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LATE MANDIBULAR INCISOR CROWDING

ORTHODONTIC ENIGMA

Late Mandibular Incisor Crowding

It is a familiar story to the general practitioner. An adult patient points to his lower incisors and complains that his once-straight teeth have become “crooked” in recent years. He suggests that the crowding was caused by his “wisdom teeth,” which are still present in spite of advice from a previous dentist to have them removed. He wants to know more about why the crowding has developed, and whether extracting the third molars really would have prevented it. More important, he is concerned that the crowding will worsen with time, and is interested in having it corrected.

WHO IS AFFECTED?

It is not surprising that the story told above is a familiar one. In fact, because of its high prevalence, late mandibular incisor crowding is considered a normal part of the aging process. Research suggests that, without orthodontic treatment, approximately two-thirds of adolescents with good alignment and “normal” occlusions will develop incisor irregularity by early adulthood.¹

As might be expected, orthodontic treatment and retention in adolescence do not protect against later crowding. After all, orthodontics corrects the original malocclusion, but it does not change the developmental processes that lead to late crowding. Once retainer wear stops, orthodontic patients may show changes in incisor alignment similar to those seen in untreated individuals. (Fig. 1) Some experience a higher rate of change in the first several years after retainers are discontinued, suggesting a limited period of true orthodontic relapse. Fortunately, although incisor irregularity may continue to increase as a person ages,

the rate of change appears to slow with time.²

So, what differentiates the one-third of adolescents whose alignment does not worsen with age? Unfortunately, the risk of late incisor crowding is unpredictable on an individual basis. It appears to be associated with all classes of malocclusion. Despite efforts to maximize orthodontic stability, no treatment approach is immune to late crowding once retainer use stops.

WHY DOES IT HAPPEN? CAN IT BE PREVENTED?

Years of study have failed to identify a single primary cause of late incisor crowding.³ The etiology undoubtedly is multifactorial. Leading theories can be grouped into two categories: those proposing that the problem is caused by mesial movement of posterior teeth, and those suggesting it results from lingual movement of anterior teeth. Both may be correct to some extent.

Posterior teeth moving mesially?

The third molar theory is the explanation most commonly voiced by dentists and patients alike. It proposes that erupting third molars push against the mandibular arch, forcing posterior teeth forward and crowding the incisors. The concept is an attractive one because it implies that dentists can prevent incisor crowding simply by extracting third molars before crowding develops.

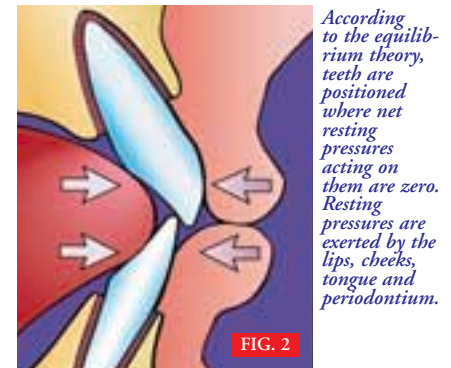
Unfortunately, research has shown that the problem is not that simple. Multiple studies have found no clinically significant reduction in the incidence of incisor crowding following third molar extractions.⁴ In fact, patients who are congenitally missing third molars are still affected

by late crowding. Although there are valid reasons for extracting the third molars, preventing lower incisor crowding does not appear to be one of them.

Other theories in this category attribute late crowding to mesial movement caused by physiologic drift of teeth, occlusal forces, muscle function or eruption patterns. It is possible that these factors contribute to the problem, but none has been found to play a primary role.

Anterior teeth moving lingually?

This category is best understood in terms of the equilibrium theory of tooth position.⁵ It proposes that a stable dentition exists in a state of balance — where the net resting pressure of the tongue, lips, cheeks and periodontium is zero. If this balance is disrupted, the teeth will move until a new state of equilibrium is reached. (Fig. 2)



Leading this category is the differential mandibular growth theory. According to this theory, when mandibular growth outpaces maxillary growth, forces from the maxillary arch and labial soft tissues cause uprighting of the mandibular incisors. This uprighting, or lingual movement, results in crowding by forcing the incisors to occupy a smaller arch perimeter. (Fig. 3) Such differential mandibular growth is not uncommon in late adolescence and may continue at a slow rate into adulthood.

