also discussed in detail appliance design, mechanics and side effects and referred to Burstone's pioneering work on segmental arches.

They described:

(a) a helical spring to upright the tipped molar if the extraction site is to be widened;

(b) a rectangular loop if the amount of mesial tipping is not very great and the side effect of extrusion must be minimal and

(c) a root spring to upright both abutment teeth on either side of the extraction space when the pontic space is not to be effectively changed.

Tuncay, Biggerstaff, Cutcliffe and Berkowitz (1980) stated that

(i) the helical spring is contraindicated when the molar being uprighted has no antagonist. This contraindication is due to the occlusal as well as the distal effects of the spring and

(ii) the box spring is used when two molars require uprighting but the box spring is difficult to fabricate properly.

They advocated the use of a single T-loop spring for patients in whom a single terminal molar has migrated mesially to a position next to or within 2mm of the distal premolar when it is intended to upright this molar and move it mesially to contact the premolar. Paired segmental T-loop uprighting springs are suggested when two terminal functional molars require uprighting.

Norton and Parker (1980) presented a plan for timing restorative, periodontic and endodontic procedures in conjunction with tooth movement. They said little attention is usually paid to the problem of relapse of the moved abutment teeth.

B. Intrusion of posterior teeth

The literature contains publications describing several different methods of treating over-erupted teeth. Most of the articles deal with over-erupted incisors which contribute to an increased overbite. Intrusion of these teeth, or occasionally extrusion of posterior teeth, using orthodontic appliances, is advocated. The literature on orthodontic intrusion of posterior teeth is more sparse.

Abelson (1972) illustrated two cases in which he employed Spengeman's COSLA appliance. This is essentially a full occlusal coverage splint trimmed appropriately. Metal bands and elastic bands are also used. The first case was not shown to completion and the second case was finished with full bands.

Norton and Lopes (1980) said 'intrusion of a supra-erupted molar or premolar is difficult to correct orthodontically. The problem may be best treated by partial or full crown coverage constructed to the natural occlusal plane' (presumably after grinding).

Tuncay, Biggerstaff, Cutcliffe and Berkowitz (1980) wrote 'grinding the opposing, extruded tooth should be done routinely as the opposing tooth must be prepared for a crown to establish an optional functional occlusal table. The simultaneous fabrication of the crown to function with the fixed partial denture without interferences in working and balancing is an additional benefit'.

Bell, Proffit and White (1980) showed a case in which maxillary right second and third molars were supra-erupted into mandibular edentulous second and third

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† (For MeSH words, see Journal Overview)

molar spaces. The surgery comprised a posterior maxillary subapical osteotomy to advance and superiorly reposition the second and third molar teeth.

Mostafa, Tawfik and El-Mangoury (1985) stated 'correcting a maxillary first or second molar presents a dilemma. Use of conventional fixed appliances to intrude the molar may lead to undesirable extrusion of the anchorage units and lengthen treatment time.'

The authors described a technique in which fixed edgewise appliances were inserted prior to a single stage osteotomy being performed under local anaesthesia. Interdental cuts were made through the cortex. Immediately after surgery sectional arch wires were inserted. The patient was seen at weekly intervals in order to make the necessary arch-wire changes. Rapid movement of the tooth-bone segments occurred within four to five weeks. They declared that the over-erupted maxillary molars were successfully intruded without anchorage loss and the teeth remained vital. No cases were presented.

Case 1
(G.R. d.o.b. 2/9/54)

A Class I malocclusion, with missing 17.22.26.38.46.47, 16 over-erupted, and 48 tipped mesially.
19/5/81 *Figure 1(a)* is the orthopantomogram (OPG)* at commencement.
Figure 1(b) is the upper removable appliance (URA) which was inserted to intrude 16.
Figure 1(c) shows bands on 44.45.48 and the sectional arch wire which was fitted to upright 48.
Figure 1(d) depicts the lingual arch cemented on 33.43 to aid anchorage i.e. to help resist the forces on 43.44.45 created by the spring.
29/10/81 *Figure 1(e)* is the OPG at completion of intrusion of 16 and uprighting of 48.
Figure 1(f) shows how 16 was retained with multistranded wire bonded to 15.16.17 buccal and palatal.
Figure 1(g) illustrates the intra-oral situation at commencement.
Figure 1(h) shows completion of intrusion of 16.
Figure 1(i) is the bridge which was fitted to replace 46.47.

