

Case Report CB

Surgical vs nonsurgical treatment in the nongrowing patient

With an increase in the number of adults currently seeking orthodontic care, the orthodontist will invariably be faced with the planning and execution of treatment for nongrowing patients with significant skeletal discrepancies. Surgical orthodontic treatment may be the preferred mechanical choice in many of the cases, but may not fit the patients' financial or emotional capabilities. It is often incumbent upon the orthodontist to present alternative treatment options along with the risks and benefits inherent in the dentoalveolar compensation of a malocclusion which is predominantly skeletal. Traditional concerns have been with periodontal and dentoalveolar stability, intermaxillary dental function and soft tissue facial aesthetics with more recent focus on the medical-legal implications of potentially altered temporomandibular joint function. Ultimately the decision to undertake an alternative treatment plan, postpone combination surgical/orthodontic treatment or opt for no treatment must lie with the well informed patient. The following case represents many of the considerations and compromises involved with the treatment of a nongrowing skeletal Class II problem.

By Roy Gunsolus, DDS

The patient presented as a 27-year-old Caucasian female in excellent health. Her chief complaint related to perceived protrusion of the maxillary incisors and the irregularities and crowding of mandibular anterior incisors. The patient had received a blow to the mandibular left side during an auto accident, but had no recollection of altered growth or altered function as a result of the injury. Review of childhood photographs reveal facial asymmetry was present prior to the auto accident.

Temporomandibular joint examination revealed a normal range of motion with 44 millimeters of active opening, 13 millimeters of protrusive excursion and five millimeters of lateral excursion which seemed to be more a muscular than a mechanical limitation. The mandible deviated two millimeters to the left side at maximum opening and there was a low level pop at the end of the maximum opening on the left side. The left side pop was also present in protrusive opening and the timing appeared to be coincident with the passage of the condyle over the eminence. There were no joint sounds in the right or left lateral excursions. Muscle pal-

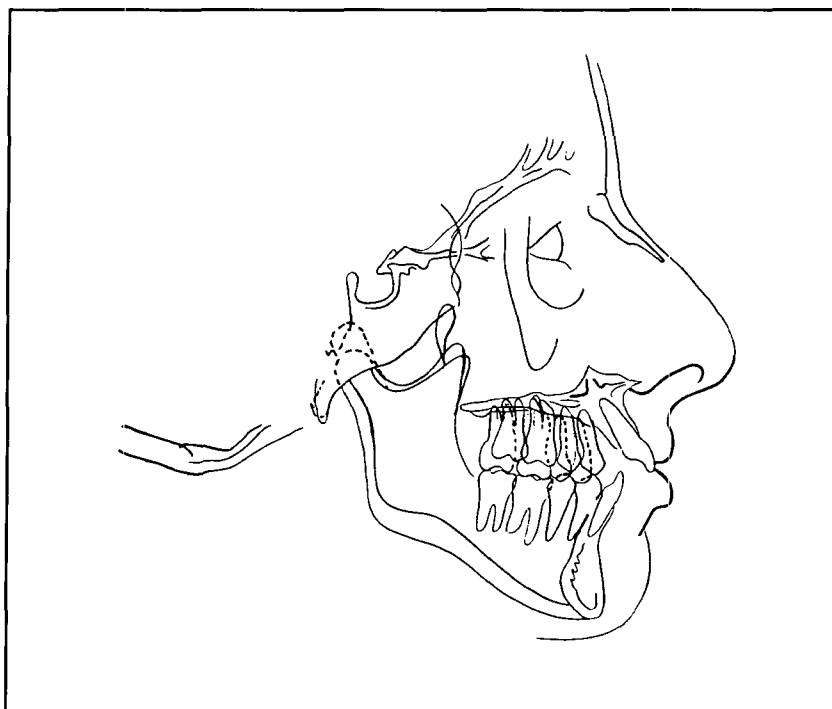
pation revealed no tenderness of the muscles of mastication.

