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TORQUE APPLICATION TO MAXILLARY INCISORS*

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The correction of malocclusions with fixed appliances involves the application of three important orthodontic concepts. These are anchorage conservation, bite opening and incisor torquing movements. Torque force has been described by Strang and Thompson[1] as the force obtained from a twisted spring wire in its effort to untwist itself. These authors state that torque is the newest force in orthodontics and is probably the least understood. It is, however, one of the most helpful of the forces available, although it is at the same time difficult to control and affects an appliance in regions where least expected. This paper considers certain features of axial tooth movement, or torque, obtained with the Begg light wire appliance.

As a basis for treatment planning Tweed[2] advocated the application of torque procedures to assist in changing the relationship of mandibular incisors to predetermined IMPA or FMIA angles. However, far less attention has been given to the attainment of significant axial alterations of the maxillary incisor teeth to the cranial base line S-N. This situation can be largely attributed to the mechanical difficulties formerly associated with achieving adequate maxillary incisor torque.

Nowadays, efficient auxiliary torquing mechanisms allow the preparation of a realistic treatment plan which includes an assessment of all axial over-corrections considered to be necessary during therapy. A comprehensive evaluation is most important since extensive torquing movements involve the provision of increased anchorage when compared with those malocclusions which do not require incisal torque. Therefore, anticipation of future torquing requirements will enable a more accurate evaluation of total anchorage potential prior to the commencement of treatment.

The correct application of the Begg technique involves three well-defined stages of clinical treatment. The successful completion of the second of these stages is frequently characterized by a pronounced, though temporary, retroclination of both maxillary and mandibular anterior teeth (Fig. 1). This appearance is generally indicative of the successful maintenance of first and second stage anchorage. Marked retroclination of anterior teeth can be predicted under a variety of circumstances. These include certain malocclusions demonstrating a large A-B discrepancy and also some cases of bimaxillary protrusion. As a result of the incisor tipping, which produces their retroclination, the inter-incisal angle undergoes a series of significant changes during therapy. These various tipping movements assist in conserving anchorage and permit the axial rearrangement of the teeth for optimal aesthetics, function and stability.

Figures 2 and 3 illustrate the long-term results of treating a mutilated malocclusion having a deep overbite. The final models show the occlusion five years after band removal. Although a simple maxillary Hawley retainer was worn for 12 months after debanding, no retention was used for the mandibular dentition. When the removal of four first bicuspids is indicated in malocclusions with this type of incisor relationship, the permanent reduction of overbite and long-term stability can be anticipated provided adequate incisor torque is achieved in the maxilla. Furthermore, reported collapse of the lower labial segment need not be feared if a functionally adequate inter-incisal angle is combined with sufficient upper incisor torque.[3] There are additional features of interest related to this particular patient. Dento-facial growth and development since debanding

* From a lecture presented at the clinical day of the Begg Lightwire Study Group at Surfers Paradise 1st November 1971.

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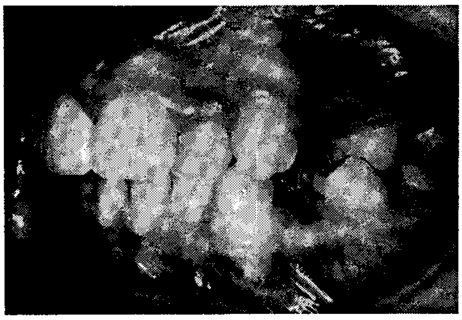
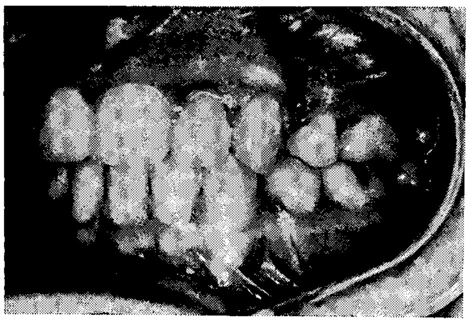


