

Chapter 11

Cranial therapy and dentistry

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DENTISTRY AND CRANIAL THERAPY: THE LINKS

Dentists, along with most doctors, are taught to analyze body systems and body parts separately. We are taught to change one area at a time, but such approaches frequently ignore the interconnectedness of the systems in the human body. If it is accepted that normal cranial motion and structure are necessary for the optimal functioning of the individual (Page 2003, Stockton 1998, Zeines 2000), it should be possible to acknowledge that dental procedures can potentially have debilitating, possibly long-term effects on a person's health, when those procedures interfere with the optimal functioning of the cranial complex (Fischer 1940, Hodgson & Hansen 2000, Morgan et al 1982, Simon 2001).

Similarly, cranial treatment may be less effective if inappropriate dental procedures produce changes that interfere with normal function (Frymann 1998).

In contrast, it is suggested that dental therapy that considers the whole body can result in major benefits, especially when integrated with suitable cranial therapies.

BACKGROUND

The cranium is a compact container with many structurally and functionally interrelating parts and tissues. Dysfunction of a single part can affect

the entire interrelated system (Upledger 1997). Because of this, an integrated 'whole-body' dental approach needs to take into account more than just the achievement of 'straight' teeth (Gelb 1971, 1977, Upledger 1987).

Dental education, for the most part, fails to take into consideration areas of the body beyond dentition, the status of the maxillae and mandible and their occlusion (Breiner 1999, Zeines 2000). Similarly, many practitioners who treat temporomandibular dysfunction symptoms (TMJ dysfunction or TMD) do not look beyond the interrelationships of the maxillae, mandible and TMJ (Hruby 1985, Page 2003). Issues surrounding hard tissue correction seem to be given more weight than other cranial interrelationship issues (Simon 2001). It is not surprising therefore that much of the discussion that follows is neither understood, nor accepted, by mainstream dentistry (Breiner 1999, Carter 1993, Zeines 2000).

In this chapter we define the goal of *whole-person dentistry* as:

- healthy tooth structure
- optimal occlusion
- mandibular/maxillary relationship, with correct structural relationship between the maxilla, the sphenoid and all other cranial bones (Breiner 1999, Gelb 1971).

DENTAL TREATMENT CAN ENHANCE OR INHIBIT CRANIAL TREATMENT

FUNCTIONAL JAW ORTHOPEDIC ORTHODONTICS (also known as functional jaw orthopedics or FJO)

Functional jaw orthopedic orthodontics: 'The use of orthopedic orthodontic appliances to influence the teeth and bone in such a way as to stimulate remodeling or alteration of growth patterns of the jawbones and associated neuromuscular tissues' (Zeines 2000). A longer definition would be:

The use of tooth and tissue anchored appliances, designed to create change during function, toward the eventual goal of cranial symmetry through orthopedic movement and soft tissue balance, while at the same time emphasizing

correct TMJ mechanics, cranial suture, cranial bone and sacral motion. (Hockel 1983, Hruby 1985, Wiebrecht 1966, 1969)

FJO can have positive effects in transforming a person's life. The author has regularly, in clinical practice, observed marked positive physical, mental and emotional changes, as the face, skull and body are reorganized following appropriate dental care (Magoun 1979, Page 2003, Stack 2004, Stockton 1999).

Depending on the individual's belief system, these beneficial changes might be ascribed as deriving from changes in CSF movement, cranial sutural mobility and/or membranous and facial stress reduction (Gelb 1977).

Some clinically documented examples of these transformations include: increased self-esteem, marked improvements in school grades, enhanced ease of learning, reduced ADD or ADHD symptoms, improved social skills, ease of breathing, bedwetting elimination, desire to change abusive relationships and increased energy.

FJO can make cranial treatment more efficient and effective and have longer lasting benefits by encouraging the correction of underlying structural problems (Hockel 1983).

FJO analysis and treatment from a dental relationship point of view

Class I Dental relationships

This refers to a fairly normal relationship of upper to lower teeth. However, this classification does not address the health of the TMJ nor the possible malposition of the maxillae relative to the cranial base.

For example, a patient may present having had several teeth extracted, a severe TMJ dysfunction, as well as cranial and esthetic disturbances and despite these problems may still have a classification of a Class I occlusion, merely because the teeth fit together well.

Figure 11.1A represents a post-treatment case with a normal face form and Figure 11.1B demonstrates an intraoral view of a normal overbite (vertical overlap) and overjet (horizontal overlap of the upper jaw compared to the lower jaw). In this Class I case the TMJ, tooth alignment and jaw relationship are ideal.

Box 11.1 Understanding what another health professional may be saying: different classifications (systems) for the same problem

In order to be able to establish good communication with a dentist it is vital that there is an understanding of the background of his/her diagnosis. There are five main types of classifications used to describe the interrelationship of the teeth, jaws and skull (Bowbeer 2003, Gelb 1977).

- I Dental
- II Functional
- III Esthetic
- IV Radiographic
- V Cranial.

Each can be used to describe the same case in a different way, which means that to communicate it is necessary to establish a common language. A broad overview of these classifications follows.

Dental relationships Classes I–III relate to how the upper and lower teeth fit together. This classification utilizes the first molars and the cuspids (eye teeth) as reference points to describe and diagnose a case. This classification is also known as describing occlusion or the interdigitation of the upper and lower teeth. It does not however describe or diagnose the health or function of the TMJ (Enlow 1975, Spahl & Witzig 1991).

Functional relationships The health of the TMJ and neuromuscular system can be identified by grading the degree of joint degeneration from 1 to 4. Neuromuscular dysfunction can be graded according to the degree of over- or undercontraction through the use of electromyography.

Esthetic relationships This classification is a diagnosis of how the face appears from the front and side.

The facial balance involves one-third upper, one-third middle and one-third lower face dimensions. This classification can overlap with the dental classification in that how the teeth fit together can also be related to how the face appears from the profile view. For example:

- Class I demonstrates a normal/ideal profile
- Class II Division I: the lower jaw is recessive (posteriorly positioned)
- Class II Division II: has a bite in which the dentition of the maxilla hangs too far over the dentition of the lower – an overclosed vertical or deep bite
- Class III: the lower jaw is too far forward and generally the upper jaw is deficient anteriorly (Celic & Jerolimov 2002, Enlow 1975).

Radiographic relationships The most commonly used radiographic analysis involves the use of cephalometric X-rays (lateral head and neck), transcranial X-rays of the TMJ, CT or MRI of the TMJ/skull and panoramic X-ray of the lower half of the skull.

Cranial relationships There are a number of classifications which seek to explain malformations and/or malalignments of the cranial structure. A professional's ability to classify such characteristics would depend on training and background, for example in cranial osteopathy or craniosacral therapy, Howell's neurocranial restructuring, orthobionomy, sacro-occipital technique (SOT) and chirodantics. Each area of study has its own classification methods and philosophy, sometimes making it difficult to hold a meaningful cross-educational-background discussion.

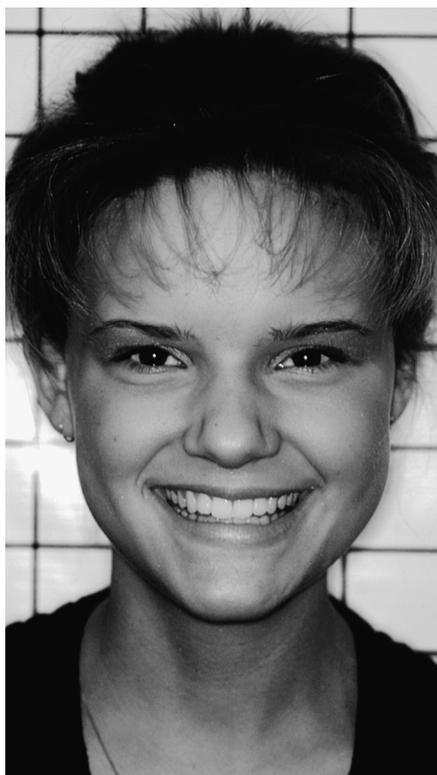
Class II Division I dental relationships

Division I refers to the occasions when the upper teeth are abnormally in front of the lower teeth, commonly known as 'buck teeth'. This condition involves having a recessive lower jaw, with or without crowded teeth. This is often related to headaches, ear problems (otitis media), TMJ clicking and a narrow cranial structure (extension pattern) (Morgan et al 1982, Price 1945).

Figure 11.2A represents the facial profile of a classic Class II Division I malocclusion. Figure

11.2B shows the same malocclusion from an intra-oral view. Note the horizontal protrusion of the upper teeth (overjet). The reality is that the lower jaw is extremely retruded (recessive). In cases such as this it would be a mistake for a dentist/orthodontist to extract upper bicuspids in order to move the upper teeth backward to match the lower jaw (Carlson 2004).

Appropriate dental treatment of this problem involves widening the upper jaw with a flexible appliance, such as the Advanced Lightwire



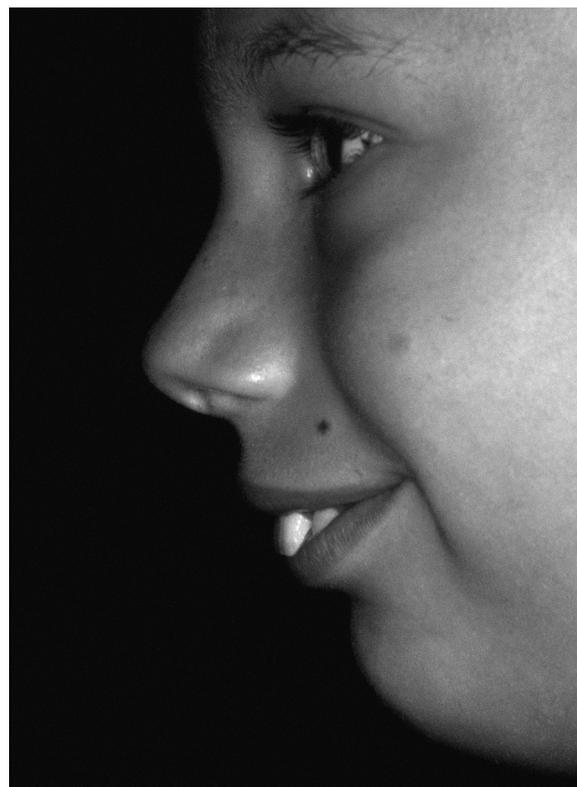
A



B

Figure 11.1 A A post-treatment case with a normal face form. B An intraoral view of a normal overbite (vertical overlap) and overjet (horizontal overlap of the upper jaw compared to the lower jaw). In this Class I case the TMJ, tooth alignment and jaw relationship are ideal.

Functional appliance (ALF – Fig. 11.3), combined with cranial treatment to balance the mechanism. Both methods, dental and cranial, can be utilized to encourage forward repositioning of the mandible. A twin block, or Bionator, is used to further advance



A



B

Figure 11.2 A The facial profile of a classic Class II Division I malocclusion. B The same malocclusion from an intraoral view. Note the horizontal protrusion of the upper teeth (overjet). The reality is that the lower jaw is extremely retruded (recessive). In cases such as this it would be a mistake for a dentist/orthodontist to extract upper bicuspids in order to move the upper teeth backward to match the lower jaw.



Figure 11.3 Advanced Lightwire Functional appliance.

the lower jaw and decompress the TMJ. Treatment completion may possibly involve use of fixed orthodontic appliances to bring the back teeth together, providing the TMJ with better support through proper occlusion (Nordstrom 2003, Spahl & Witzig 1991).