Dental history revealed all teeth were present with the exception of the third molars which had been removed previously. There were no

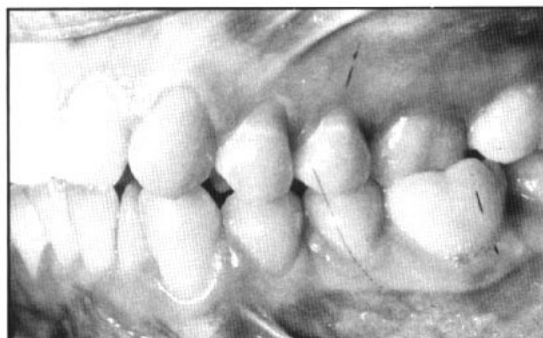
Pretreatment photographs at 27 years 5 months



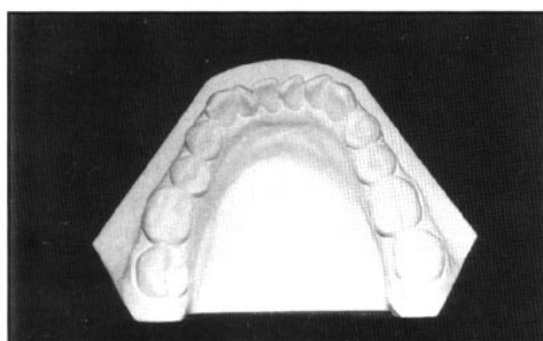
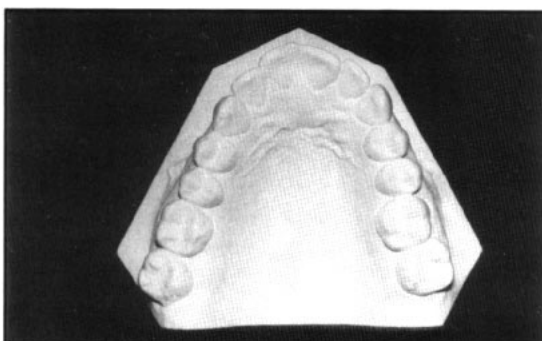
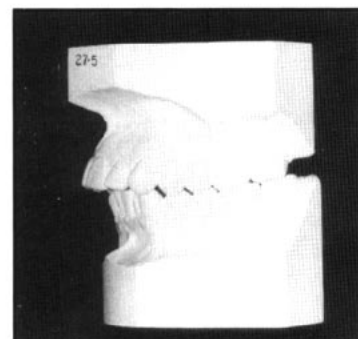
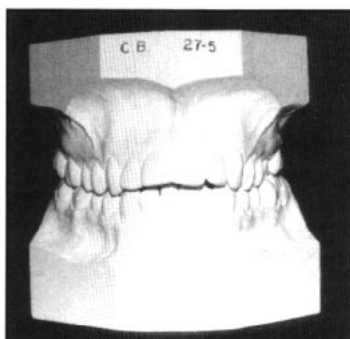
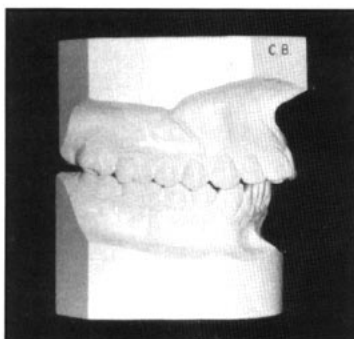
Cephalometric tracing shows skeletal disharmony



Pretreatment intraoral photographs show posterior crossbite



Pretreatment study casts. Note the maxillary asymmetry.



restorations present. The periodontium was in good health although there were potential mucogingival problems in the area of the mandibular canines adjacent to the two lateral frena which were attached somewhat near the gingival free margins.

Diagnosis

Clinical examination and evaluation of records disclosed a unilateral left side skeletal Class II mandibular retrusion and accompanying maxillary transverse arch width discrepancy. The mandibular retrusion was characterized by a shortened ramus on the left side resulting in a skeletal deviation of the mandibular midline to the left. The resulting facial asymmetry and the compensatory canting of the occlusal plane was evident when viewing the patient from the frontal plane. The dolichocephalic facial pattern appeared even more divergent when evaluated from the left lateral aspect and posed a significant challenge in management of vertical treatment mechanics on the posterior left side. The maxillary arch form was tapered and skewed to the right while the mandibular arch form was square tapering and foreshortened and widened on the left as a result of the skeletal asymmetry and the tooth to tooth crossbite of the left side first permanent molars.

The dental malocclusion was an Angle Class II, division 1, subdivision right with nine millimeters of overjet and one millimeter negative overbite anteriorly. There was a left side posterior buccal crossbite with the mandibular first molar displaced labially. The left side Class II was progressive with the anteroposterior relationship of the molars in a cusp to cusp relationship while the left side canine exhibited a full cusp Class II. There was a mandibular arch length discrepancy of five millimeters with rotation of the incisors resulting in root proximity and irregular gingival contours. Mandibular incisors were upright but within normal limits considering the facial pattern and position of the lower lip.