1A

1D

1B

1E



1C

Fig. 1

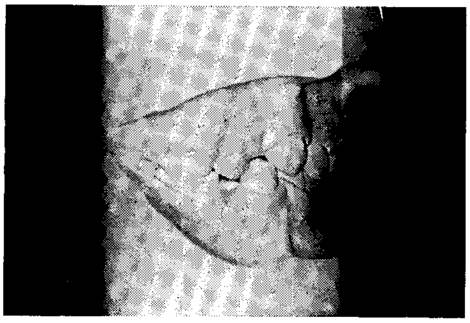
A — Bimaxillary protrusion prior to banding

B — Second stage retroclination

C — Occlusion out of retention

D — Profile before treatment

E — Profile after treatment



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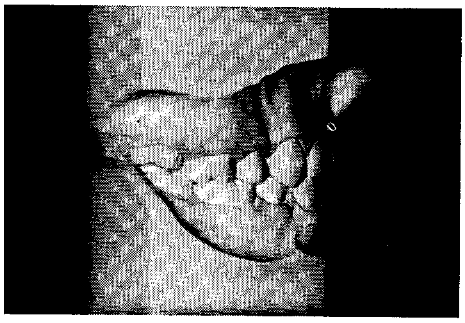

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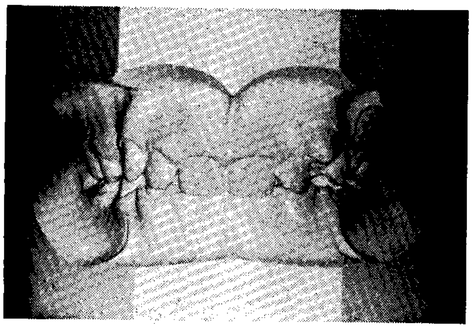

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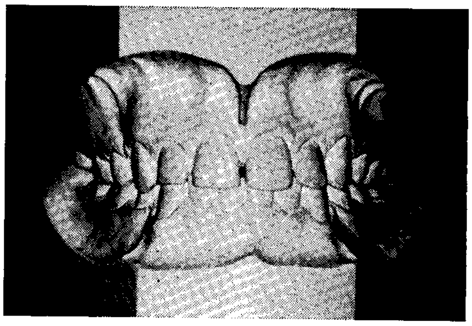

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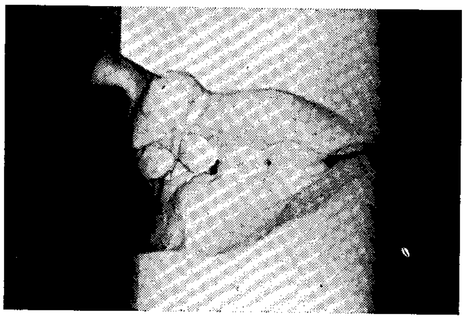

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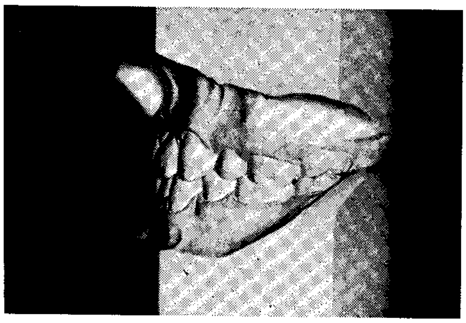