Class II Division II Dental relationships

This is the diagnosis that represents a deep bite where the upper teeth are both forward of the lower and severely overlap them vertically. The result is an outward facial appearance of a large lower lip that in turn causes a cleft between the lip and chin.

This condition is classified by Jecman (1998) and others as a sphenobasilar symphysis (SBS) lesion, in which the SBS junction is in a 'hyperflexed' position (invaginated superiorly). This position tips the posterior aspect of the maxillae up and posteriorly, causing the anterior maxillae (the premaxilla) to rotate inferiorly so that the tips of the front teeth incline posteriorly (see Fig. 11.4A,B). The result of this condition is that the mandible is trapped in a posterior position, with the temporal bones in external rotation (Magoun 1976).

Dental treatment First, the premaxilla must be released into a more anterior position. The teeth are tilted so that the tips are not retroinclined. In other words, a type of buck tooth position is created (with the upper front teeth ahead of the lower front teeth) before the mandible and temporal bones can change position. Appliances

Box 11.2 Controlled arch development and non-surgical mandibular advancement

Cranial orthopedics is a term that helps to explain how the lower jaw is able to move forward in a patient who has a posteriorly displaced mandible. The mandible cannot make drastic changes in position without involving simultaneous changes in the position, function and mobility of the temporal and other cranial bones (Baker 1971, Jecmen 1995, Magoun 1979, Morgan et al 1982).

A wide variety of appliance designs have been used for many years to advance the mandible. These include the Andresson activator, Frankel Witzig orthopedic corrector, Mew orthotropics, Sved, Katsev's K-Flex, Clark's Twinblock, Nordstrom's ALF and others. All these appliances are dependent on affecting major cranial changes to accomplish their goals of mandibular advancement. Most dentists using these appliances do not fully realize the dental-cranial connection and therefore do not understand the positive impact a cranial therapist can have on assisting their progress (Zeines 2000). For example, in not adequately preparing for maxillary development, both anteriorly and laterally, the forward mandibular movement will be considerably impeded, because the maxilla is the matrix for mandibular position (Gelb 1994). If birth, general trauma or improper nutrition has restricted the normal maxillary growth and position, then the temporals, and thus the mandible, will be negatively affected (Gelb 1977, Nordstrom 2003, Price 1945).

The advantages of this form of treatment are the achievement of better face form, wider maxillae and zygomatic processes (allowing the cranial mechanism greater freedom of movement) and better forward positioning of the lower jaw (Diamond 1979a). Mechanically, this treatment also provides improved TMJ function, enhanced drainage of the sinuses and Eustachian tubes, as well as improved inner ear function, cranial motion and amplitude (Hockel 1983).

such as the Twinblock, ALF twin block, Bionator, etc. are then used to further correct the mandibular position (Gelb 1977, 1994).

Results obtained

- Correction of the SBS restriction
- Improved position of the externally rotated temporals



Figure 11.4 A,B The anterior maxillae (the premaxilla) are rotated inferiorly so that the tips of the front teeth incline posteriorly.

- Reduced overbite and overjet, improving face length and esthetics
- Lessened stress of the TMJ complex
- Positive changes in positioning of the neck, back and neuromuscular system (Jecmen 1998).

Any technique which mobilizes the cranosacral mechanism can assist this transformation (Smith 2000b).

Class III Dental relationships

In this diagnosis the lower jaw is seen to be in front of the upper jaw (commonly known as an underbite) – see Figures 11.5A and C. A cranial description might include a maxilla that is positioned posteriorly (recessive/pushed back), laterally constricted and anteriorly underdeveloped. Internal rotation of the temporal bones is also often seen in a Class III diagnosis (Magoun 1976).

The author provided dental treatment utilizing upper and lower ALF appliances with elastics

hooked from the upper posterior to the lower anterior teeth. The elastics can encourage anterior development of the maxillae and provide a general widening effect of the upper arch (Nordstrom 2003). As shown in Figures 11.5B and 5D, the results obtained by such therapies can be excellent.

Low tongue posture (almost always present) should be addressed with special tongue retraining (myofunctional therapy) (Gelb 1977, 1994). The treatment generally includes stimulating the maxillae to become wider and positioned anteriorly. This creates more room for the tongue in the roof of the mouth.

The temporals can be further balanced with cranial therapy and improved vertical development (this adds to TMJ support) which is encouraged with the use of elastics (Spahl & Witzig 1991).

Improved TMJ function and improved esthetics of facial features can be achieved, usually without surgical intervention. When treatment is started before age 15–16 (the younger the better; 4–6 years

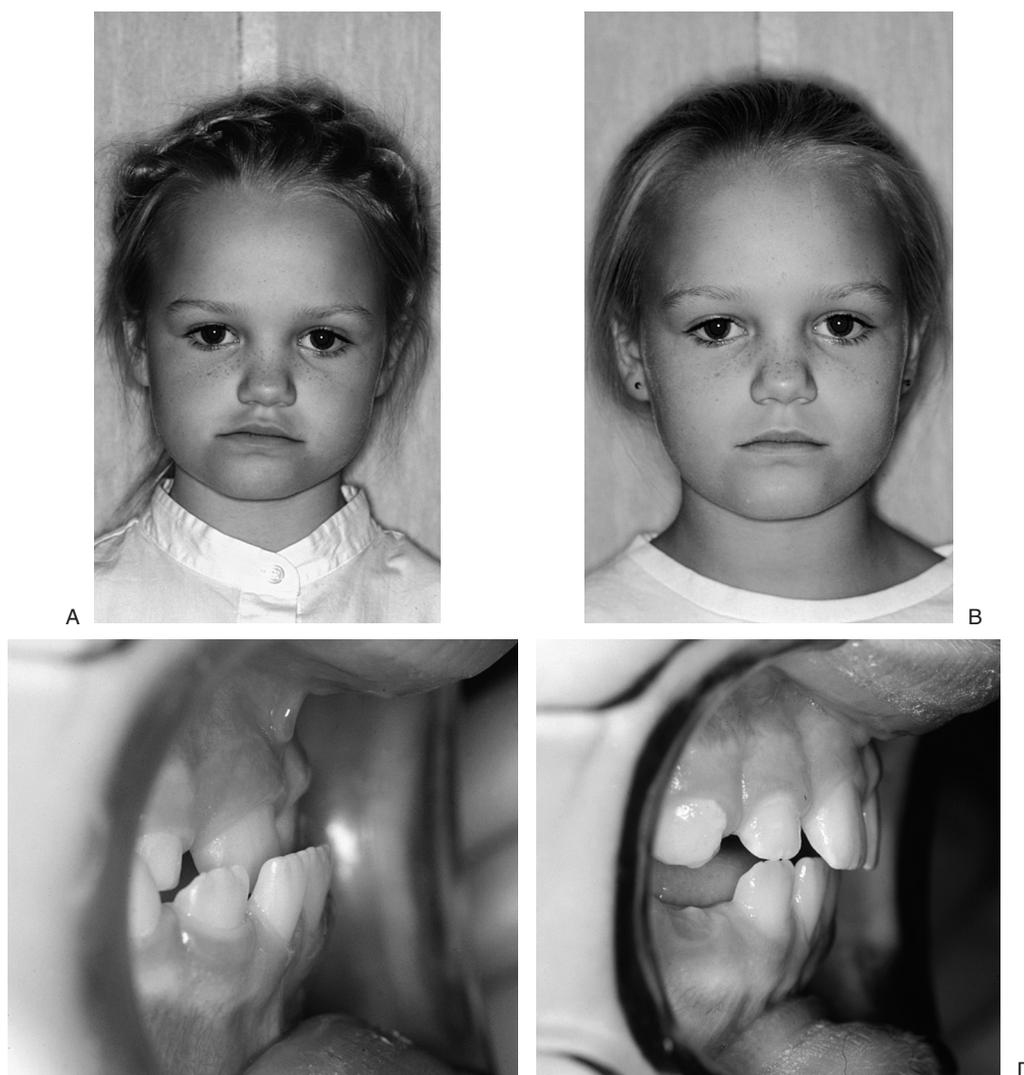


Figure 11.5 A–D Class III dental relationship. The lower jaw is in front of the upper jaw (commonly known as an underbite).

is best) the possibility of resorting to surgical or extraction therapy is greatly reduced (Page 2003, Simon 2001).

Functional jaw orthopedic FJO analysis and treatment from a cranial relationship point of view

Many varied cranial conditions are described in the literature, including sideflexions, lateral strains, vertical strains and torsions. Such dysfunctional patterns are commonly present in combinations

(Nordstrom 2003). In order to demonstrate how dental orthopedics can assist in the correction of these patterns, a sidebend/vertical strain combination has been chosen.

A sidebend (sideflexion) dysfunction pattern is a cranial classification of an imbalanced cranial form. In this classification the face, when viewed from the front, appears to have one side which is wider and compressed vertically (involving external rotation of the temporal bone) with the other side appearing narrower and longer (internal rotation of the temporal bone).

Figures 11.5A and 5C show an example of this dysfunction; the right side of this patient can be seen to be compressed and the lower jaw shifted to the right.

It has been reported by numerous experts that ear problems can often be found on the internally rotated side (Frymann 1998, Fushima et al 1999, Magoun 1976). Headaches (sometimes severe) are commonly also seen in these cases, as is unilateral chewing on the internal temporal side, which creates further cranial imbalance. Tinnitus is possible in later life and its symptoms are generally located on the side of the internally rotated temporal (Magoun 1976).

Dental treatment

The upper and lower ALF appliance is used, with elastics positioned on the upper outside of the externally rotated (wide) side, down to the lower inside on the same side.

This action helps to hold the wide side by 'putting the brakes on' the maxilla, with elastics on the ALF or Crozat appliance. This causes the opposite side of the maxilla to receive lateral stimulation from the expanding appliance trans-fixed to it.

The internally rotated side therefore balances out and the mandible is then encouraged to correct its position by moving and rotating toward the internally rotated side (Jecmen 1995).

Cranial therapy helps to facilitate the change through mobilization of the internally rotated side, as well as normalizing functional behavior of the sphenoid, occiput and temporals (Smith 1992, Upledger 1987).

The author suggests that when changes are only made dentally (as described above), without accompanying cranial support, the rest of the craniosacral system can be left in a state of sub-clinical or clinical distress.

In the case of the patient seen in Figure 11.5, an immediate vertical dimension restoration was accomplished by building up the vertical support over the lower back teeth. Use of an ALF appliance widened the maxilla and elastics helped develop the maxilla anteriorly. A K-wire was anchored to the upper cuspids (eyeteeth) to further encourage widening of the maxillary arch (Katsev 2003).

By using functional jaw orthopedics to correct this type of cranial lesion, combinations of the following benefits have been reported (Diamond 1979a, Page 2003).

- Restoration of normal facial symmetry (Fig. 11.5B,D)
- Bilateral chewing
- Normalized cranial motion and CSF flow
- Improved TMJ function
- Improvement or elimination of a variety of other symptoms (physical, mental, emotional).

Examples of a sidebend pattern of dysfunction may be present in a Class I, II or III malocclusion. All lesion and strain patterns may be present in combinations, often overlaying one another. It is for this reason that cookbook, analytical and reductionist methods of diagnosis, although necessary, may lead to incomplete and limited success (Cathie 1952, Zeines 2000).