Comments
The OPGs show the amount of intrusion of 16 and uprighting of 48. Three of the four retaining bonds came off within one month even though there was no occlusion on 16.

Case 2
(C.D. d.o.b. 11/3/53)

A Class II Division 2 malocclusion, 28.36.46.47 were missing, 37.48 tilted mesially and 16 was over-erupted.
13/10/82 A URA was inserted to intrude 16. Bands on 43.44.45.48, a lingual arch 33.43, and a sectional arch to upright 48, were also fitted.
16/12/82 15 was intruding also, therefore the mesial and distal of 16 were trimmed. 48 was uprighting.
29/4/83 Patient debanded and a lower removable retainer inserted.
1/7/83 The URA was modified by the addition of a wire to hold the intruded 16 and a spring to intrude 17.
5/8/83 Intrusion of 17 ceased. *Figure 2(a)* palatal view at commencement.
Figure 2(b) palatal view at cessation of intrusion.
Figure 2(c) study models before and after treatment.
Figure 2(d) OPG at commencement of treatment.
Figure 2(e) OPG at cessation.
30/12/83 *Figure 2(f)* a bridge to replace 46.47 was inserted.

Comments
The OPGs show the amount of intrusion of 16 using as markers the MO filling of 16 and the DO filling of 15. The intrusion of 17 can be seen by comparing its level with that of 13 and also from *Figures 2(a) and 2(b)*. The OPGs also show that 47 has uprighted considerably. By noting how 47 occludes with the opposing molar in *Figure 2(c)* it can be observed that the extraction space has widened as 47 has been uprighted.

Case 3
(D.B. d.o.b. 8/4/61)

A gross asymmetrical Class III malocclusion, all of whose first molars were missing. A request was received from the oral surgeon to intrude 28 prior to orthognathic surgery otherwise, following surgery, 28 would interfere with closure of the mandible.
22/11/83 *Figure 3(a)* is an OPG at commencement of intrusion.
Figure 3(b) is the URA which was inserted to intrude 28
27/3/84 the addition of a spring to also intrude 18 was carried out.
31/5/84 *Figure 3(c)* is the OPG when intrusion ceased.
13/12/84 *Figure 3(d)* shows study models pre- and post-surgery.

Comments
The change in relationship of the contact points, on the OPGs and study models, between upper second and third molars indicates the extent of intrusion of the upper third molars.

Case 4
(R.A. d.o.b. 17/8/65)

A Class II division 2 malocclusion, whose impacted 13 was extracted on 22/5/84. A request was received from the restorative department to intrude 43 and move it lingually prior to prosthetic replacement of 13.
24/8/84 *Figure 4(a)* shows the case at commencement. 43.44.45 were bonded, 46 was banded and a sectional spring fabricated to intrude 43 and move 43 in a lingual direction. A stabilising arch wire was fitted on 44.45 and in the occlusal tube of 46. Stripping of proximal contacts from 33 to 45 was carried out over several visits.
3/1/85 *Figure 4(b)* taken during treatment, shows 43 was intruding
6/3/85 activation of the spring was stopped and the appliance left passive until the prosthesis was made.
16/7/85 patient was debanded. *Figure 4(c)* shows before and after lateral views of 43.
Figure 4(d) illustrates before and after occlusal views of 43.
Figure 4(e) shows the intruded 43 and the prosthetic replacement of 13.

Comments
Using the principles to upright tilted molars alluded to in the introduction, the sectional appliance achieved a successful result. The appliance consisted of the same apparatus as for cases 1 and 2 but without a lingual arch.