Although the differential mandibular growth theory is supported by sound research, the correlation found between growth changes and incisor crowding is generally weak. Alternative theories in this category suggest that changes in facial muscles or other soft tissues are responsible for the altered equilibrium that causes crowding. These

This woman developed late incisor crowding in spite of orthodontic treatment that included premolar extractions and a period of retainer wear.



FIG. 1A

Post-treatment immediately following removal of braces, age 17



FIG. 1B

Eighteen years post-treatment, age 35

explanations are plausible, but they seem to tell only part of the story.

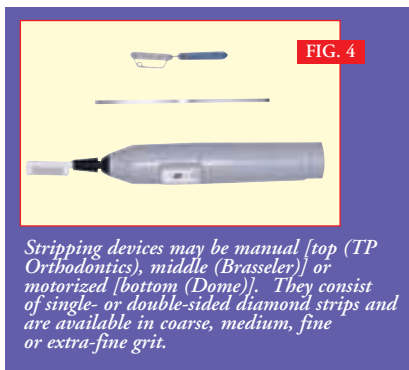
A subgroup of late incisor crowding that should not be overlooked is true orthodontic relapse. Again, the problem is one of disrupted equilibrium. If orthodontic treatment involves significant expansion of the arches toward the labial soft tissues, post-expansion relapse will occur unless the teeth are retained indefinitely against the unbalanced pressure from the lips and cheeks.

For a given person, late incisor crowding is probably caused by some combination of factors. As a result, the chances of preventing it, short of permanent retention, are not good. Extracting third molars is unlikely to provide significant relief of later crowding and is not indicated for that purpose.

SHOULD IT BE CORRECTED, AND HOW?

The decision to treat mandibular incisor crowding depends largely on the severity of crowding and the complexity of other components of the patient's malocclusion. In the presence of significant malocclusion, incisor crowding is best managed as part of a comprehensive orthodontic treatment plan. However, if a patient has Class I dental relationships and good maxillary alignment, limited treatment may be appropriate.

Even in cases with Class I occlusion and an acceptable maxillary arch, the correction of incisor crowding may not be a simple task. Other



Stripping devices may be manual [top (TP Orthodontics)], middle (Brasseler)] or motorized [bottom (Dome)]. They consist of single- or double-sided diamond strips and are available in coarse, medium, fine or extra-fine grit.

The effect of aligning mandibular incisors on the anterior occlusion depends on how the incisors are aligned. Mandibular incisor crowding can be corrected in one of two ways. The incisors can be aligned within the existing arch perimeter, or they can be flared to align along a greater arch perimeter. Aligning the teeth within the existing arch requires that their mesio-distal dimension be reduced, either by interproximal reduction ("stripping") or by extraction. This treatment approach does not significantly alter anterior occlusal relationships.

In contrast, flaring to align mandibular incisors has the potential to decrease both overjet and overbite. In cases with excess overjet and overbite, this may be a desirable side effect. However, in many of these cases, optimal anterior occlusion is difficult to achieve with single-arch treatment. Comprehensive orthodontics often is needed so that maxillary teeth can be moved to accommodate mandibular alignment.

If it is decided that mandibular incisors will be aligned along the existing arch perimeter, the severity of crowding becomes a primary consideration when planning treatment. In cases with moderate to severe

crowding, extraction of a mandibular incisor may be indicated, particularly if a tooth-size discrepancy exists between maxillary and mandibular anterior segments, and a diagnostic set-up indicates a good final occlusion can be achieved. When one incisor is blocked out, and little residual space will remain following



This removable spring-clip appliance was designed to align mandibular incisors following stripping. Its fabrication required sectioning the incisors from the mandibular cast and resetting them in alignment, simulating the amount of stripping needed.