STRUCTURAL/FUNCTIONAL ASPECTS OF THE CRANIAL SYSTEM

Implications of vertical dimension

Within dentistry, vertical dimension refers to the distance between the alveolar process of the mandible and the maxilla; in other words the height of the bones and teeth from the nose to the chin. If a person has all their teeth removed, with no dentures in place, their nose would nearly touch their chin. Missing one or more back teeth or wearing dentures with inadequate vertical dimension will to a lesser degree have the effect of reducing vertical support, but less dramatically (see Fig. 11.6A).

Unless dental orthopedics, fixed or removable dentures, crowns or bridges are included in the treatment plan, reduced vertical dimension can cause disruption of neuromusculoskeletal balance. This will often result in dysfunctions that are resistant to cranial therapy.

Symptoms of vertical dimension inadequacy

Symptoms that are seen in such cases may include inner ear problems involving hearing loss, tinnitus and infections; trigeminal neuralgia; bone/tooth

pain; sleep apnea; severe headaches and sinus infection (which may lead to tooth death and bone infections) (Fischer 1940, Morgan et al 1982).

It has been suggested (Morgan et al 1982, SOTO 2001) that when there is inadequate support for the TMJ, patients may exhibit irresolvable, unresponsive, structurally related TMJ pain, jugular foramen impingement with vagal nerve compression, equilibrium problems (Ménière's syndrome, Costen's syndrome), temporal artery compression and compression of occipitomastoid suture and nerves.

Results of a restored vertical dimension

When a patient's vertical dimension is restored (either temporarily with appliances or more permanently with prosthetics or by means of FJO) the TMJ is restored to proper form and function, thus reducing TMJ-related pain and condylar and/or disk displacement (Gelb 1994).

Restoration of the vertical dimension can also alleviate many underlying problems that would otherwise inhibit the effectiveness of cranial treatment.

Take as an example yawning, which involves translation of the mandibular condyles to the eminence of the glenoid fossae and a maximum opening of at least 42 mm. Structural corrections allow for this motion of yawning (as well as chewing) to improve (Jecmen 1998, Magoun 1976).

Once TMJ form and function are restored, the muscles and ligaments of the area (such as stylomandibular, stylohyoid, stylo mastoid, internal pterygoid, tensor veli palatini, tensor tympani) are likely to assume normal length and tension. This reduces impingement on the vessels (lymphatic, blood and cerebrospinal), muscles and nerves in the region. An example is the vagus glosso-pharyngeal, its accessory nerves and internal jugular vein as they pass near and through the jugular foramen, just medial and posterior to the TMJ complex (Feeley 1988, Magoun 1976).

Once vertical dimension is restored and the condyle-fossa relationship is balanced, the temporal bones appear to experience greater freedom to resume normal internal and external rotation. Equilibrium difficulties such as Ménière's and Costen's syndromes have been reported to be

related to an excessive internal rotation of the temporal bone (Magoun 1976). Restoring the tensions of the medial TMJ region, the tensor veli palatini and the tensor tympani, accompanied by relaxation of the Eustachian tube, can contribute to greater ease in the manipulation of the temporo-occipital region, as well as to greater stability once correction is achieved (Magoun 1976, 1978, Morgan et al 1982).

Figure 11.6A demonstrates a loss of vertical support due to bone resorption under the dentures. The patient's dentures were 25 years old and needed temporary relining, followed by new upper and lower dentures. Once treatment was completed the patient's facial profile was improved (see Fig. 11.6B). Headaches were eliminated for this patient following the change, in conjunction with chiropractic care and cranial therapy.

Implications of sinus function as it relates to vertical dimension

Neuromuscular imbalance, brought about by the many structural effects of an inadequate vertical dimension, results in reduced fluid flow through the sinus cavities. The resultant congestion in the sinus cavities can inhibit the beneficial effects of cranial treatment. Restoration of improved vertical dimension to the mouth, restoring proper neuromuscular balance and function to the muscles of mastication, improves the flow of fluids through the sinus cavity and allows increased freedom of sutural motion, thus increasing the effectiveness of cranial therapy.

Inappropriate (shortened) muscle length, caused by an inadequate vertical dimension, reduces the effectiveness of the masticating muscles. Proper function of those muscles appears to be largely responsible for powering the action and drainage of the sinuses (SOTO 2001).

A suggested sequence might involve the following.

Proper function

- Correct occlusion in combination with efficient mastication causes external rotation of the maxillae during chewing and swallowing.
- This creates a pumping motion that aids fluid flow in the sinus cavities.



A



B

Figure 11.6 A Loss of vertical support due to bone resorption under the dentures. B The patient's facial profile was improved by the treatment.

- Decreased efficiency of these muscles results in diminished fluid flow through the sinuses.
- This reduced fluid flow may lead to increased pressures which inhibit the freedom of sutural movement, possibly limiting the effectiveness of cranial treatment.

Reduced motion of the maxillary/mandibular complex may produce a domino effect, resulting in the disruption of neuromuscular balance which in turn impacts on sinus function.

Improper function

- The resultant reduction in external rotation of the maxillae reduces function of the maxillary division of the trigeminal nerve.
- It also reduces stimuli to the cilia, resulting in less ciliary motion (Gelb 1977, Lundberg & Weitzberg 1999).
- Diminished ciliary motion moves the fluids through the sinuses less efficiently.

Normalization of bilateral chewing improves function of the maxillary sinuses, as well as other sinuses such as the nasal, frontal and sphenoidal (Fonder 1977, Gelb 1994, Page 2003, Upledger 1987).

When correction of function is accomplished in a growing patient, reduced pressures allow the maxillary tuberosity to achieve greater growth, allowing for a larger, more efficient sinus cavity (Enlow 1975, Gelb 1994).

The importance of correct airway function

Normal nasopharyngeal airway function is essential to appropriate cranial growth, TMJ health and correct mandibular positioning. Restriction of the airway, anywhere between the nose and the alveoli of the lungs, can create a number of signs and symptoms (Fig. 11.7). Long-term dysfunction of the nasopharyngeal airway can, in some cases, result in postural changes, which can further inhibit correct cranial function (Gelb 1977, 1994).

A discussion of proper airway function, its effects and its presentation is not only appropriate when considering vertical support (as discussed above), but also in relation to a person's overall health. Poor dietary control (consuming foods that trigger allergic reactions), other allergies, cavitation-induced sinus infections (see later in this chapter), chronic or acute immune system disturbances (from any source) and many other causative factors can induce acute – possibly leading to chronic – nasopharyngeal airway

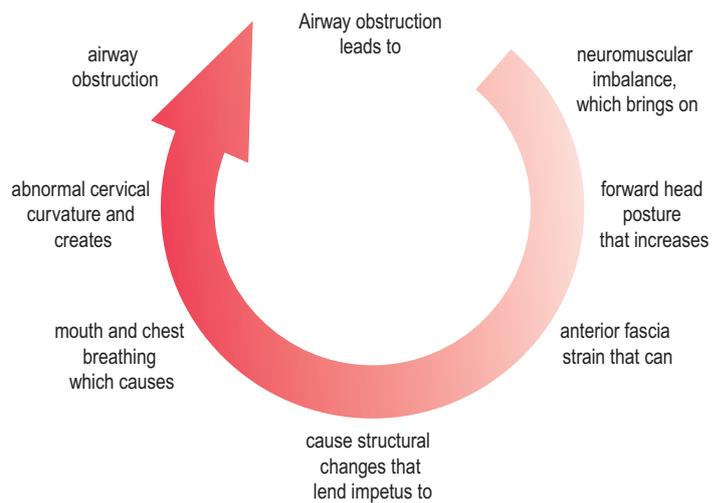


Figure 11.7 The acute/chronic nasopharyngeal airway dysfunction–postural correction–body adaptation cycle of change.

dysfunction. This dysfunction, as discussed below, can lead to serious inhibitions of cranial function (Page 2003, Rubin 2003, Stockton 1999).

Acute signs and symptoms of a dysfunctional nasopharyngeal airway (Diamond 1979b, Fonder 1990, Stockton 1999)

- Sore throat with infections
- Shoulder pain
- Middle and low back pain
- Sleep disorders
- Moodiness
- Allergies (both as cause and effect)
- Swallowing difficulties
- Ear problems
- Vertigo
- Reduced fluid flow to and from the head.

Chronic signs and symptoms of a dysfunctional nasopharyngeal airway (Char 1980, Gelb 1994, Hockel 1983, Rubin 2003)

- Increased decay of teeth and bone
- Adverse cervical curvature
- Facial deformity
- TMJ dysfunction
- ADD
- ADHD

- Bedwetting
- Crowded teeth.

Effects of functional nasal breathing

Nasal breathing may contribute to the ionization of cerebrospinal fluid through the olfactory bulb and the cribriform plate of the frontal bone (Chia & Chia 1993).

A side benefit to nasal breathing involves the relatively automatic superior and anterior positioning of the tongue. It has been suggested that this assists the flexion and extension of the sphenoid and occiput at the SBS. This may occur by way of lateral pressures at the maxillae, affecting the temporals (Gelb 1977).

Normal nasal breathing also stimulates nitric oxide (NO) production which is believed to play a vital role in regulation of blood flow (through endothelial relaxing factor – ERF), platelet function, immunity and neurotransmission. Nitric oxide seems to be produced in the paranasal sinuses, suggesting that the natural production of NO may be enhanced by improved functioning of the cranial/sinus system. If this hypothesis is correct it may explain why patients feel better when the maxillae are widened/developed and nasal breathing becomes easier (Lundberg & Weitzberg 1999).

TWO CAUSES OF DENTAL RELATED DISTRESS AND DISEASE

Cavitations: an underrated source of distress and disease in the human body

Definitions according to Dorland's illustrated medical dictionary (24th edn)

- Cavitations: the formation of caries.
- Caries: the molecular decay or death of a bone, in which it becomes softened, discolored and porous. This decay produces chronic inflammation and forms a cold abscess filled with a cheesy, fetid, pus-like liquid, which generally burrows through the soft parts until it opens externally by a sinus or fistula.
- Fistula: an abnormal passage. In effect, these definitions mean that we have necrotic material that is hidden away from sight, mainly walled off, but eventually leaking its gangrenous materials into the rest of the body (Neville et al 2002, Newman 1996).

Clinical results have demonstrated a consistent link between the existence of cavitations and the presence of many treatment-resistant diseases (Herzberg & Weyer 1998, Mattila 1993, Newman 1996, Nord & Heimdahl 1990) (see Fig. 11.8A).

Diagnosing cavitations

The presence of cavitations may be linked to a range of symptoms and the presence of recurrent and unremitting health problems suggests the possibility of cavitations. Dental assessment, including use of radiographs, electrodermal screening, applied kinesiology, CT and most accurately (and most recently) the Cavitat ultrasound three-dimensional imaging device, can diagnose the presence of cavitations. Treatment of these cavitations can often result in the alleviation of substantial and seemingly unrelated pain and suffering (Stockton 1998).

Symptoms which have been associated with cavitations include the following (Cutler 1999, Fischer 1940, Huggins & Levy 1999, Stockton 1998).

- | | | | |
|---|---|---|---|
| <ul style="list-style-type: none"> • Amyelotrophic lateral sclerosis (ALS) • Angina | <ul style="list-style-type: none"> • Migraine • Multiple sclerosis • Nephritis | <ul style="list-style-type: none"> • Arthritis • Asthma • Bacterial endocarditis • Bronchitis • Eczema • Epilepsy • Gangrene • Gout • Herpes • Iritis | <ul style="list-style-type: none"> • Neuritis • Pain with or without referral • Parotiditis • Pneumonia • Sinusitis • Sore throat • Trigeminal neuralgia • Tonsillitis • Ulcer |
|---|---|---|---|

Diagnosis of cavitational lesions should be performed by a qualified dentist/dental surgeon using methods including the following.