2G

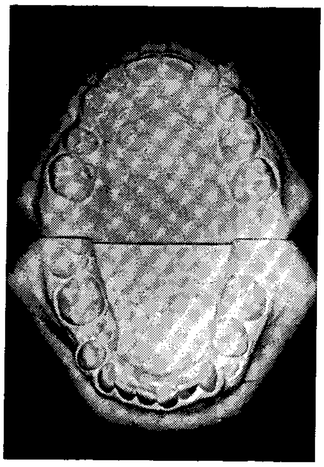

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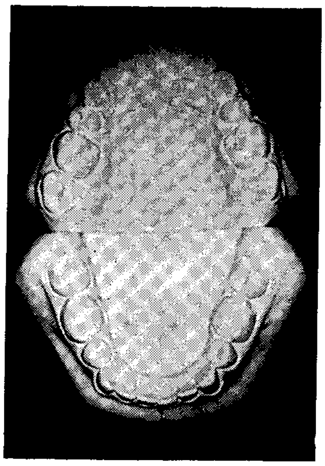
Fig. 2

A, B, C, D —
Models of mutilated malocclusion

E, F, G, H —
Patient's occlusion at the age of twenty-two years: five years after debanding



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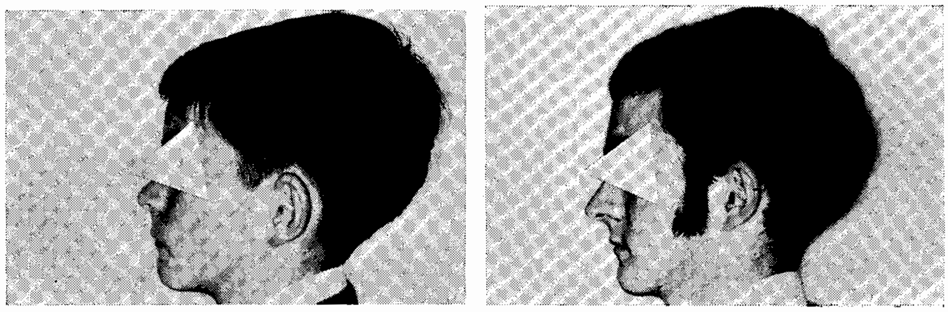


Fig. 3 A, B — Profile photographs corresponding with models in Figure 2.

	BEFORE TREATMENT	BANDS OFF
SNA	81	77
SNB	79	78
FMA	25	26
1-SN	91	111
1 TO T	161	132
IMPA	77	87

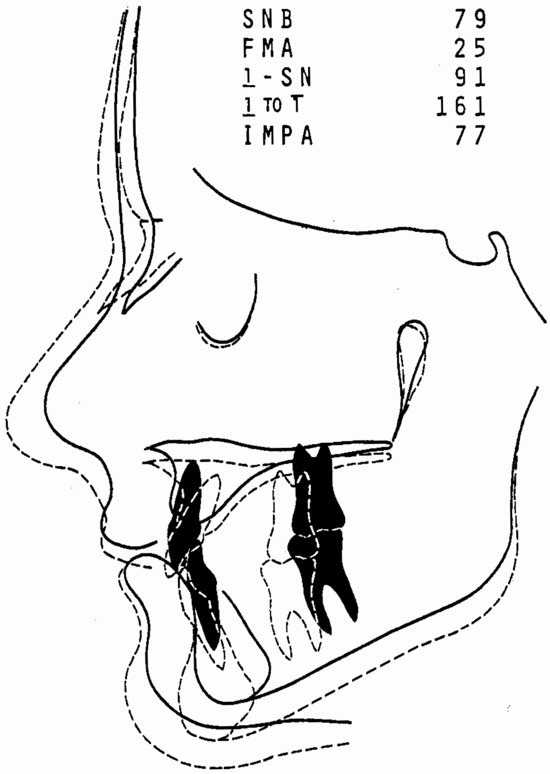


Fig. 3 C — Tracings before and after treatment. Superimposed head plates reveal that no significant growth changes have occurred over the past five years.

