# Midline diastemas: Closure and stability

*In growing patients, midline diastemas often appear during a transitory stage of development, and then close spontaneously. Occasionally a local cause must be identified and eliminated before the diastema can be closed orthodontically with a stable result. In nongrowing adult patients, the situation is quite different. The following case report shows two patients with similar malocclusions who received similar treatment but whose results were quite different. The patients had relatively rare mandibular midline diastemas in which the causative factor was tongue resting pressure. The report concludes with a description of two posttreatment alternatives to avoid relapse.*

**Yves Attia, DSO**

Midline diastemas are spaces of varying magnitude between the crowns of fully erupted maxillary or mandibular central incisors. They are frequently encountered in orthodontic practice and were reviewed in an exhaustive paper by Bishara[1] in 1972.

Diastemas can occur in the temporary, mixed or permanent dentition. In the temporary dentition, interdental spaces help to settle down the superseding permanent teeth. During the stable period of the mixed dentition, a midline diastema often represents a normal stage of development, and closes spontaneously when the canines erupt. (Paradoxically, in France at least, this natural closure may impel parents to seek an orthodontic evaluation for their child. Folklore dictates that a midline diastema brings good luck. Separated central incisors are called "teeth of good luck" and some French parents actually ask the orthodontist to reopen the diastema!) If the midline diastema persists after the permanent canines have erupted, etiologic factors must be identified and eliminated so the space can be closed with stable results.

Etiologic factors include: 1) a dental defect, such as an abnormality in the size, shape or number of teeth; 2) a periodontal defect, such as hypertrophic fibrous frenum; 3) a muscular defect in the size of the tongue; or 4) a neuromuscular defect, such as tongue thrust during speech or swallowing, or abnormal pressure during rest.

If a supernumerary tooth (mesiodens) has caused the diastema, extraction followed immediately by orthodontic treatment will produce a stable result. If the diastema results from the congenital absence of a lateral incisor, initial treatment to bring the central incisors together can be followed by moving the canines forward into the lateral position or by moving them distally to allow for prosthetic replacement.

Occasionally central incisors are narrower occlusally than they are gingivally. Any attempt to close the space between the crowns would force their long axes into bizarre positions and create unhealthy root proximities. This type of space should be corrected by bonding the teeth or placing jacket crowns. In other cases, unusually small central or lateral incisors may result in a diastema. Here, too, reconstruction by bonding or jacket crowns will solve the problem. But occasionally, so many teeth are so diminutive in so many dimensions that not even expert prostheses can provide satisfactory restoration. In such cases the best solution may be to convince the patient to leave well enough alone.

If a hypertrophic frenum is present, it must be removed, but only after closure of the diastema. Edwards[2] described a surgical technique which respects the papillae and eliminates fibrous bundles as well as supra crestal fibers compressed by treatment.

An imbalance between intraoral and perioral musculature stemming from an oversized or overactive tongue is a frequent cause of midline diastema. However, diagnosis of macroglossia should be reserved for cases associated with tu-



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Figure 1A

Figure 1B

Figure 1C

**Case JS**
**Figure 1A-C**
**A: Labial tipping, anterior openbite and a very wide mandibular midline diastema, resulting from excessive tongue pressure.**

**B: After five months of active treatment on the mandibular arch, the midline diastema had closed. A temporary ligature holds the teeth waiting for a fixed splint.**

**C: Three months later, the permanent splint still has not been made. Removal of the temporary ligatures and the posterior band give rise to a dramatic reopening of the diastema.**

mors or mongolism because it is not possible to assess the tongue's true volume or its ability to adapt to the space available in the buccal cavity.

Some authorities have incriminated improper swallowing patterns or speech defects as causative factors in the development of diastemas. However, even if the pressure is excessive during a functional act, the duration is too short to maintain incisors in a labially tipped position. Graber[3] suggested that three pressure components must be increased in order to maintain a permanent malposition: intensity, frequency, and duration. These factors may be increased in a patient with a tongue thrust habit. In these cases, an excessive forward inclination of the incisors can be observed. Orthodontic treatment is easy: a simple reverse rotary movement of the teeth around the center of resistance will close the space. This can be accomplished relatively simply with an undersized round archwire with closing loops or with a power elastic chain.

### Retention

If the causative factor — such a tongue thrust — has not been eliminated, then keeping the space closed may be difficult. For a young patient, tongue activity might be altered with therapy or a tongue crib. But the chances of successfully retraining the maladaptive behavior of an adult tongue are slim. After space closure, retainers should be placed immediately and worn permanently. A classical sectional arch retainer bonded on the canines is insufficient; the six anterior teeth must be interlocked.

The alternative to life-long retention is glossoplasty, partial glossectomy with remodeling, a procedure that is used to correct relative macroglossia and to enhance surgical correction of mandibular prognathism. Critics of the procedure claim it is painful, prone to relapse, inefficient and that it interferes with speech and causes psychological problems. Pr. Deplagne, oral surgeon and professor at the dental school of Lyon, quoted by Vesse,[4] has performed more than 100 glossectomies, and reports that the procedure is ineffective only when the surgeon is reluctant to cut away sufficient tongue tissue. To test this hypothesis, he weighed excised tongue tips and concluded that for the operation to succeed, surgeons had to remove, on average, 11 grams of tissue. (Glossectomies are still not a common procedure in France, however Dr. Deplagne has now treated several hundred cases. His recently completed article, "Glossectomy," has been accepted for publication in 1993 in Encyclopedie Medico Chirurgicale (Stomatologie), Paris; personal communication, February 1993).