- Radiographs. In this medium a cavitation is very difficult to discern. Most dentists have been trained to misdiagnose areas which we now know to be cavitations (by way of other diagnostic methods) as normal bone formation. Mainly this confusion is due to the fact that in most cases where actual cavitations are present, the cortical plate has not been compromised. Doctors seeing such X-rays only 'see' the healthy cortical plate which leads them to report an incomplete or faulty analysis of the condition. Unless the practitioner is adequately trained in this identification process the cortical plate is likely to conceal the presence of the vast majority of cavitational lesions. Figure 11.8B shows the highlighted presence of a cavitation that was identified using a combination of X-ray and Cavitat analysis.
- Electrodermal screening. Originally known as EAV (Electro-Acupuncture according to Voll), developed in the early 1950s, this technique measures electromagnetic field disturbances in the body. In the hands of a well-trained technician this type of screening can provide specific analysis of the body's health. An experienced and knowledgeable practitioner can use this device to uncover the possibility of cavitations and their location, often to the accuracy of a quadrant or tooth site (Fetzer 1989, Voll 1978).
- Applied kinesiology. This method of 'asking' the body to diagnose itself was originally developed by Goodheart (Walther 1988). Despite a paucity of research validation, practitioners

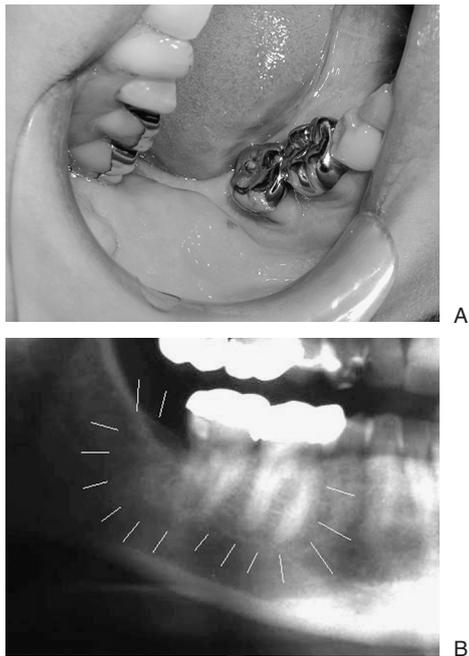


Figure 11.8 The first image (A) gives the appearance of a healthy jaw condition and X-ray analysis on its own could leave one with an inconclusive or incorrect diagnosis (B). Once diagnosed and surgical treatment is begun, the presence of cavitations becomes obvious.

who are familiar with AK claim clinical success in identifying the effects of cavitations and may use that knowledge to more accurately assess the body's responses (Gelb 1977; see Ch. 5).

- Computed tomography (CT). This X-ray based diagnostic tool provides computerized axial tomography of the skull. The higher resolution and ability to see cross-sections inside the bone make it very precise in its diagnostic abilities.
- Cavitat ultrasonograph three-dimensional imaging device. This device can provide an accurate three-dimensional image representing density changes within the alveolar process (jawbone). These density changes have been determined to accurately represent the health of the bone (Stockton 2002, Walker 2000, Zeines 2000).

Cavitations, when diagnosed with the Cavitat, may be graded on a scale of 0–4, with a 0 rating indicating normal healthy bone. A rating of 1 is

the diagnosis for bone that has reduced blood/fluid flow in the examined area. 2 indicates that there is an ischemic area of bone present, which means that while the bone is probably still technically 'living' the lack of blood flow to the area is endangering its health and viability. 3 and 4 are indicative of the presence of necrotic material and the necessity for surgical intervention (Fischer 1940, Stockton 1998).

When the health of a section of bone begins to degrade and degenerate (rating of 2–3) the body identifies a growing source of toxicity and begins to defend itself by creating a hard bony layer around the toxic area. This walling off of the cavitation is what makes it difficult to identify cavitations through X-ray examination. While the toxic cavity is walled off the patient can go for extended periods of time without any indication that there is poisonous, gangrenous material in their jawbone. The growing cavitation will eventually begin leaking necrotic material into the rest of the body with potentially serious consequences (Cohen & Burns 2002, Herzberg & Weyer 1998, Neville et al 2002, Newman 1996, Price 1945).

Development of cavitations

Cavitations generally develop as a result of trauma, bacterial infection, reduced vascular activity or toxicity (Stockton 1998).

Cavitations are usually the result of one of the following (Shankland et al 2001, Stockton 1998):

- an infection the body has walled off to protect itself
- reduced blood flow resulting in dead or dying bone
- physical trauma, when the jaw is unable to heal itself.

Disease-related results of cavitations in the body

Dorland's illustrated medical dictionary (24th edn) provides a basis for a discussion of the implication of cavitations in the body.

- Metastasis. The transfer of disease from one organ or part to another not directly connected with it. It may be due either to the transfer of pathogenic micro-organisms or to transfer of cells, as in malignant tumors.

Box 11.3 Types of trauma that can lead to cavitations

Physical trauma	Bacterial trauma	Toxic trauma
Tooth extractions	Avital (dead) teeth	Root canal toxins
Root canal procedures	Infected wisdom teeth	Bacterial toxins
Dental injections	Root canal bacteria	Anesthetic vasoconstrictors
Periodontal surgery	Abscesses	Dental materials
Grinding and clenching	Cysts	Chemical toxins
Electrical trauma from dissimilar metallic restorations	Improper removal of periodontal ligament after tooth extraction	Anesthetic by-products
Heat from high speed drilling	Periodontal disease	Other toxins

- Metastases. A growth of pathogenic microorganisms or of abnormal cells distant from the site primarily involved by the morbid process.
- Metastasize. To form new foci of disease in a distant part by metastasis.

The ideas behind focal infection have been with modern medicine since 1877 with Carl Weigert's observations of a 'dissemination of "tuberculosis poison"' (Fischer 1940). Since then there have been many studies analyzing distant effects of focal infections as it has been shown that oral pathogens can infect other parts of the body (Herzberg & Weyer 1998, JADA 2002, Mattila 1993, Neville et al 2002, Newman 1996, Nord & Heimdahl 1990, Shankland et al 2001).

Treatment of cavitations

Treatment of cavitations can be accomplished by surgical removal of the cavitation lesion or non-surgical therapies designed to help the body heal itself. Though the non-surgical avenues of treatment are generally only appropriate when the lesion has not yet reached the 'necrotic' stage and is more ischemic in nature, those types of treatment can often be incorporated with surgical intervention to increase the chances of success.

Figure 11.8A gives the appearance of a healthy jaw condition and X-ray analysis on its own could leave one with an inconclusive or incorrect diagnosis (Fig. 11.8B). Once diagnosed and surgical treatment is begun, the presence of cavitations becomes obvious.

Figure 11.8C shows a first molar extraction and the beginnings of exposure of a deep cavitation at

the previous third molar extraction site. Once the oral surgeon began cleaning out the cavitation it became apparent how extensive the necrosis was (Fig. 11.8D).

Non-surgical treatment of less serious cavitation lesions is an area with less documentation, less consistent results and many differing avenues of treatment (Hodgson & Hansen 2000, Tuner & Hode 1999). Some success has been achieved with treatment protocols that involve infrared pads, low-level lasers and nutritional guidelines (including enzyme therapy). The internet is a good resource for identifying alternatives in this area.

Cranial effects of cavitations

In the author's clinical experience, cavitation lesions cause reduction in the amplitude of cerebrospinal fluid fluctuation and in the overall vitality of the individual. Elimination of the cavitations should theoretically have a positive effect on neuromuscular balance and on the effectiveness of cranial therapy.

Cranial implications of intraoral metals

Evidence suggests that the presence of mercury (silver amalgam) fillings and other metals in the mouth interferes with the proper function of the nervous system (Carpi 1998, EPA 1997). Additional electromagnetic fields, produced by the presence of different metals, may lead to irritation of the nervous system. Both these factors are reported to inhibit the effectiveness of cranial therapy (Huggins & Levy 1999, Walker 2000).

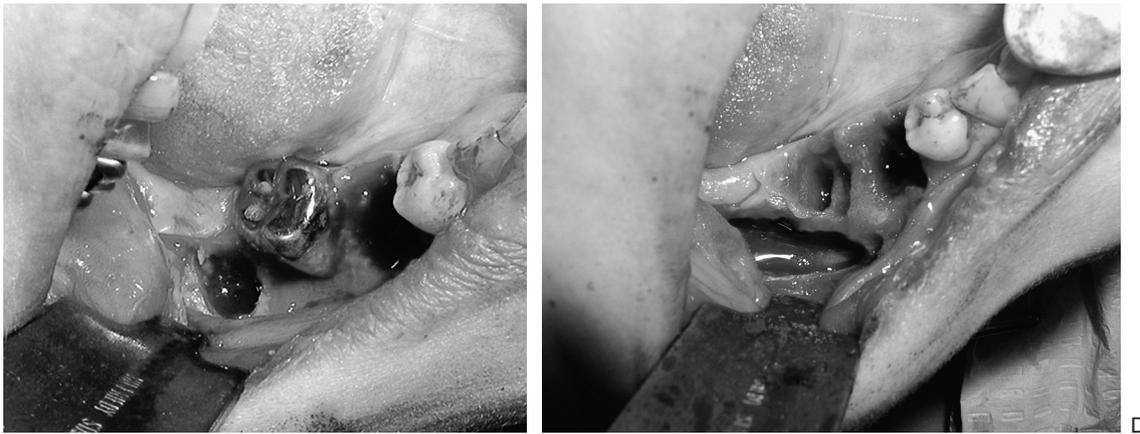


Figure 11.8 C shows a first molar extraction and the beginnings of exposure of a deep cavitation at the previous third molar extraction site. Once the oral surgeon began cleaning out the cavitation it became apparent how extensive the necrosis was (D).

Summary

Mercury is a powerful neurotoxin (EPA 1997, Simon 2001, WHO 1991).

- Mercury vapor constantly leaks from amalgam fillings, even after having been in the mouth for 20 years (Leistevuo 2001, Sellars & Sellars 1996, Zeines 2000).
- Research shows that there are three definitive genome types which determine how the body will handle the assimilation of mercury. This may explain why some people react strongly to small amounts of mercury (Cutler 1999, Ziff & Ziff 2001).
- Two or more dissimilar metals, in contact, cause a current, for example in the mouth of the patient featured in Figure 11.9A–C.
- In the mouth, restorations of differing metals (or even silver amalgam fillings done at different times) such as non-precious metal crowns, gold, stainless steel, etc., combined with saliva (an electrolyte), creates electrical currents that are far greater than those involved in normal neurological activity (Cutler 1999, Stortebecker 1985, Vimy 1999, Walker 2000, Ziff & Ziff 2001). These currents can negatively affect neurological function (Marino & Ray 1986, Neutra 2001, Thomas et al 1987).

Clinical example

The patient featured in Figure 11.9A was experiencing severe memory loss. The author's electrical tests showed very high readings between teeth, crowns, fillings and root areas. Figures 11.9B and 9C view the various metals present which, with the saliva acting as an electrolyte, were creating a flow of electrons similar to a battery (Becker & Selden 1985, Raue 1980, Stortebecker 1985). Improvement of her mnemonic abilities followed shortly after removal of the amalgam fillings and metallic crowns.