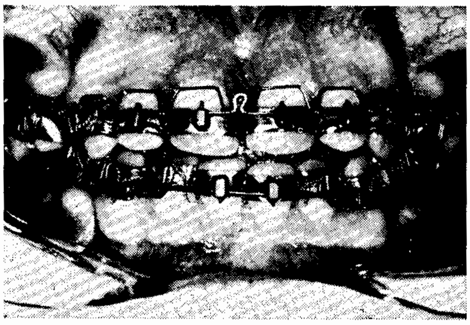
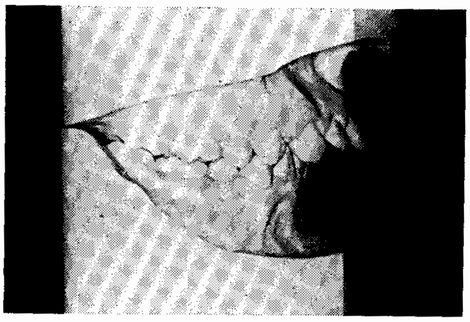
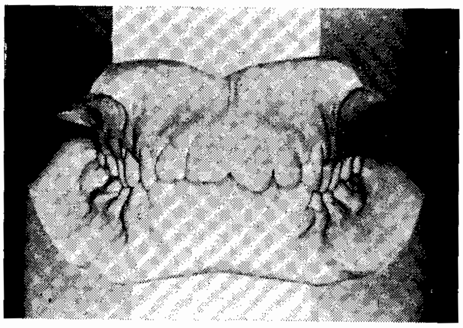


Fig. 4 — Maintenance of first stage bite opening while completing third stage incisor torque.



A



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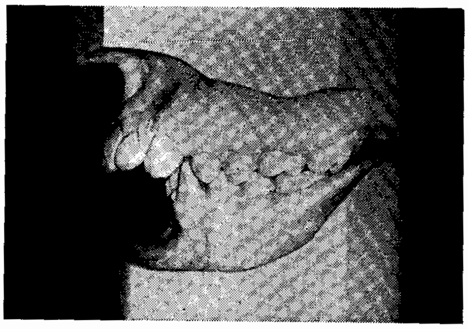


C

Fig. 5 A, B, C — Models prior to treatment

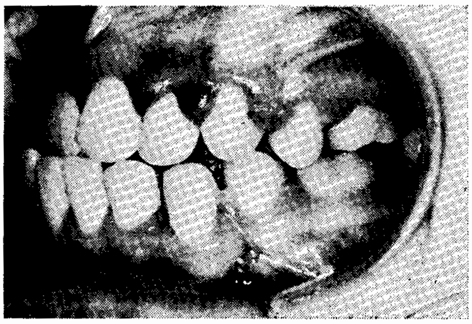
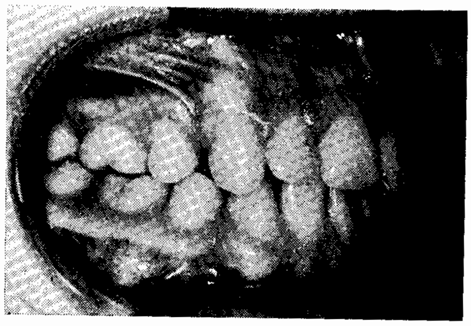
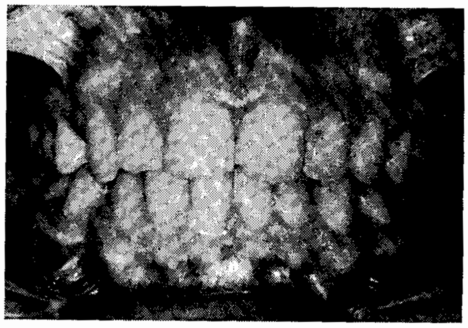


Fig. 5 D — Overtreatment on the day appliances were removed



E



F

G

Fig. 5 E, F, G — Occlusion two years after debanding

	BEFORE TREATMENT	BANDS OFF
SNA	80	72
SNB	74	72
FMA	27	29
$\underline{1}$ - SN	115	88
$\underline{1}$ TO $\overline{1}$	111	131
IMPA	98	104

