Cranial Strains and Malocclusion: VI: Side-Bend - Part 2: Treatment

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There are specific criteria for treatment of a side-bend strain. These apply whether the side-bend is the only strain present or is found in combination with another strain.

As the first part of this article on the side-bend strain was published in the previous IJO issue, the characteristics of a side-bend strain are therefore reviewed. A left side-bend is shown (Figures 1a, b).

A conventional approach to treatment might be to distalize the maxillary left posterior teeth by an appliance such as a pendulum fixed type appliance. If crowding is present a unilateral extraction such as the left first bicuspid, or perhaps three bicuspids, might be considered, leaving the molars in a Class II relationship on the side-bend side. These treatment objectives are designed for correction of the dentition only and fall short of addressing the primary etiology of the problem. This leaves the craniofacial displacement untreated or worsened in the process of reconfiguring teeth.

The relationship between asymmetric malocclusion and a side-bend strain has always co-existed. To our knowledge there has not been a satisfactory explanation in dental literature as to how it arises. The cranial configuration underlying the malocclusion was described in detail in the previous article.1 As we emphasized in that article, a necessary step in recognizing how a side-bend strain affects the dentition is to mount the models on an articulator using a face bow and a functionally generated occlusal registration.

In a left side-bend strain the following characteristics are identifiable:

1. The entire maxilla is rotated to the right, reflecting the rotation of the greater wings of the sphenoid.
2. The mandible is rotated to the left as the temporal bone follows the occipital bone distally.
3. The maxilla must be seen as two individual halves. The side-bend side is normally internally rotated (closer to the palatal mid-line). The contra-lateral side is externally rotated (further from the palatal mid-line). This feature is not invariable, but is usually present.
4. The maxilla cants up to the left.
5. The mandible during closure and prior to any tooth contact shows a self-correcting tendency toward the mid-line. The initial contact is in the area of the right first bicuspid, cuspids and first bicuspid (closer to the palatal mid-line). The contra-lateral side is externally rotated (further from the palatal mid-line). This feature is not invariable, but is usually present.
6. With the models mounted in a functionally generated registration, there is a significant disharmony between the posterior segments in a lateral plane (Figure 3).
With disarticulation of the teeth, the mandible is no longer influenced by the primary dental interferences. Under the influence of the musculature, the mandible can align itself toward the facial midline. There is still a Class II relationship of the posterior segments on the left and Class I on the right.

**Treatment:**

The primary goal in the cranial approach is to correct the craniofacial distortion as much as possible using the teeth as a means to achieve this, then develop the mandibular position and stabilize the occlusion.

**Phase I:**

The aim is to develop symmetry of the maxilla. The diagram in Figure 4 shows the appropriate direction of initial force applications. Movement of the right lateral incisor, cuspid and first bicuspid is needed in a buccolabial aspect. Distal movement of the maxillary left molars is also required. With the appropriate appliance design (Fig 4) an effective reciprocal force can achieve both of these objectives. This is best accomplished by using an Advanced Lightwire Functional (A.L.F.) appliance. This type of correction cannot be achieved with either removable or conventional full bracketed appliances and preformed arches. The appliance is activated by expanding the arch at the loops in the right anterior segment and on the left posterior segment. Lateral development of the arch can also be accomplished if the overall arch form is deficient or incongruent.

In the mandible an A.L.F. appliance is also used (Figure 5). A pad is placed over the bicuspid teeth on the right. The pad provides a point of initial contact and allows the mandible to move toward the centerline. It also helps to reduce the maxillary cant by introducing a subtle intrusive direction to the maxillary posterior quadrant. This encourages the opposite, higher side of the maxilla to drop downwards.

Figure 6 is a diagram of the treatment sequence in phase one. A very light force through-the-bite elastic is applied on the right side to prevent expansion of the posterior teeth on the right. The net expansile effect of the appliance is therefore on the anterior right segment and the left buccal segment. The effect of the elastic is to act as a brake. This is an important concept since cranial correction is achieved by employing a very light constant force to take advantage of the flexibility inherent in the craniofacial structures. In this case, the light force is being used to achieve a true orthopedic movement, i.e. the buccal expansion of the left (internally rotated) half of the maxilla.