After the operation, the anterior portion of the tongue will be painful for about one week. The pain provides feedback which helps the patient relearn motor responses. While speech may be difficult at first, it will improve as the retraining becomes established.

### Case JS
### 35 years

This patient presented with a Class I occlusion. Her maxillary and mandibular incisors were proclined labially with a large mandibular midline diastema and a smaller maxillary space. She had a slight speech defect and she sputtered. She wanted to be treated very quickly, and requested an appliance she could wear during the night only. She agreed to banding on the mandibular arch for a few months, followed by a fixed splint on the lower arch to be placed by her periodontist.

The mandibular space closed in 5 months. The maxillary space closed spontaneously during that time, thanks to the centripetal force of the lips. The patient was insistent that the bands be removed, although her appointment with the periodontist was not for another month. She finally agreed the keep the posterior bands with a ladder type ligature wire on the incisors.

Three months later, the patient returned, in a panic. She had skipped the appointment with the periodontist, believing lifetime retention was not necessary, and she had asked her dentist to remove the remaining appliance. Her tongue thrust

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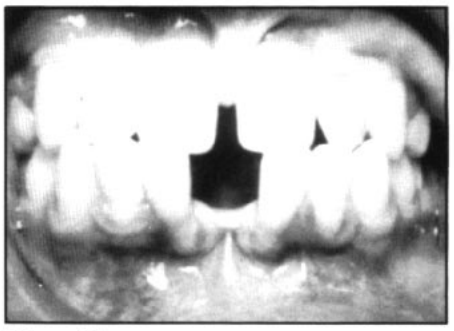

Figure 2A

Figure 2B

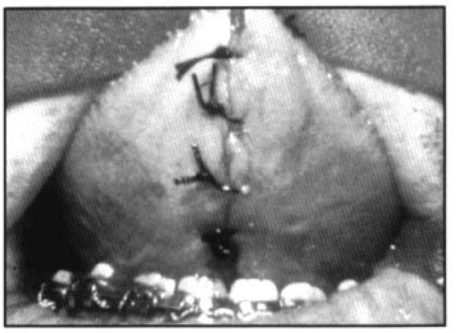

Figure 2C

Figure 2D

Figure 2E

**Case GB**
**Figure 2A-E**

**A: A large mandibular midline diastema and a small upper space. Incisors are tipped labially.**

**B: The mandibular arch was treated to upright the incisors and close the diastema. The maxillary diastema closed without treatment.**

**C: Before removing the bands, a partial glossectomy was performed.**

**D: Three months later the bands were removed. The result seems to be stable but the patient requires some periodontal care.**

**E: Four years later the mandibular teeth remain well aligned with no space reopening. The contact points are tight. Tongue contour is normal with scarring scarcely perceptible.**

habit was still present and both the maxillary and mandibular diastemas had reopened.

### Case GB
### 14 years

This patient presented with full adolescent denture, brachicephalic facial pattern, Class I occlusion and an anterior crossbite.

His maxillary and mandibular incisors were proclined labially causing a very large mandibular midline diastema and a 1.5 mm maxillary diastema. His related problems included tongue thrust, primary swallowing, speech defects, sputtering and poor oral hygiene with gingival recession on the mandibular incisors. He appeared highly motivated to improve his dentition.

He was treated with an Edgewise appliance on the mandibular arch for 10 months. When the mandibular diastema had closed, an oral surgeon performed a partial glossectomy, excising the tongue tip and suturing the blood vessels, and the inferior and superior planes of the tongue. The bands were removed three months after surgery. Although the mandibular space remained closed, the maxillary diastema was still slightly open. However, that arch was not treated and the frenum had not been removed.

Four years after treatment, the results remained stable and both diastemas were closed. Oral hygiene, unfortunately, had not improved although contact points remained tight. The tongue showed very few sequellae: it has a regular contour, speech is wonderfully improved, taste seems to be normal, there is no pain and the patient smiles more and is more communicative.

### Conclusion

1. Mandibular diastemas, though seen less frequently than maxillary diastemas, are often more dramatic.
2. The primary etiologic factor of mandibular diastema is tongue thrust in low rest position.
3. In adult patients, mechanical closure of the diastema without posttreatment retention is doomed to immediate relapse.
4. Stability can be maintained with a fixed permanent retainer.
5. The alternative is surgical reduction of the tongue following closure of the diastema. The new position of the anterior teeth, the new shape of the tongue, and the heightened sensitivity of the tongue immediately following surgery create a feedback mechanism to help retrain the tongue and cancel the etiologic factor of the malocclusion.

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**Author Address**
Yves Attia, DSO
Professeur a la Faculte de Chirurgie
Dentaire de Nice
55 rue Gioffredo
06000 Nice, France

*Y. Attia is a professor on the faculty of Odontologie, in Nice, France.*

## References

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