APPARATUS USED
A. To upright tipped lower molars.

(i) the edgewise brackets were 0.47/0.76mm;
(ii) the molar buccal tube was a double tube 0.47/0.64mm;
(iii) the stabilising arch wire was 0.41/0.56mm;
(iv) the spring was 0.41/0.56mm and
(v) the 33-43 lingual arch was 0.81mm.

This apparatus is very similar to that described by Norton and Lopes (1980) who comprehensively detailed the amount and direction of activation.

Figure 1(a). OPG at commencement of intrusion and uprighting

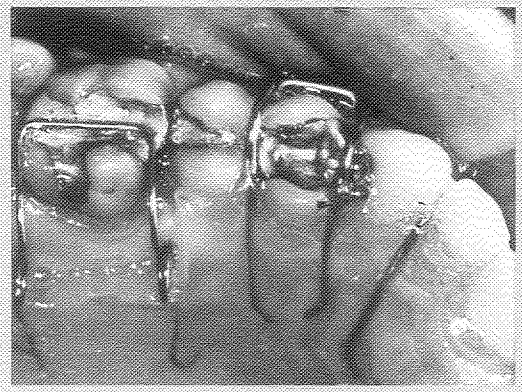

Figure 1(b). Detail of spring used to intrude 16

Figure 1(c). Bands and sectional arch wire used to upright 48

Figure 1(d). Lingual arch which was used to aid anchorage

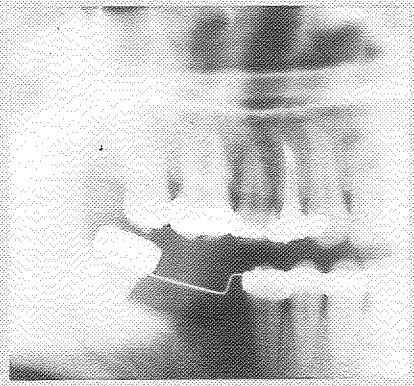

Figure 1(e). OPG at completion of intrusion of 16 and uprighting of 48

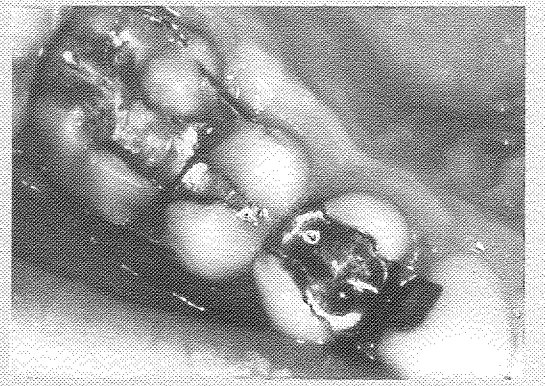

Figure 1(f). Multistranded wire bonded to 15.16.17 buccal and palatal to retain intruded 16