INAPPROPRIATE ORAL SURGICAL PROCEDURES

Alteration of the jaw form, structure and position without proper consideration given to the cranial mechanism can cause harmful long-term effects.

Bicuspid extraction

It is not uncommon for a dentist or orthodontist to diagnose a patient as having a tooth/jaw discrepancy (generally meaning that the jaw is not sufficiently large to accommodate the teeth that are present or erupting) (Simon 2001). Some

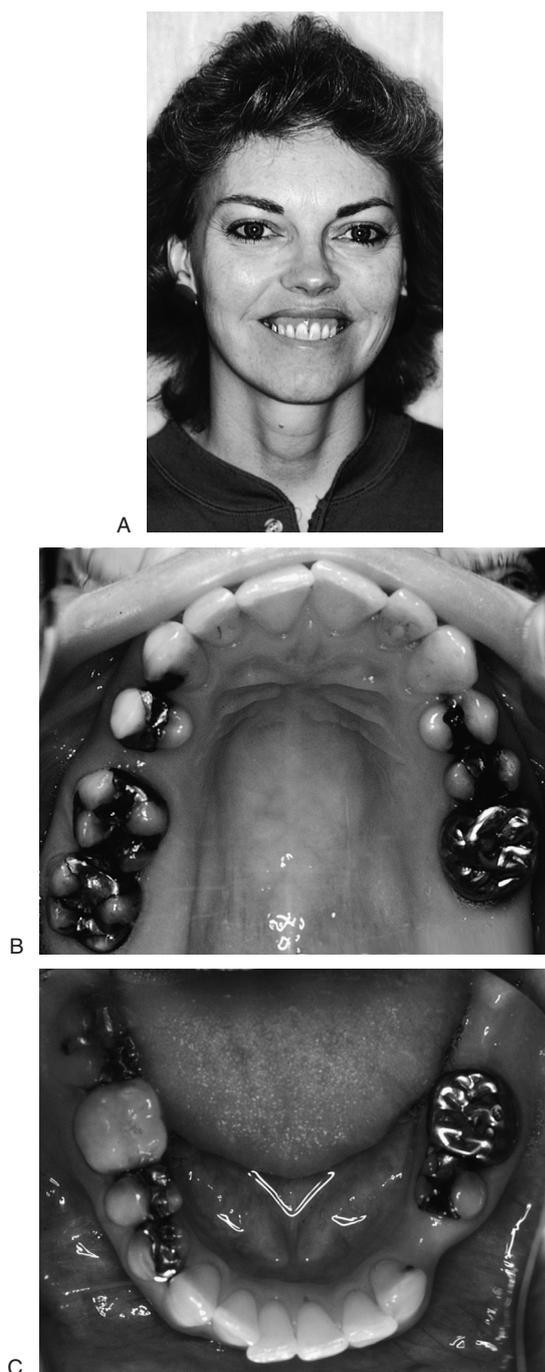


Figure 11.9 A–C Patient who experienced severe memory loss. The author's electrical tests showed very high readings between teeth, crowns, fillings and root areas. Figures 11.9B and 11.9C show the various metals present which, with the saliva acting as an electrolyte, were creating a flow of electrons similar to a battery.

orthodontic philosophies believe that jaws stop growing at a certain age, usually 11–15 years old, and after that age the only way to make room for the teeth, and to 'straighten' them, is to remove other teeth (Mahoney et al 2003, Mew 1999, Zeines 2000). In such cases referral may be made to an oral surgeon for bicuspid teeth to be removed.

Such removal leads to elimination of the normal forces on the jaw to continue its natural growth (Enlow 1975). This process often leads to the creation of more space than is actually necessary to 'straighten' the patient's teeth. Tight muscles and fascia whose forces may originally have contributed to the underdevelopment of the jaw continue to exert their force (Enlow 1975).

With no opposition, these forces may, through their constant constrictive action, force the arch to shrink to a size more appropriate for the remaining teeth (see Fig. 11.10A) (Gelb 1994, Mahoney et al 2003, Mew 1999).

This pressure is commonly increased with the orthodontic practitioner's use of braces and headgear, resulting in a posterior movement of the lower half of the face (see Fig. 11.10B) (Mew 1986, Page 2003, Spahl & Witzig 1991).

This posterior movement or 'distilization' of the maxilla (and as a result, the mandible as well) creates compression of various structures (nerves, vessels, dura, muscles, bones and fascia) between the upper front teeth and the occiput (Baker 1971, Jecmen 1998). It has been suggested that the effects of this procedure can lead to:

- depression (Hockel 1983)
- snoring (Katsev 2003)
- sleep apnea (Frymann 1998, Katsev 2003)
- vision problems (Page 2003)
- hearing difficulties (Gelb 1977)
- vocal cord nodules (Solberg & Clark 1980)
- swallowing problems (Jecmen 1995)
- TMJ dysfunction (Jecmen 1998)
- mid and low back pain (Page 2003)
- headaches (Solberg & Clark 1980)
- reduced self-esteem (Frymann 1998)
- birth/conception difficulties (Ziff & Ziff 1987)
- endocrine/growth disturbances.

The patient in Figure 11.10 is a good example of the conditions described in this section. Many of the symptoms listed here are issues she has faced.

Figure 11.10A shows the retarded growth of the upper and lower jaws, which has basically made the lower half to one-third of the face set back 8–10 mm. Functionally this has also resulted in an airway problem; esthetically the patient appears very nearly chinless.

Figure 11.10B shows a picture of two upper ALF appliances. The small one is that of the patient in Figure 11.10A, the large one belongs to her 8-year-old son. In both appliances, the 'cribs' (circles of metal that fit over the same teeth – first permanent molars in both mother and son) show an astonishing size difference. Consider the pressures that having the maxilla and mandible placed in such a posterior position must bring to bear on the rest of the cranial mechanism (Jecmen 1998). It also follows that the more teeth that are removed, the less support the TMJ receives, as vertical support is reduced.

Muscular imbalance

Loss of tooth mass produces neuromuscular imbalance (Page 2003, Smith 1986). Normal muscle length will now be inappropriate since the vertical distance from the upper skull (and jaw joint) to the lower jaw will have been reduced by the loss of teeth. The muscles and fascia anterior to the upper cervical spine would be altered, with potential changes in the neck curvature and occipital position. Vagal nerve compression and distress to the areas innervated by the vagus nerve can result (Gelb 1994).

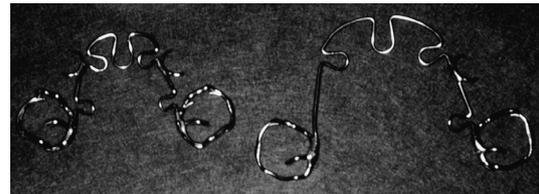
Compressive effects

Some oral surgical procedures such as maxillary resection and bicuspid extraction can have compressive effects on the maxillary sinuses as well. As mentioned previously, tooth extraction often has the negative effect of reducing jaw growth. The resultant smaller skull size manifests in compressed vertical face height (Frymann 1998, Mahoney et al 2003, Mew 1999, Upledger 1987) which, when combined with scar tissue formation, creates compromised sinus size and function (Burr Saxton 1972, Voll 1978).

Though there is no research that the author is aware of substantiating reduced nasal function as a direct result of bicuspid extraction, it has been



A



B

Figure 11.10 A This shows the retarded upper and lower jaws, which have in effect made the lower half to one-third of the face set back 8–10 mm. Functionally this has also resulted in an airway problem and esthetically the patient appears very nearly chinless. B Two upper ALF appliances. The small one is that of the patient in Figure 11.10A, the large one belongs to her 8-year-old son. In both appliances the 'cribs' (circles of metal that fit over the teeth – lower part of the appliance) fit onto the first molars. The size difference is astonishing. Consider the pressures that having the maxilla and mandible placed in such a posterior position must bring to bear on the rest of the cranial mechanism (Jecmen 1998). It also follows that the more teeth that are removed, the less support the TMJ receives, as vertical support is reduced.

noted in clinical practice that one frequently accompanies the other. Possibly the reduced nasal capacity precedes the bicuspid extraction and contributes to the condition that eventually is diagnosed as requiring extractions. On the other hand, it could be the extractions that result in, or contribute to, the reduced nasal function (Hockel 1983, Page 2003).

There are some instances where removal of teeth is indicated; however, appropriate FJO and cranial treatment can reduce subsequent dysfunction to a minimum.

Dental Surgery

There are a variety of situations in which surgery may be appropriately or inappropriately suggested. For example, where there is upper to lower jaw size discrepancy, incorrect positioning of jaw or jaws, improper face form, clicking of the TMJ, acute trauma, severe joint degeneration, chronic infection or reconstruction following cancer or repair of congenital anomalies (Morgan et al 1982, Neville et al 2002, Solberg & Clark 1980).

Some of these conditions may be better served by a more conservative, non-surgical technique. Each case should be evaluated individually.

The specific surgical procedure proposed by the oral surgeon depends on the diagnosis and philosophy of the surgeon. When cranial/jaw surgery takes place, the new muscle orientation is resisted by those muscles which seek to return to their previous state. This reorientation places stress on the neuromuscular system and on the cranial mechanism. A relapse rate of 40–70% has been reported in the literature (Morgan et al 1982).

Oral surgery is seldom accompanied by follow-up treatment to help adjust the cranial mechanism (Smith 1986). Appropriate or inappropriate as the surgery may be, to not relieve the stresses created by such surgery on the neuromuscular system may cause undiagnosed effects to the structure and function of the cranium and its sutures.

Jaw surgery, though sometimes indicated, can also affect the somatognathic system by creating neuromuscular disturbances, often without improving the underlying cause of the dysfunction, which may very well have been neuromuscular or craniosacral in origin. An example of this situation can be seen in Figure 11.11 (Huggins & Levy 1999). It is imperative that cranial and other neuromuscular therapy accompanies surgery of the jaw (Frymann 1998).

Figure 11.11 shows a panoramic X-ray of a surgical procedure to close an anterior open bite secondary to TMJ treatment. Note the metallic parts relative to surgical realignment. The patient in this case experienced no relief from TMJ symptoms after the surgical procedure. In fact, her overall level of health declined considerably following the procedure. Her symptoms included: severe lymphatic congestion; suicidal thoughts with need for psychiatric care and antidepressants; reduced cognitive and speech abilities; partial loss of

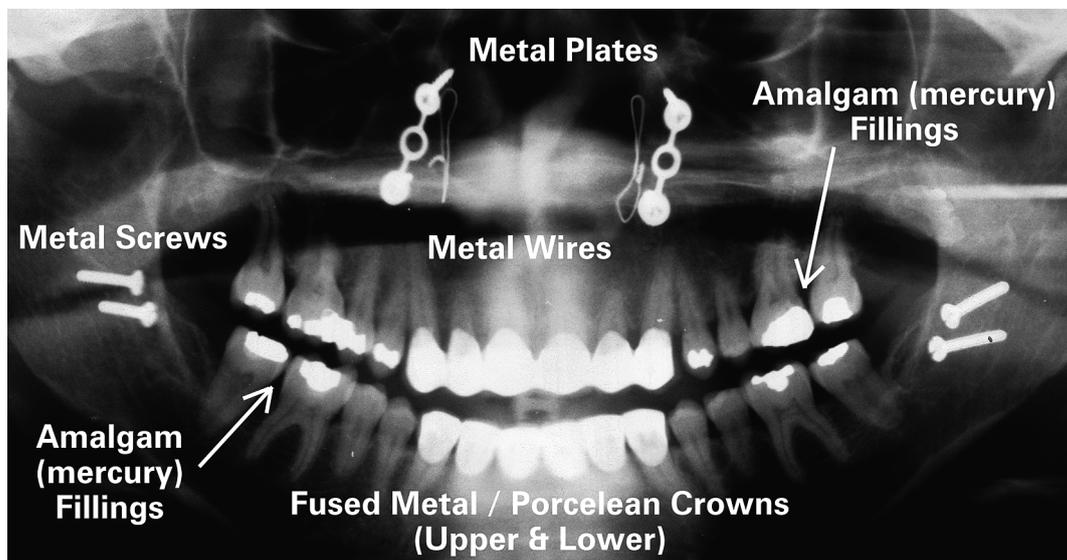


Figure 11.11 Jaw surgery can also affect the somatognathic system by creating neuromuscular disturbances, often without improving the underlying cause of the dysfunction, which may well have been neuromuscular or craniosacral in origin.

memory; and inability to smile. All symptoms and general condition improved following appropriate dental rehabilitation. Within 3 weeks this patient was off all antidepressant medication with the approval and recommendation of her psychiatrist.