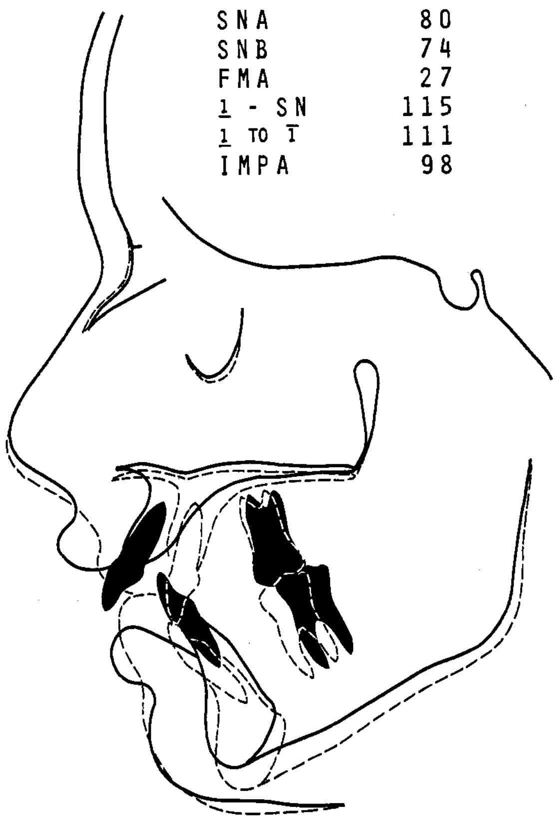


Fig. 5 H — Cephalometric tracings of the dento-facial changes during treatment

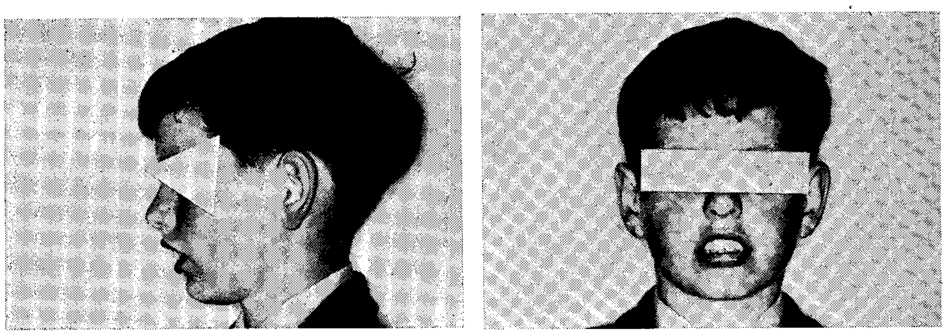


Fig. 5 J, K — Appearance before therapy

	BANDS OFF	TWO YEARS LATER
SNA	72	74
SNB	72	74
FMA	29	28
$\underline{1}$ - SN	88	98
$\underline{1}$ TO $\overline{1}$	131	134
IMPA	104	92