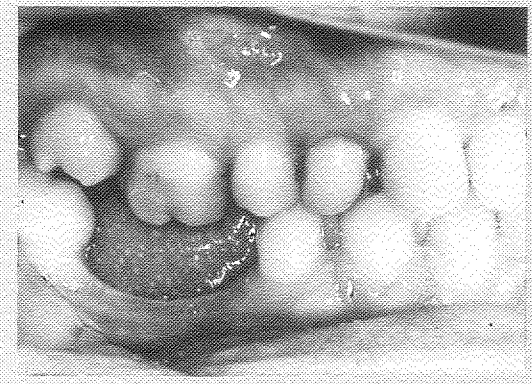

Figure 1(g). Commencement of intrusion of 16

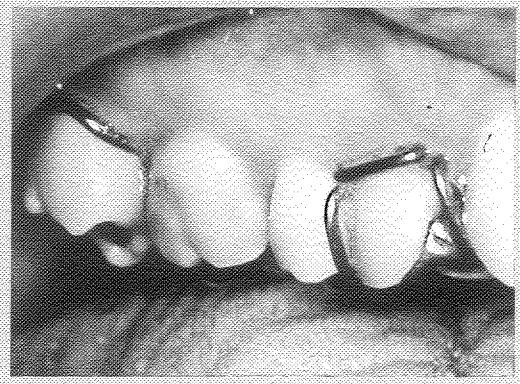

Figure 1(h). Completion of intrusion

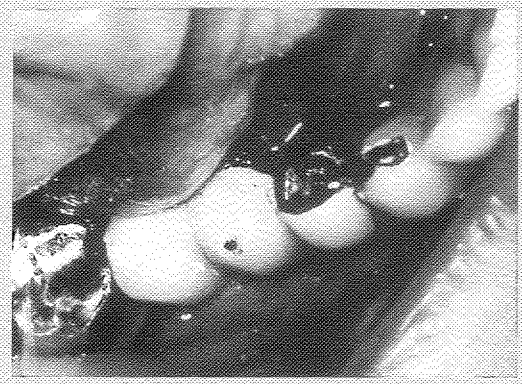

Figure 1(i). Bridge fitted to replace 46.47

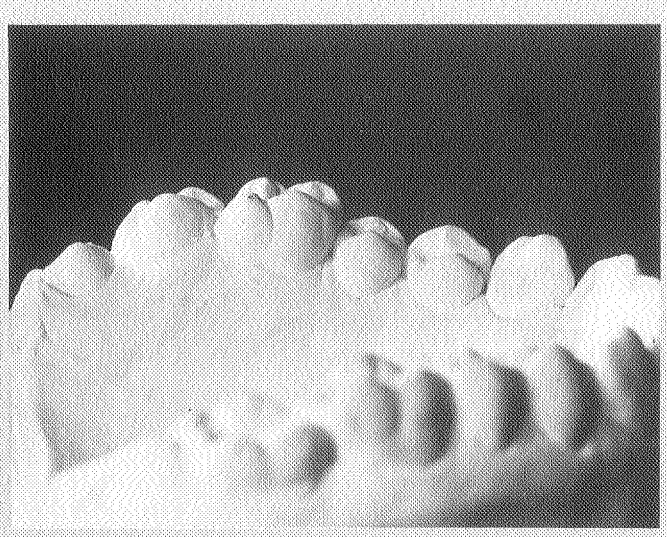

Figure 2(a). Palatal view at commencement of intrusion

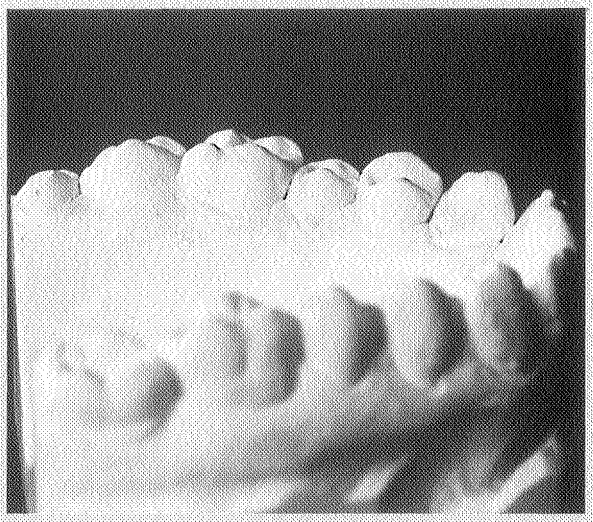

Figure 2(b). Palatal view at cessation

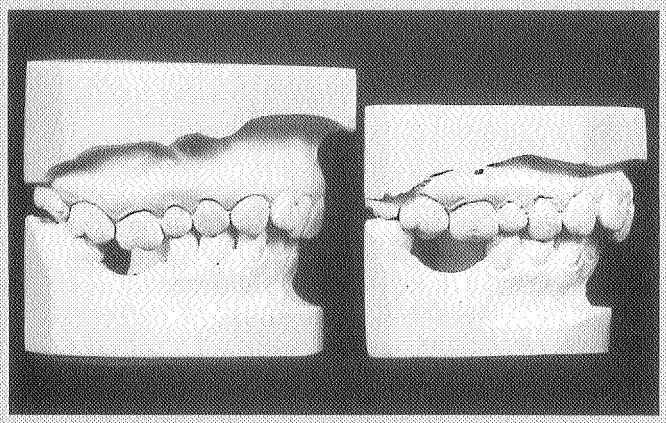

Figure 2(c). Study models before and after treatment

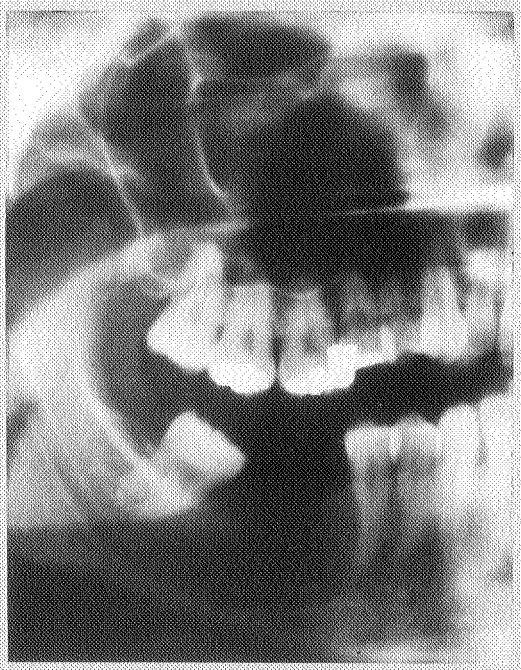

Figure 2(d). OPG at commencement of treatment

Figure 2(e). OPG at cessation of treatment

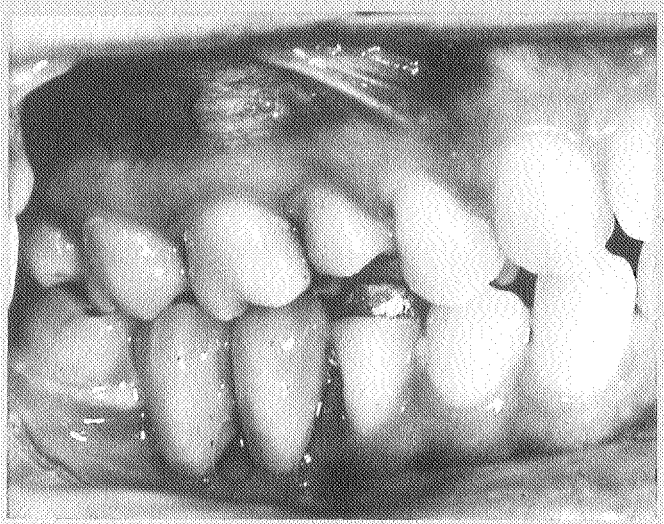

Figure 2(f). Bridge which replaced 46.47

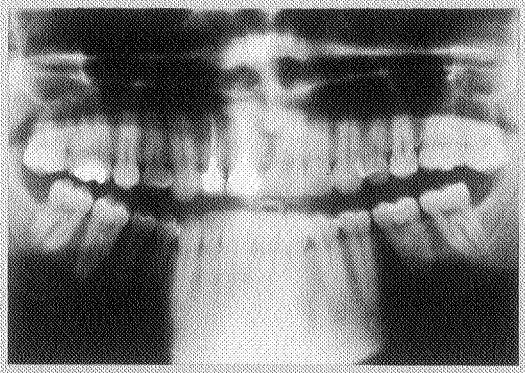

Figure 3(a). OPG at commencement of intrusion

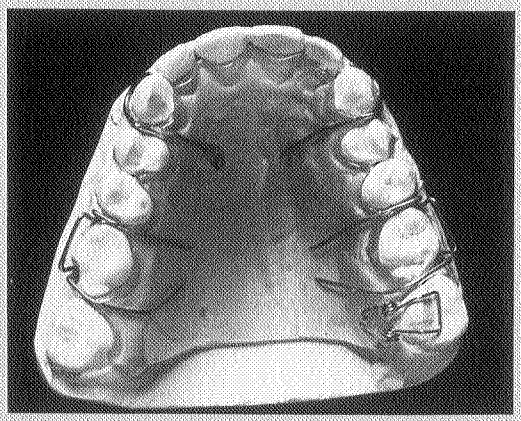

Figure 3(b). URA which was inserted to intrude 28

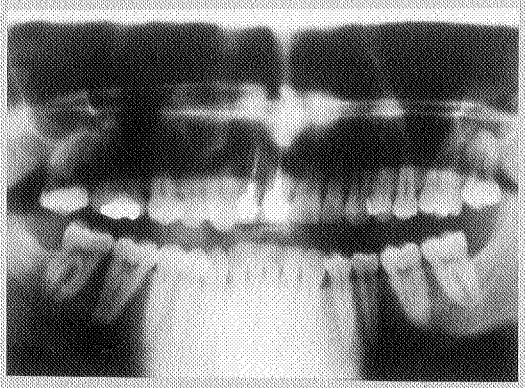

Figure 3(c). OPG when intrusion ceased