Braces, bridges, dentures and other dental therapies

These can all have negative side-effects on cranial function when constrictive treatment modalities cross (fix) sutures in the maxillae or mandible. Though the number of functional sutures in the jaw bones is debated, the existence of four is generally acknowledged.

The three sutures found in the maxilla are the maxillary/midsagittal suture (the midline suture found between the two front teeth) and two premaxillary sutures (just medial to the cuspids – eye teeth).

In the mandibular area, the most widely recognized suture is the symphysis menti (also located between the two front teeth at the midline) (Gehin 1985, Magoun 1976, Simon 2001).

Though fixation, eliminating the freedom of movement, at any of these sites can have negative effects, it is most vital that the maxillary/midsagittal suture retains freedom of motion. Fixation of this suture can lock the front of the head and reduce overall cranial motion. In some patients this may not noticeably impact on the individual's daily life but in others the effects can be serious (Smith 2000a, Laughlin 2002a, b).

If cranial motion is reduced by mechanical means, the cranial therapist may be unable to influence the resulting symptoms. Release of the fixation will, in nearly every case, instantly improve cranial function and provide the patient with instant relief of seemingly unrelated symptoms (Laughlin 2002a, b).

Bridges, braces, dentures, some appliances (e.g. rapid palatal expander) and other therapies (e.g. headgear) can all have this 'fixating' effect to some extent. While all of these therapies are esthetically and functionally important, their use in some cases can be harmful (Frymann 1998, Huggins & Levy 1999).

In the author's clinical experience the most disturbing of all these therapies is the placement

of a bridge that crosses the midline maxillary suture. Some of the symptoms that this can contribute to are:

- depression (sometimes clinically)
- headaches
- feelings of claustrophobia
- irritability
- impaired reaction time
- sternocleidomastoid dysfunction
- sinusitis.

Inappropriate suture constriction caused by fixed bridges

Fixed bridges are prosthetic devices which are bonded onto two teeth in order to replace one or more teeth in between. Teeth are normally independent units, not bonded or fused together (see Fig. 11.12A,B). When a bridge is constructed and cemented in place it essentially fuses or locks a span of teeth together. This is especially restrictive when done in the front part of the mouth (crossing the midline) and inhibiting the action between the right and left maxillae.

In cases where the bridge has already been cemented and is found to be restrictive, the author's clinical experience has shown that cutting the bridge between the two front teeth provides immediate relief to the patient in the majority of cases.

In Figures 11.12A and B we see the crowns all splinted solidly together in one unit in both the maxillary anterior and the mandibular anterior, similar to what would be seen in a bridge.

Figure 11.12B also shows where the cuts in the splinted crowns were planned. These planned cuts correspond to the maxillary/midsagittal suture and two premaxillary sutures (it does not show where the cut was made for the mandibular/symphysis menti).

Figure 11.12C shows an exterior view of the splinted crowns after the three cuts were made at the locations of the sutures. A thin diamond disk was utilized to sever these sections. The patient noticed immediate relief of cranial tension and smiled more easily. She also soon experienced a 50–70% reduction in the swelling of her hands and feet. She was referred because she had been on medical leave from her forklift job, due to an

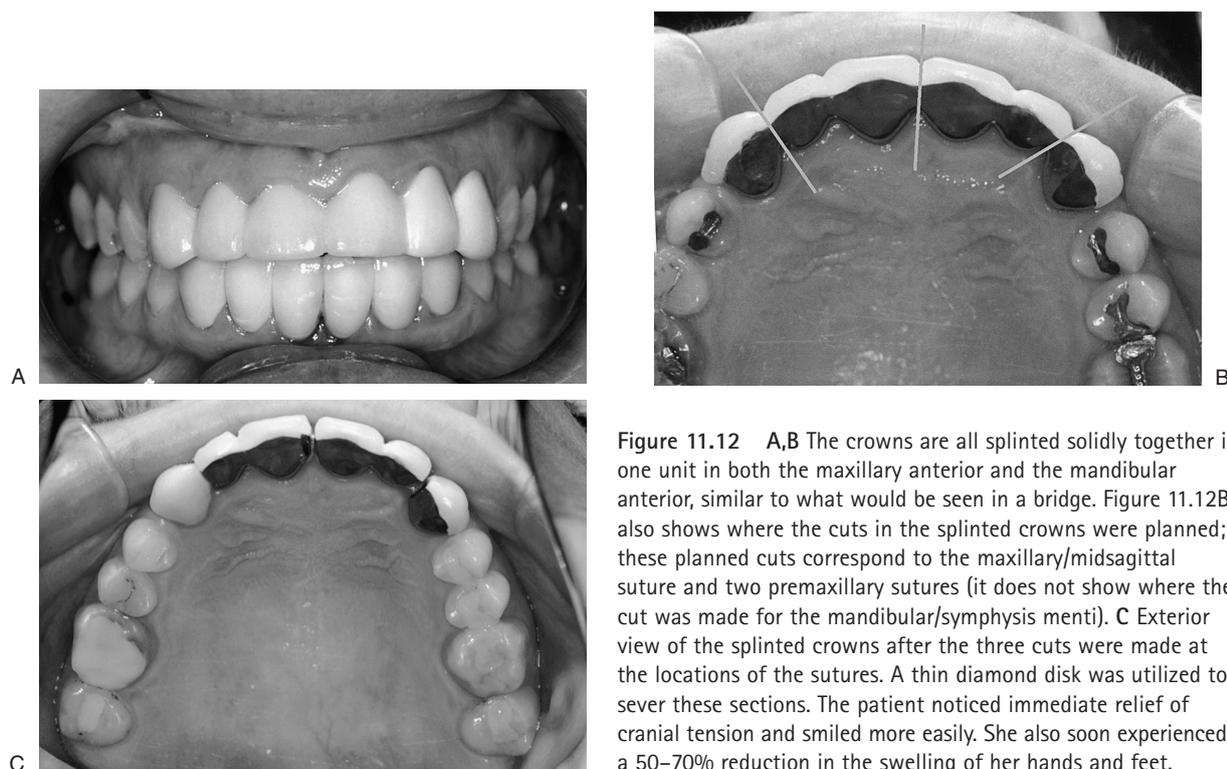


Figure 11.12 A,B The crowns are all splinted solidly together in one unit in both the maxillary anterior and the mandibular anterior, similar to what would be seen in a bridge. Figure 11.12B also shows where the cuts in the splinted crowns were planned; these planned cuts correspond to the maxillary/midsagittal suture and two premaxillary sutures (it does not show where the cut was made for the mandibular/symphysis menti). C Exterior view of the splinted crowns after the three cuts were made at the locations of the sutures. A thin diamond disk was utilized to sever these sections. The patient noticed immediate relief of cranial tension and smiled more easily. She also soon experienced a 50–70% reduction in the swelling of her hands and feet.

inability to close her hands due to the extreme swelling.

It is important to note that cutting the bridge in the mouth is like severing a bridge that crosses a river. When cut, the structural integrity of that bridge is compromised. Because of the probable benefits to the health of compromised patients, the author, in his clinical experience, will provide an option that the bridge be cut even though it could compromise the stability of the prosthesis.

Future options for the patient include the following.

- Replace the missing tooth with a removable non-metallic partial.
- Leave the 'cut' bridge in place (recementing if it dislodges).
- Insert a new (ideally non-metallic) bridge with a 'stress break' that allows sutural movement. A special attachment (called a CMA) has been developed that can be incorporated by the dental lab into the fixed bridge construction,

allowing the sagittal suture of the maxilla to retain its freedom of motion (Smith 1986, 2000a). This is one alternative that may solve the problem of cranial restriction for the patient.

Sutural restriction caused by fixed orthodontic braces

Fixed orthodontic braces can also restrict critical sutural motion by essentially creating a complete fixation of all upper and/or lower teeth (Frymann 1998, Magoun 1976, SOTO 2001). In some patients this will not impact their daily lives but in others, the effects can be debilitating. Young adults who are faced with this problem will commonly have trouble putting words to their difficulties. For this reason it is important to evaluate the overall well-being of the patient when use of this therapy is incorporated into a treatment plan.

The greater the arch-wire thickness used for braces, the greater the restriction of motion. Because braces are sometimes necessary, if the

patient is experiencing difficulty with their use, one option would be to ask the orthodontist to consider the cranial sutures in his/her treatment and to possibly reduce the period of time braces are used. Because of differences in training and philosophy, many orthodontic practitioners may be unconvinced regarding this concern. Using the ALF appliance before and during use of braces can also help to reduce the time braces are necessary and reduce the cranial restrictions.

Restricted motion of the maxilla, temporals and sphenoid can also occur with overly tight partials or dentures (Upledger 1987). Splint therapy using a rigid upper appliance (e.g. rapid palatal expander) can have similar negative effects due to its restrictive nature. In cases where these therapies could be the cause of health-compromising symptoms, it is suggested that the offending prosthetic devices be replaced with ones more conducive to sutural movement.

THE POTENTIAL BENEFICIAL INFLUENCES OF CRANIAL THERAPY

The information contained in this section is based on years of clinical practice in the field of whole-person dentistry. The author and his peers in the fields of functional orthopedics/orthodontics, biological dentistry and holistic dentistry have shared clinical experience with one another and come to the conclusions represented in this chapter. Distinct advantages can be gained when incorporating cranial techniques, such as the occipital, pterygoid and SBS release, into therapeutic dental programs.

Practically speaking, the author has accomplished orthodontic techniques with and without the benefit of cranial therapy.

The advantages of using (or referring) for cranial therapy may include improved:

- pain reduction following appliance adjustments
- amplitude and symmetry of cranial motion
- overall attitude of the patient and improved co-operation with the treatment.

Adult patients, following an orthodontic, TMJ or general dental appointment, commonly express gratitude after receipt of bilateral medial pterygoid,

SBS and suboccipital release (see below), which the author performs and believes to assist in rebalancing chronic TMJ/cranial issues and some acute (iatrogenic) dental trauma following their appointment.