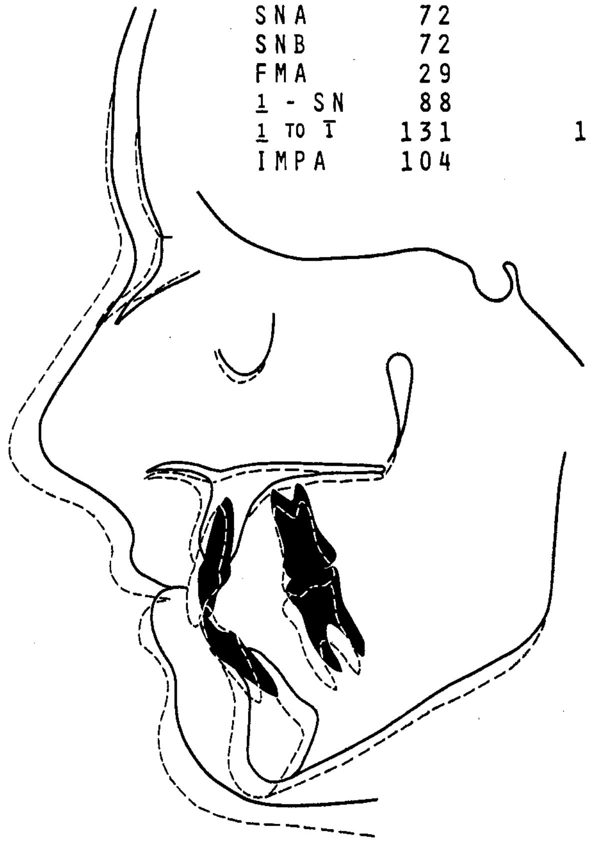


Fig. 5 I — Growth and dental changes in the two-year interval after debanding

Fig. 5 L, M — Appearance two years after therapy

has been of minimal orthodontic assistance. An increase in the vertical dimension and nasal maturation is apparent, although indaequate dental arch length persists. In this twenty-two year old adult the conspicuous buccal inclination of the maxillary second molars, associated with four severely impacted wisdom teeth, demonstrates an orthodontic problem requiring the extraction of eight permanent teeth.

There are several types of root torquing auxiliary arch wires currently used with the light wire technique. These include the loop or spur variation, the "box-type" assembly and the Kichton auxiliary which have been described in detail elsewhere.[4] Each particular mechanism reacts with unique characteristics which must be understood and correctly utilized if efficient tooth movement is to be obtained. The optimal activation of these different auxiliaries varies significantly and is particularly influenced by the inter-incisal angle at the completion of second stage treatment.

Irrespective of whether they are constructed from round or rectangular section wires, torquing appliances simultaneously produce reciprocal effects elsewhere in the mouth. These reactive effects may involve the incisor, canine and molar regions. A knowledge of the reciprocal factors peculiar to each form of Begg torquing auxiliary enables the operator to compensate appropriately in the design of a third stage assembly.

When correctly applied a round wire torquing appliance maintains bite opening without causing loss of anchorage control (Fig. 4). Moreover, round wire mechanisms provide the means to obtain an unlimited range of incisal torque. These advantages can be utilized for the routine correction of malocclusions complicated by deep overbites and large antero-posterior discrepancies.

Third stage torque may occupy half of the total treatment time which may involve nine to twelve months of axial correction for patients with a large A-B difference. Figure 5 illustrates the correction of a Class II, division 1, malocclusion requiring extensive axial correction of the maxillary incisors. In all treatments it is essential that each torquing assembly should provide a gentle and continuous action without the need to remove the appliance for reactivation prior to debanding.

The Begg round wire torquing mechanisms are so effective that they can produce large axial changes which exceed the adaptive capacity of the maxillary alveolar processes.[5] Consequently, the physical limitations to incisor relocation and axial change are dependent upon such factors as the remodelling capacity of the alveolar structures and the anatomy of the teeth, rather than deficiencies in the appliances themselves. The influence of tooth anatomy is apparent when a pronounced discrepancy exists between the angulation of the crown to the long axis of the root. Under these circumstances the most aesthetic and functional angulation of the labial surface of the maxillary incisors would result in the tooth apices projecting through the alveolar bone and elevating the overlying palatal mucoperiosteum. Therefore, diagnosis of a case should involve the recognition of all torquing considerations in order more accurately to assess treatment planning and prognosis.

Summary

Before treatment commences a detailed analysis of each particular malocclusion is required to define the dentoalveolar changes necessary to attain ideal aesthetics, stability and function. One of the frequently neglected aspects of orthodontic treatment planning and practice involves failure to relocate maxillary anterior teeth with an appropriate axial inclination to a reference plane such as the S-N line. With the light wire technique extensive axial changes can be achieved to produce an inter-incisal angle which is aesthetically satisfactory and also functionally stable in the vertical dimension.

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