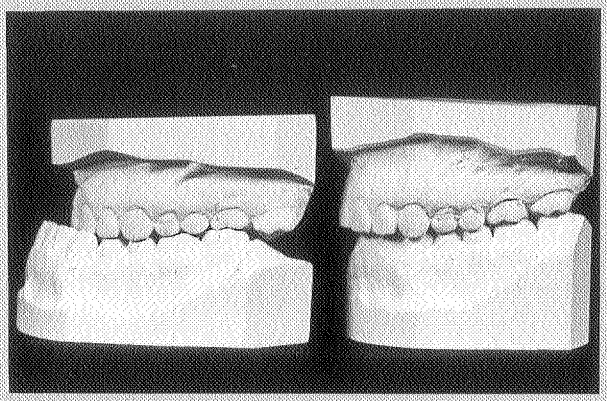

Figure 3(d). Study models pre- and post-surgery

B. To intrude over-erupted molars.

A flapper type spring contacting the central two-thirds of the occlusal surface was used. The spring was constructed to unwind when active. The wire was 0.20mm. There were one and a half coils in the spring. It was activated 2-3mm and checked monthly. As with most springs with coils it should be adjusted on the non acrylic side, as close to the coil as possible.

The spring acts most efficiently if the coils are on the same horizontal plane as the occlusal surface. However care must be taken with the position and size of the coils to ensure that they do not irritate the tongue.

The reaction to the intrusive force tends to dislodge the URA so adjacent teeth must be clasped firmly. Clasp wires may pass over shared contact points because the intruding tooth is moving away from these clasp wires in an apical direction.

RETENTION

A. Uprighted molar

After the tooth has been uprighted the appliance should be made passive for six to eight weeks. Then as Norton and Parker (1970) stated, the orthodontic care must be coordinated with other aspects of dental care to prevent relapse.

B. Intruded molar

Bonding and the use of multistranded wire was not successful in Case 1. Deactivation of the spring or, even better, its replacement by a passive section of wire resembling a flapper spring but without the coils is preferred. Retention is maintained until the bridge in the lower jaw is made.

CONCLUSIONS

Successful uprighting of molars and intrusion of over-erupted isolated teeth can be achieved using the appliances discussed and illustrated. The removable intrusion appliance may spare the patient extensive grinding, crowning or even surgical procedures involving the over-erupted tooth.

Acknowledgement

I would like to thank the orthodontic technicians of the Royal Dental Hospital of Melbourne headed by Mr Frank Iacobaccio for their help in making the removable appliances and the models illustrated in this article.