OCCIPITAL RELEASE

Freedom of motion and relaxation of the suboccipital triangle appears to have broad-ranging effects. Throughout the author's 28-year career in whole-person dentistry, it has been frequently demonstrated that relaxation in this region greatly enhances the positive cranial changes which occur during the use of dental cranial orthopedics/TMJ therapy (Frymann 1998, SOTO 2001).

Clinical experience shows that the cranial release which occurs with treatment of the occiput, C1, C2 region facilitates the patient's recovery following dental appointments. Venous drainage is positively affected by this release (Frymann 1998). The author has had subjective responses from his patients reporting clearance of nasal and maxillary sinuses, ease of breathing and drainage into the throat with these procedures (Hammer 2003). It is theorized that all sinuses are positively affected, including the superior sagittal and straight sinuses. In the author's clinical practice, the person who experiences the stress of chronic TMJ/TMD, long dental appointments or dental orthopedic treatment can benefit greatly from these therapies (see Exercises 7.3 and 7.29, Ch. 7).

LATERAL AND MEDIAL PTERYGOID RELEASE

The author not only uses the internal pterygoid release following almost 90% of all dental procedures, but will often perform it before procedures are begun. The effects are marked. In this clinical setting two measurement criteria are used to determine the effectiveness of the therapy. The first is the maximum distance the mouth can open. Using this criterion, the release routinely demonstrates an average increase in jaw opening of 3–6 mm. The second criterion used to measure effectiveness is responsiveness to commands.

While in the dental chair it is common to see delays in the patient's ability to process information in the form of commands and their response to the command. Responses after the internal pterygoid release are faster and more accurate.

The lateral and medial pterygoid muscles are extremely important in TMJ and cranial dysfunction. The lateral pterygoid muscle is important in its relationship to the mandibular positioning as well as the temporal mandibular disk or meniscus positioning (Chaitow 1999, Chaitow & DeLany 2000, McCatty 1988).

The medial or internal pterygoid has its origin at the pterygoid process of the sphenoid bone and can directly affect not only the sphenoid but also the temporal, the occiput and the maxillae (Magoun 1976). The wide range of influences this muscle has on the patient's health and well-being requires it to be in a relaxed state when it is not in use. In clinical practice, the author has never found a patient with TMJ dysfunction that did not have problems with neuromuscular imbalance of either or both the pterygoid muscles. In the author's opinion it is essential that normal tone is restored to these muscles before any progress can be made in treating the orthopedic orthodontic, or TMJ, needs of patients (Laughlin 2002a, b). (See pp 282–283 for treatment methods for the pterygoids.)

In the author's opinion cranial therapists could benefit all dental patients if they were seen soon after dental treatment. This is especially true following a long operative (dental restorative) or surgical procedure(s), when the patient's musculature has been subjected to strain. Home therapy to release internal pterygoid tension prior to dental appointments is also possible.

SPHENOBASILAR SYNCHONDROSIS (SBS)

The author's clinical experience strongly supports the importance of 'balanced membranous tension' throughout the cranial structure. Marked clinical changes have been noted following techniques which are directed toward membranous/energetic/osseous mobility of the SBS. Enhanced responses to dental therapy and functional jaw orthopedics have frequently been observed following appropriate SBS treatment (Frymann 1998, Gelb 1977,

SOTO 2001). The author believes that compression of this region of the cranium may relate to dental fixation between the right and left maxillae (caused by bridges, braces, etc.). It is hypothesized that releasing those fixations changes the mobilization at the SBS (Jecmen 1998).

ADDRESSING CRANIAL ORTHOPEDICS EARLY IN LIFE

Early attention brought to dysfunctional tendencies can eliminate their development later (see Fig. 11.13) (Zeines 2000).

PREVENTATIVE TREATMENT SAVES PATIENTS PAIN AND SUFFERING

A variety of symptoms and problems can be avoided later in life with early treatment consideration, including the following.

TMJ dysfunction: what it is and how it may be avoided

Some of the symptoms associated with TMJ problems in adult life (i.e. late adolescent and through adulthood) include earache, clicking/pain of the jaw, headaches, unbalanced face form, tonsillitis, pain while chewing, sinusitis, tinnitus, crooked teeth and swallowing difficulty resulting in face, neck and/or lip contortions during swallowing (Gelb 1977). It is suggested that had the patient shown in Figure 11.13 continued to develop uncorrected, she would probably have exhibited many of these signs and symptoms (Page 1949, Simon 2001).

The development of such symptoms in adult/late adolescent life can be avoided if the tendency is diagnosed and treated early. Early treatment of such tendencies, such as arch widening, jaw repositioning (through orthopedic orthodontic appliances) and/or cranial therapy, can provide positive results. The most beneficial treatment may usefully involve a combination of neuromuscular, cranial and dental orthopedic therapies. In normal clinical practice, dental orthopedics will not usually be initiated prior to the age of 4–6 though

when future tendencies toward malformation are seen, 4–6 is an ideal age to begin treatment (Page 1949).

Improper growth (which can lead to considerable difficulties as an adult) is often responsive to orthopedic orthodontic techniques, especially if addressed early in life (Page 1949).

Although surgery may be unavoidable, in the author's opinion it should not be the first option considered as it may cause permanence of the skull/cranio/cervical malrelationship with the rest of the body. Scar tissue is a secondary adverse effect of surgery that may cause disruption of the functioning of the neuromuscular system (Becker & Selden 1985).

Early treatment with functional jaw orthopedics as well as identifying and eliminating the causes of the abnormal growth is paramount to the prevention of the malformation (Fig. 11.13). It is significantly more advisable to develop the jaw size at 4 years of age rather than have baby teeth extracted. There are some instances when surgery is not only important but necessary but it should be the last, not the first option explored. Seeking the alternative becomes an uphill battle where insurance reimbursement is concerned (Carter 1993). This may be another reason why dental practitioners are slow to make the shift to incorporating alternative therapies into their practices.

The five images in Figure 11.13 tell a complete story of dysfunctions corrected by FJO. No braces (fixed orthodontics) were used in this case.

Growth disturbances had been developing since birth in this case. The author began treatment very soon after the patient's first visit at the age of 7. A combination of direct bite build-ups (using composite resin, non-metallic filling material to build up the vertical of her teeth) and ALF appliances with elastics was used to produce these results by the time she was 8 years old.

Cranial therapy was used to great benefit and, in the author's opinion, enabled the results to be obtained in a shorter period of time. This patient is a prime example of a child whose situation,

speaking from clinical experience, would have probably led to TMJ problems as well as many other symptoms without the treatment as described.

Posture and airway obstruction

What follows is a scenario that has been seen regularly in the author's clinical experience.

- Poor posture contributes to forward head positioning during eating, sitting, studying, working or sleeping.
- This in turn leads to airway obstruction which causes mouth breathing and resultant low tongue posture.
- If the tongue is in a 'low posture' position, it is not properly positioned up against the roof of the mouth, unable to stimulate forward and lateral growth of the maxillae.
- This lack of stimulation inevitably leads to insufficient growth and development.
- The resultant poor growth and development of the jaws will result in crowding of the teeth.
- At this point, very often the parents will be advised to remedy the situation with four bicuspid extractions and fixed orthodontics.
- This only exacerbates the underlying problems and in the end can lead to body-wide hormonal changes and neuromusculoskeletal problems (Jecmen 1998).

Treatment from a dental orthopedic viewpoint involves proper maxillary, nasal, sinus and airway development. Such cranial development assists proper tongue and head position which then translates into correct head, neck, jaw and thorax relationship (Gelb 1977). When these regions are in balance and nasal breathing is habitual, then the tongue is in correct location in the mouth (up with the tip behind the front teeth) to provide positive encouragement toward stimulation and then stabilization of the arch form (Gelb 1994). This broad maxillary form then provides a sound base for the lower jaw to function within a healthy downward and forward direction (Mew 1986). The TMJ complex appreciates this posture and mandibular position – less compression, improved circulation and less crowding of the cranial system (Gelb 1994).

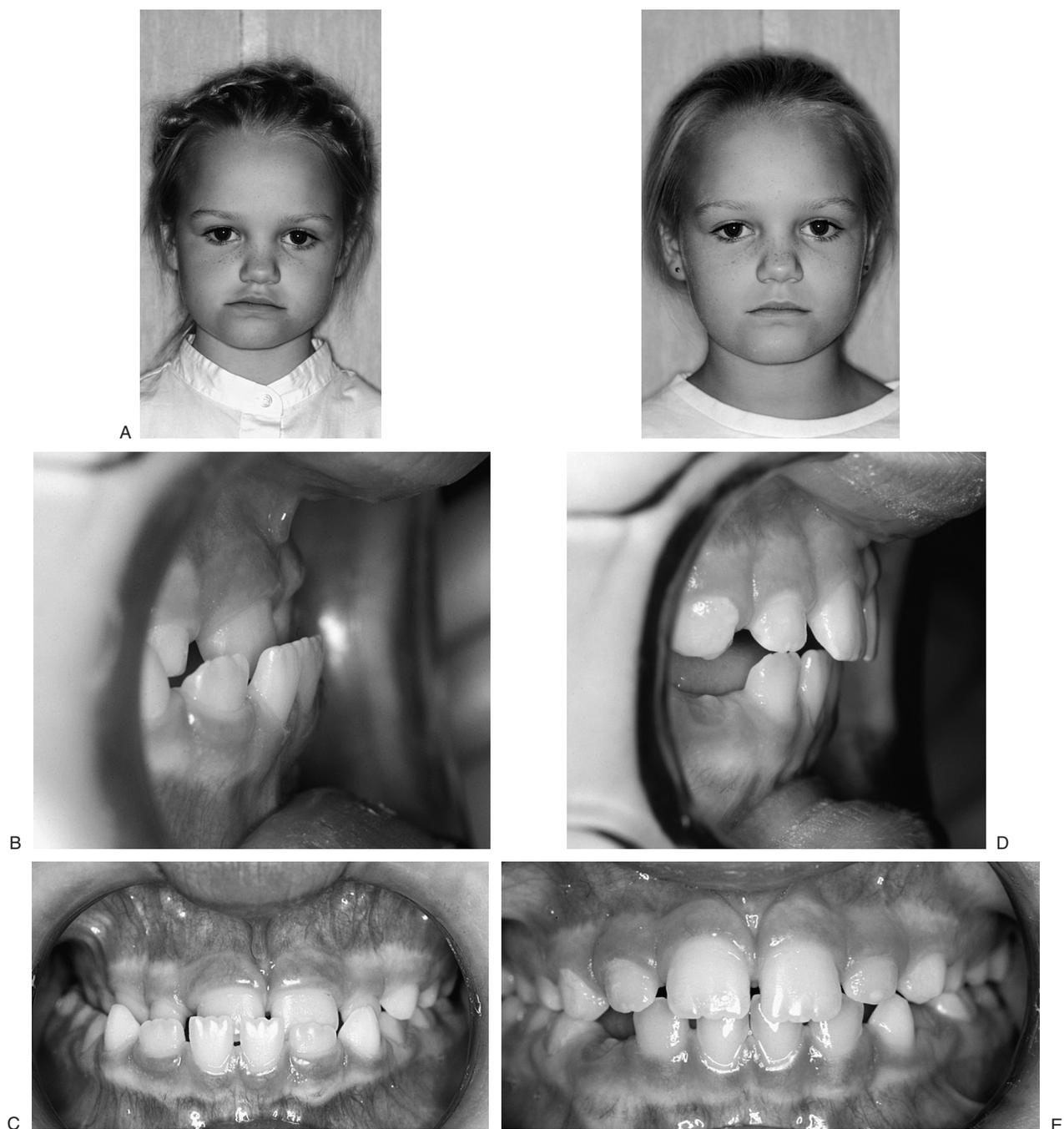


Figure 11.13A–E These images tell a complete story of dysfunctions corrected by functional jaw orthopedics. No braces (fixed orthodontics) were used in this case. Growth disturbances had been developing since birth in this case. The author began treatment very soon after the patient's first visit at the age of 7. A combination of direct bite build-ups (using composite resin, non-metallic filling material to build up the vertical of her teeth) and ALF appliances with elastics was used to produce these results by the time she was 8 years old. Cranial therapy was used to great benefit and in the author's opinion enabled the results to be obtained in a shorter period of time.