Evaluation of the facial soft tissues showed evidence of a mild incisor to lip discrepancy created by a short columella to lip distance. This resulted in only minimal gingival display, however, since the maxillary incisors apparently had been prevented from excessive eruption as a result of their contact with the lower lip. There was mild lip incompetence at rest with some mentalis strain during forced closure of the lips. The facial profile was convex but the relationship of the lips to nose and chin was acceptable as a result of the lower lip being supported by the maxillary incisor and a reasonable pogonion

considering the divergent facial pattern. Review of soft tissues from the frontal plane revealed deviation of both stomion and alar base to the left of the maxillary dental midline as a result of the canted occlusal plane and deviation of the mandible related to the short left ramus height.

Functional analysis

There was a one millimeter lateroposterior shift of the mandible from the initial prematurity on the left first molars in centric reference position to centric occlusion. There were group working contacts bilaterally with both cross arch and cross tooth balancing interferences on right and left sides. There was no apparent symptom provoking contact, however, and no remarkable wear facets or areas of maxillary gingival tissue recession were noted.

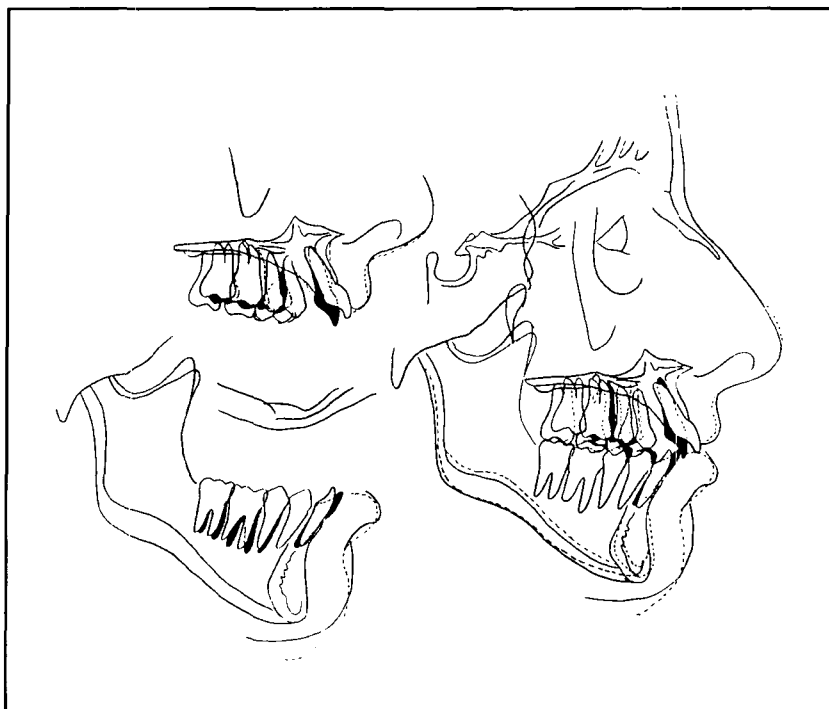
Treatment plan and objectives

Initial treatment planning revolved around correction of this malocclusion through the combined disciplines of orthodontics and maxillofacial surgery. Treatment involved presurgical leveling, arch coordination and correction of the arch length discrepancy through expansion. Due consideration would be given to extraction in the mandibular arch depending on the tendency of the proclination of lower incisors to result in an adverse periodontal response or to limit the advancement of the mandible. Mandibular advancement was to be a differential bilateral sagittal osteotomy with a presurgical re-evaluation of the need to involve the maxilla surgically to correct the maxillary width deficiency and canted occlusal plane. This treatment proposal was abandoned after considerable discussion with both the patient and the surgeon. The patients' objections were related to lack of emotional comfort with the surgical procedure and lack of insurance coverage to assist with the surgical expense.

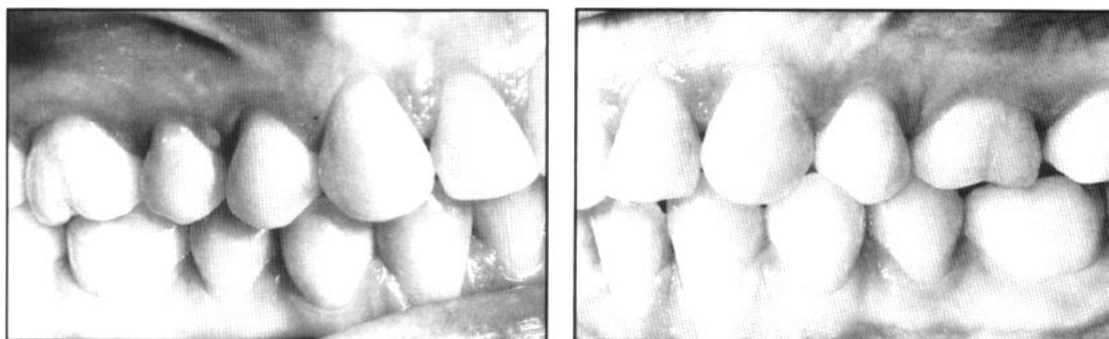
Treatment discussions were then focused on alternative orthodontic treatment plans or no treatment. Based on the diagnostic findings the following alternative treatment plan was established:

1. Extraction of the maxillary left first premolar and retraction of the maxillary incisors and left canine allowing adequate tipping to increase overbite while avoiding excessive loss of maxillary incisor torque which might result in mandibular limitation of protrusive function.
2. Alignment of mandibular dentition (nonextraction) with expansion and reproximity to alleviate arch length discrepancy and avoid excessive proclination of mandibular incisors.

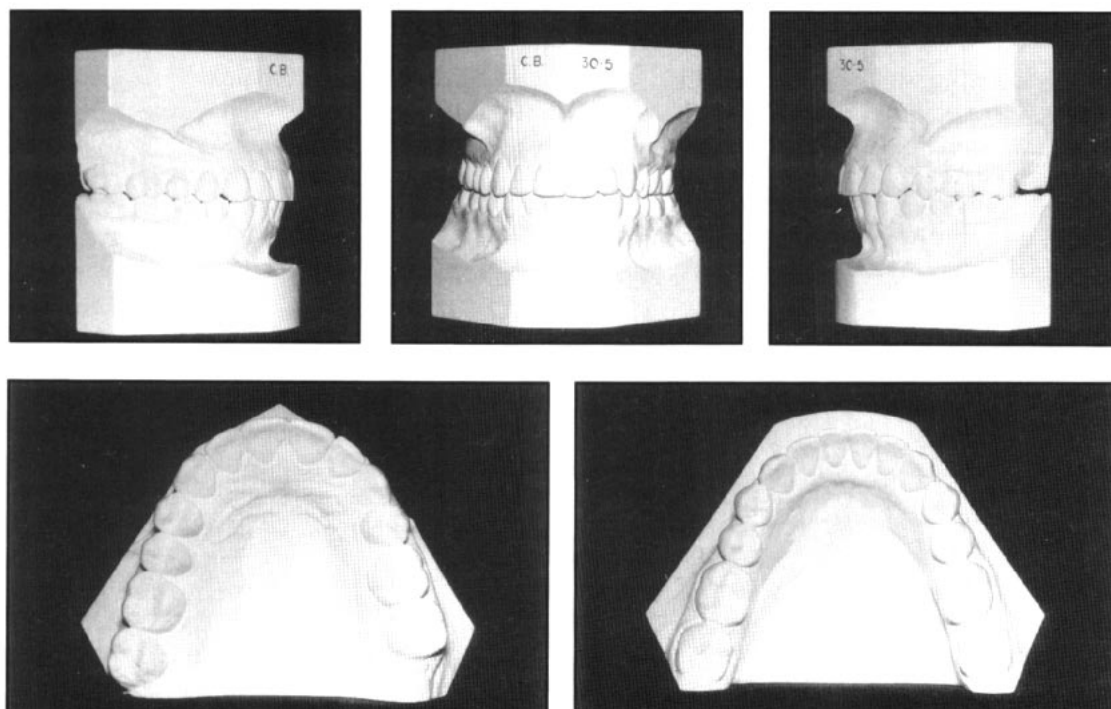
Cephalometric tracings superimposed on the ethmoid triad. Note the dental change resulting in correction of the malocclusion.



The asymmetric extraction resulted in a Class II molar relationship on the patient's left side



Posttreatment study casts



3. Alignment of the maxillary dentition with expansion and posterior buccal root torque to coordinate arch forms and correct single tooth posterior first molar crossbite on the left side.
4. Reproximation of maxillary incisors to maintain maxillary and mandibular tooth size proportions and to minimize maxillary midline shift to the left while still reducing overjet with Class I and Class II mechanics.
5. Utilization of centric reference position splint during use of single tooth cross elastics to correct crossbite and during Class II retraction mechanics to minimize excessive mandibular reposturing. Adjust and reduce splint as needed to maintain mandibular comfort and to assist in leveling of the frontal occlusal plane.
6. Finish to a right side Class I molar and canine and left side Class II molar and Class I canine with improved lateral and protrusive guidance. Reduce mandibular anterior root proximity. Establish coincident dental and soft tissue midlines with minimal shift to the left. Improve frontal occlusal plane to de-emphasize asymmetry.
7. Fabricate hinge axis positioner to finalized tooth positions followed by circumferential retainers and evaluate for equilibration six months posttreatment. Particular emphasis should be given to unincumbered lateral and protrusive excursions with no excessive contact of the incisors in centric occlusion.