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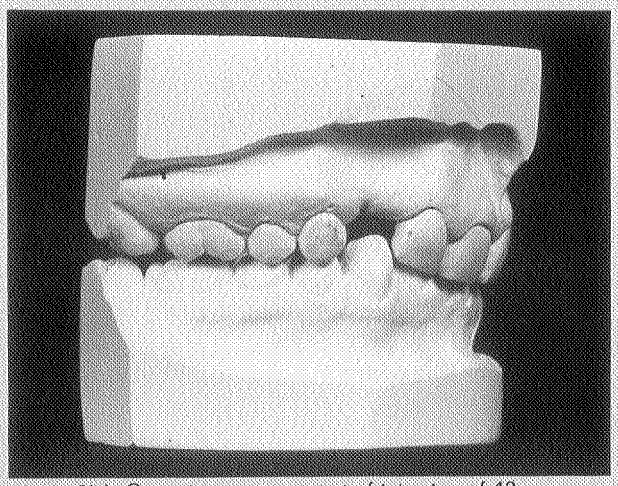

Figure 4(a). Case at commencement of intrusion of 43

Figure 4(b). Taken during treatment. 43 is intruding

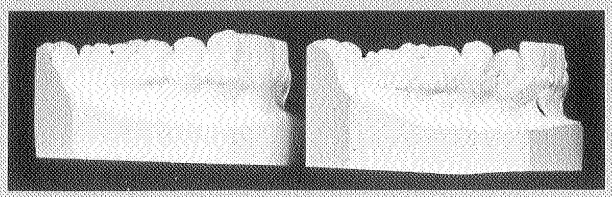

Figure 4(c). Before and after lateral views of 43

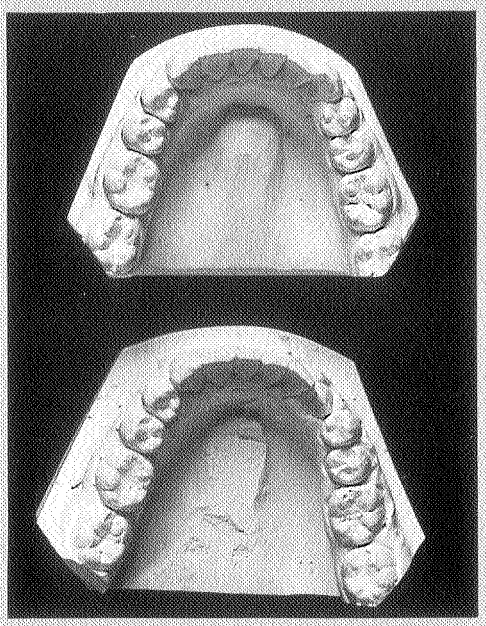

Figure 4(d). Before and after occlusal views of 43

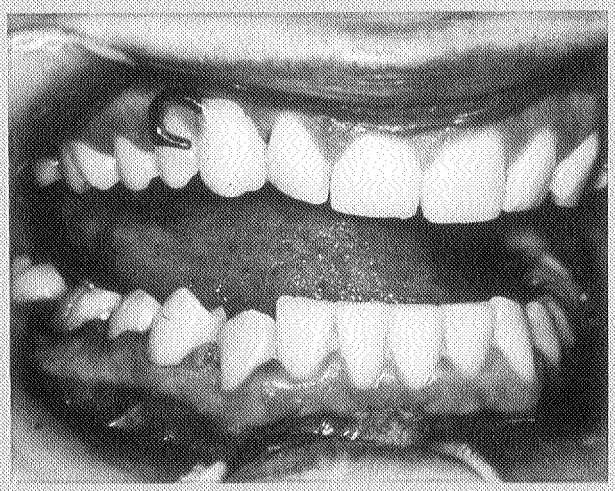

Figure 4(e). Intruded 43 and prosthetic replacement of 13

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