**Phase II:**

As the maxillary arch is developed the mandible continues to move toward the centerline. At this point, the centerlines are not yet corrected to each other or to the face. Phase II therefore involves the use of Class II
elastics on the side-bend side and Class III elastics on
the non side-bend side (Figure 7). This rotates the
maxilla toward the left, thus bringing the maxillary
centerline into alignment with the facial mid-line. As
the entire maxilla is being moved, nasal deviation will
often show some degree of correction. The effect of the
elastics on the mandible is to help centre it as well. The
pad on the right segment serves to orient the
mandibular position toward the facial centerline as well
as protect the right temporomandibular joint from
being compressed by the Class III elastic.

Phase III:
Where the side-bend strain is the only strain,
conventional fixed appliances are normally placed at this
point. The need to avoid suppressing the natural
movement of the craniofacial structures is a constant
requirement. Self-ligating brackets with Copper-
Nitinol archwires offer a more suitable level of force. If
there is another strain present (usually an inferior
vertical strain), the correction of the centerlines which
has now been achieved will result in an increased
overjet. This has to be addressed with some form of
anteroposterior correction, such as a MARA combined
with fixed appliances for final detailing.

Patient P. S. demonstrates the entire treatment
sequence. A left side-bend is present combined with an
inferior vertical strain. (Figures 8a, b, c, d, e, f, g, h, i,
j).

Differential Diagnosis:
It is the responsibility of the clinician to decide
whether an asymmetry has a cranial aetiology. Careful
evaluation of patient’s facial features, radiographs and
the models mounted on an articulator are essential.
The records for Patient D. K. demonstrate this. The
models (Figure 9a) show a Class II molar and cuspid
relationship on the right and a Class I on the left. The malocclusion is essentially an asymmetrical Class II, division II in Angle terms. The dentition resembles a right side-bend strain combined with a hyperflexion. When the full face is examined (Figure 9b), it can be seen that the ocular and occlusal planes are parallel. They both cant up to the left. This facial feature suggests a torsion strain, not a side-bend strain. When the models are placed on the articulator a quite different picture emerges (Figure 9c). The mandibular centerline deviation is no longer evident and the posterior occlusion is now a full unit Class II on the left and a unit and half on the right. In other words, the interferences introduced by the retroclined maxillary incisors have created a severe functional shift of the mandible to the right, thereby distorting the dentition to become asymmetrical when in full intercuspation. This individual does not have a side-bend, but rather a left torsion combined with a severe hyperflexion. We are actually dealing with a symmetrical problem in the anteroposterior plane and not an asymmetrical one. Treatment planning has to address this.

Clinical implications:

The clinical implications of the side-bend strain extend far beyond the dental picture. The asymmetrical position of the occiput directly affects the position of the temporal bones. On the side-bend side the temporal bone is externally rotated. On the contralateral side, the temporal bone is internally rotated. Sutherland called the temporal bones “the trouble makers,” and Magoun has demonstrated how their displacement can cause many problems. For example, there is uneven loading of the temporomandibular joints. In particular, the mandibular condyle on the side-bend side is driven upward and distally, predisposing to joint dysfunction. The mandible itself is off center and there is considerable myofascial involvement as the musculature adapts to the asymmetry.

Rotation of the occiput around a vertical axis leads...
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An assessment of the temporomandibular joints has to be seen against a background of cranial and postural factors as well as the dental configurations. This embraces the idea that temporomandibular joint dysfunction is as much a response to influences extrinsic to the joint as to disturbances within the joint. One potential source of these extrinsic factors can be a cranial side-bend strain. With an understanding of the characteristics of each cranial strain and especially a side-bend strain the clinician has a broader, more comprehensive grasp of temporomandibular dysfunction.

References:
5. Sutherland, W.G. Teachings in the Science of Osteopathy. Sutherland Cranial Teaching Foundation 1990, 4116 Hartwood Drive, Fort Worth, TX 76109