The patient was counseled on the probable increase in soft tissue convexity and reduction in maxillary and mandibular lip support resulting from the retraction of maxillary incisors. Additionally, the patient was cautioned that even subtle changes can provoke or exacerbate temporomandibular joint and masticatory muscle symptoms although every effort would be made to minimize rapid or excessive mandibular repositioning related to the crossbite correction or treatment mechanics.

Treatment results

Cephalometric superimpositions, with the cranial base used as reference, revealed tipping and relative extrusion of the maxillary incisors as well as proclining of mandibular incisors as anticipated. There also appeared to be some mild rotation or mandibular repositioning with approximately one millimeter of anterior superior (counterclockwise) movement of the mandible. This seems plausible in view of the lateral posterior mandibular shift that resulted from the prematurity involving the left side molar crossbite. Superimposition on palatal plane re-

vealed some extrusion of the maxillary posterior teeth particularly on the left side. This probably occurred as a result of leveling of the frontal occlusal plane which involved selective reduction of the splint on the posterior left during treatment.

Photographic evaluation shows adverse profile change both in the upper and lower lip with retraction of the upper lip at stomion due to the tipping of the maxillary incisors and the eversion of the lower lip related to the rotation and relative extrusion of the maxillary incisors. Although the net change in either the upper and lower is not great when considered separately, the additive effect with both lips moving in an unfavorable direction is quite noticeable. Soft tissue changes when viewed from frontal plane are more favorable with the smile line more parallel to the interpupillary plane and left side facial height appearing greater. Changes in the frontal plane may be related to mandibular repositioning, leveling of the occlusal plane by extrusion of maxillary left posterior segments, both of which had the net effect of increasing facial height on the left side, thus helping to mask the skeletal asymmetry. While an increase



Posttreatment panoramic radiograph

Posttreatment photographs at 30 years 5 months



in gingival display of approximately two millimeters was noted during smiling, the change was not aesthetically objectionable.

Review of six month posttreatment study casts and photographs revealed that most interocclusal objectives were met through the combination of fixed appliances and a period of post-treatment positioner wear and equilibration from mounted models. Pretreatment concerns focused on avoiding over coupling of anterior teeth with resultant steep anterior guidance and possible retrusive closure of the mandible into centric occlusion/relation seem to have been avoided. Functional evaluation shows range of motion has remained the same in active opening while lateral excursions have increased from five millimeters to nine millimeters. Muscle and joint palpation reveal no capsule or muscle tenderness at two years posttreatment. Both mobility and fremitus of anterior teeth were checked with no positive findings in an effort to rule out the possibility of a habitual rest posture of the mandible which was significantly forward of centric occlusion. Stability of the proclined mandibular arch has been acceptable with retainer wear now at a three nights per week level. The patient has been apprised, however, that indefinite retention will likely be necessary to maintain integrity of the mandibular anterior arch form. Periodontal assessment reveals no mucogingival problems to date and gingival architecture appears improved in the mandibular anterior areas.

Summary

With more focus on orthopedic correction through the use of functional appliances in

young age groups and with orthognathic surgery used frequently in nongrowing orthodontic patients with significant skeletal dysplasia, many of the traditional orthodontic treatment plans involving dentoalveolar compensation have fallen into disfavor and in some cases have been implicated as the underlying causative factor in occlusal, masticatory muscle and temporomandibular joint dysfunction.

While a "balanced" musculoskeletal system in conjunction with an excellent interocclusal relationship and stable supporting dental structure is most often a desirable overall treatment objective, it seems most unwise to let current trends in treatment mechanics dictate treatment plans or to let scientifically unsubstantiated cause and effect relationships narrow treatment alternatives.

Careful assessment of the patient's needs and concerns in conjunction with a considerate evaluation of physiologic parameters has been a hallmark of orthodontic treatment planning and should continue to have at least equal billing with medical legal concerns and current treatment trends. WHEN ALL ELSE FAILS, TRY DIAGNOSIS!

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