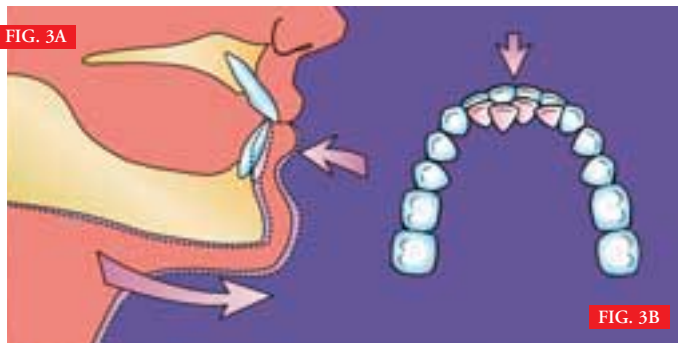
extraction, single-arch fixed appliances may be adequate. More commonly, comprehensive orthodontics will be needed to close space and establish optimal anterior occlusion. The decision to extract a mandibular incisor must be made carefully. Even with comprehensive treatment, the patient may be left with inadequate anterior guidance due to excess overjet.

In the case of mild crowding (4mm), interproximal enamel reduction, or "stripping," usually will provide adequate space. (Fig. 4) Alignment can then be accomplished using a removable spring-clip appliance. (Fig. 5) If teeth are significantly rotated or displaced, the greater control provided by partial fixed appliances is advantageous. (Fig. 6) With either treatment approach, this degree of crowding generally can be corrected within six months.

Once alignment is achieved, retention must follow. If a removable appliance was used during the correction phase, often the same appliance can serve as a retainer. If not, a removable retainer can be fabricated.



Mandibular fixed appliances provide greater control of tooth positions than removable appliances and do not rely on patient compliance.



3A: Differential mandibular growth results in lingual movement of the mandibular incisors due to increased pressure from the lips and the maxillary dentition.

3B: As the incisors move lingually, they are "crowded" into a smaller arch perimeter

factors, particularly the anterior occlusal relationships (overjet and overbite), must be taken into consideration.

The American Association of Orthodontists is a national dental specialty organization that was founded in 1900. The AAO comprises more than 13,000 members. Among its primary goals are the advancement of the art and the science of orthodontics; the encouragement and sponsorship of research; and the achievement of high standards of excellence in orthodontic instruction, practice and continuing education.

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Alternatively, the patient may opt for a bonded lingual retainer. The advantage of such fixed retention is its reliability — patient compliance is not a problem. Its disadvantages are the risk of debonding and the difficulty patients may have with cleaning around the appliance.

Finally, before embarking on treatment, it may be wise to determine how dissatisfied the patient is with his or her current condition. Considering that even after correction there will be a significant risk of recrowding, perhaps the most prudent approach would be to advise the patient to accept a little incisor irregularity as inevitable. ■

References

1. Sinclair, P.M., Little, R.M.: Maturation of untreated normal occlusions. *Am. J. Orthod. Dentofac. Orthop.* 1983;83:114-123.
2. Vaden, J.L., Harris, E.F., Zeigler Gardner, R.L.: Relapse revisited. *Am. J. Orthod. Dentofac. Orthop.* 1997;111:543-53.
3. Sampson, W.J.: Current Controversies in Late Incisor Crowding. *Ann. Acad. Med. Singapore.* 1995;24:129-137.
4. Harradine, N., Pearson, M., Toth, B.: The Effect of Extraction of Third Molars on Late Lower Incisor Crowding: A Randomized Controlled Trial. *Br. J. Orthod.* 1998;25:117-122.
5. Proffit, W.R.: Equilibrium Theory Revisited: Factors Influencing Position of the Teeth. *Angle Orthod.* 1978;48:175-186.

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The AAO recommends that every child should have an orthodontic screening no later than age 7.