CORRECTING CRANIAL DYSFUNCTION DENTALLY

There are numerous classifications of cranial lesions which relate to the reciprocal tension membranes, motion of the cranial bones, flow of the CSF and lymph, as well as energetic blockages (Frymann 1998, Gelb 1977, Jecmen 1998).

Symptoms which are caused by cranial lesions may include headaches, ear problems (vertigo, tinnitus, otitis media), nasal congestion, sinusitis, maxillary and mandibular growth disturbance, endocrine disturbance, eye problems, swallowing problems and neck problems (Feeley 1988, Frymann 1998, Phillips 2001, Stockton 1999).

Methods of intervention using dental orthopedic techniques include: improved upper and lower jaw development; proper positioning of the maxillae and mandible relative to the sphenoid, occipital and other cranial bones as well as to each other (Jecmen 1998); establishment of proper reciprocal membrane tension within the TMJ/cranial complex (Jecmen 1998). In the author's opinion, these objectives are best accomplished through the combined therapy of functional jaw orthopedics and cranial therapy.

Example: ear problems

Correct TMJ support and correct length of the lateral pterygoid and temporal muscles are critical to free functioning and normal drainage of the Eustachian tube (Gelb 1977, Morgan et al 1982, Simon 2001).

Children may present with a variety of signs and symptoms which alert to potential ear-related problems. These include: runny nose; frequent colds; head congestion (indicative of thickened fluids and probably allergies); mouth breathing; dry lips; mandible shifting to one side, too far forward or too far backward; or a strong habit of thumb, finger or pacifier sucking. Once these issues have been identified a multidisciplinary analysis can determine the possible consequences and an ideal treatment plan (Morgan et al 1982).

Fonder (1977, 1990) accomplished some of the research in the 1960s and 1970s regarding ear problems and vertical support. He would build

up the back teeth with filling material to relieve otitis media and hearing loss. The author has found that releasing the internal pterygoid and improving vertical support are two of the most important techniques to employ. Figures 11.14A and B display a mouth-breathing patient with a developing cranial, cervical scoliosis. When treatment began she presented with extremely underdeveloped maxillary and mandibular arches. The resultant treatment brought about marked changes in posture, jaw form and jaw position (Figs 11.14C,D). Note the profile change and the ease with which the lips are able to close (facilitation of nasal breathing). Whereas before, the patient often experienced earaches and other ear problems, after the completion of treatment these problems were greatly diminished or eliminated.

EARLY OBSERVATION AND CROSS-REFERRAL

Early childhood observation and treatment, when appropriate, can eliminate or alleviate long-term symptoms and problems (Page 2003). Parental and professional attention to the criteria outlined below is critical to a timely identification and proper treatment, in order to avoid the possible development of malformations and their associated dysfunctions (Gelb 1994, Mahoney et al 2003, Mew 1999).

A list of what is required from a cranial therapist, in terms of observation, is provided below, with the suggestion that when problems are identified it may be time to consult a cranially educated dentist for further diagnosis.

Prenatal history

- Evaluate the nutrition and health of the parents. A healthy sperm and egg are the first steps toward a healthy fetus (Price 1945).
- Neuromuscular balance for the mother will help to lead to a normally functioning pelvis and birth canal (Phillips 2001).
- Magnesium consumption should ideally increase for pregnant and nursing mothers (Huggins 1981, Pierce 1994).

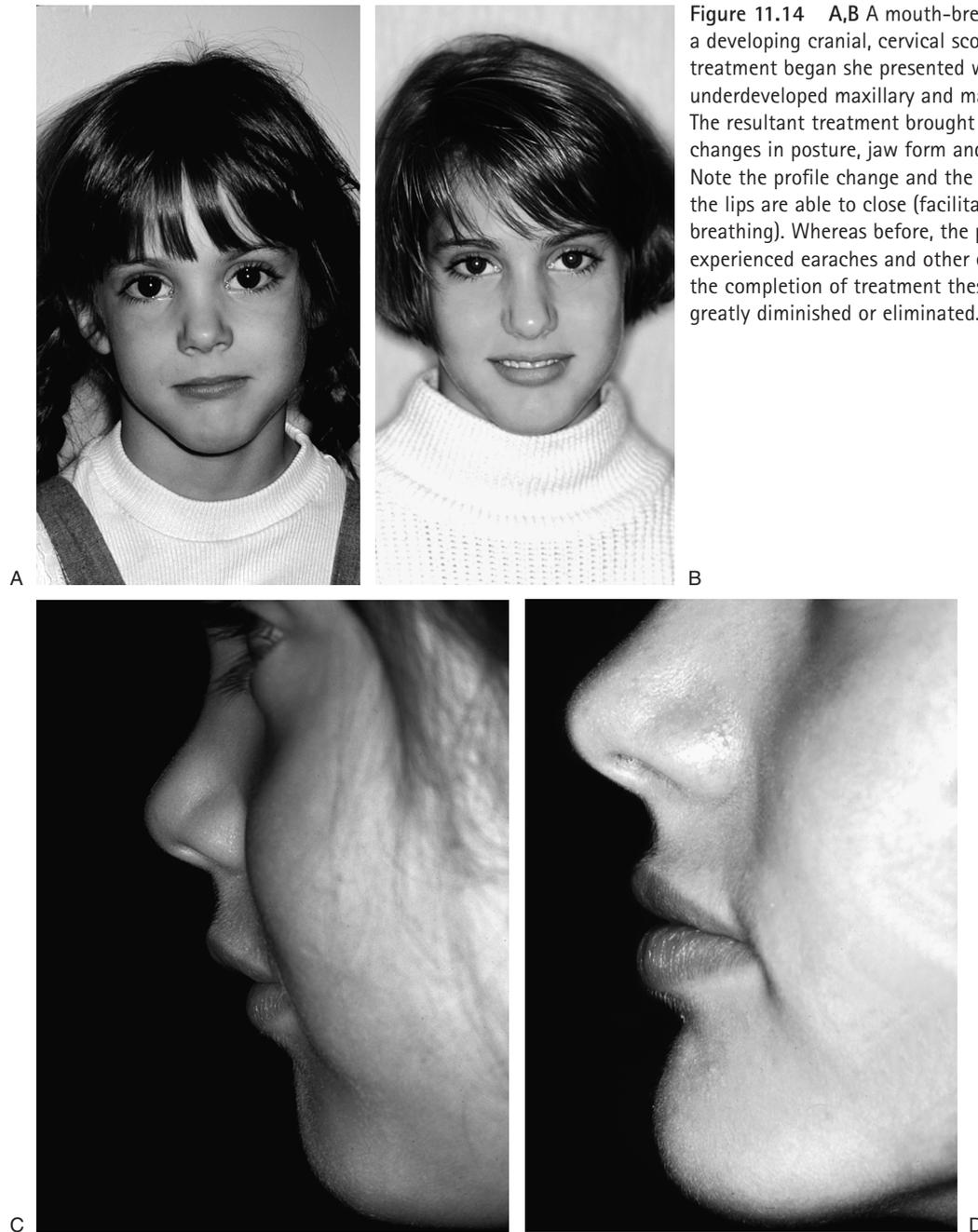


Figure 11.14 A,B A mouth-breathing patient with a developing cranial, cervical scoliosis. When treatment began she presented with extremely underdeveloped maxillary and mandibular arches. The resultant treatment brought about marked changes in posture, jaw form and jaw position C,D. Note the profile change and the ease with which the lips are able to close (facilitation of nasal breathing). Whereas before, the patient often experienced earaches and other ear problems, after the completion of treatment these problems were greatly diminished or eliminated.

Birth

- Birthing posture. Encourage ideal birth posture for the mother, avoiding being supine with stirrups, unless surgery is necessary (Northrup 1998, Phillips 2001).
- Note specifics of birth: ease, trauma (mechanical assists such as suction or forceps), length of labor, force of delivery, surgery, Apgar score (reflection of trauma) (Arbuckle 1954, Frymann 1976, 1998).

- Skull shape and form at birth (often reflective of trauma) if undiagnosed, unnoticed and untreated can have developmental repercussions in the future. These repercussions can affect the esthetic and functional presentation of the mouth (Arbuckle 1948, Frymann 1976).
- For example, consider a forceps extraction delivery of the newborn. The temporal bones, as well as the maxillae, can be driven into an internal rotation. Left untreated, this would probably lead to mouth breathing, a high palate and a recessive mandible. Early cranial treatment can reduce or eliminate the future manifestation of these conditions (Arbuckle 1948, Frymann 1976, Phillips 2001).

Age 0–4

Observe (Page 2003):

- mouth versus nasal breathing
- inability to latch on/nurse easily
- irritability and pain from gas (colic)
- inability or uneasy yawning
- earaches
- swallowing difficulty
- chewing problems.

Tongue freedom There may be a need for a frenectomy for a newborn or as soon as the restricted tongue movement is diagnosed. The ‘tongue tied’ condition is best addressed soon after birth but in any case, the sooner the better. If the tongue is ‘tied’ or ‘tethered’ too tightly to the floor of the mouth, low tongue posture will ensue (Gelb 1977). Low tongue posture inhibits maxillary growth both laterally and anteriorly, which reduces maxillary and cranial sinus size. This can also limit development of the nasal airway and pharyngeal airway which can sequentially lead to mouth breathing; more low tongue posture; excessive lower jaw growth; TMJ compression; and TMJ dysfunction (Hockel 1983). The use of the tongue then goes between the back teeth to act as a cushion (splint) to help take pressure off the TMJ and assist neuromuscular balance to the jaws, as well as the rest of the cranial mechanism (Hockel 1983).

This illustrates a cycle that has begun and will continue until corrective measures are taken (Gelb

1977). A simple frenectomy procedure can correct the ‘tongue tied’ condition and reduce future difficulties (Gelb 1994). This is best accomplished by a laser technique which reduces scar tissue formation and is nearly bloodless. The healing is further enhanced by the use of a low-level laser following the surgery (Tuner & Hode 1999). The author recommends 2×/day for 7–10 days for further healing and scar reduction.

Age 2–5

An examination by a cranially astute dentist trained in functional jaw orthopedics should be scheduled to evaluate posture, nasal breathing, arch form and jaw position (Gelb 1994).

Permanent teeth begin erupting between 5 and 6 years old so if the jaws are too small, the teeth will not have room to straighten. When small jaws are present it is not unusual to see one permanent tooth, in the lower front part of the mouth, displace two baby teeth as it forces its way into the jaw (Page 2003). The ideal arrangement in the 3–5 year old is to have 1–2 mm of space between all the front baby teeth because the permanent teeth are larger so they need more room than the baby teeth.

Age 5–12

Observing overall facial structure can provide a therapist with important clues as to historical growth patterns and possible undiagnosed dysfunctions (Zeines 2000).

- A ‘long’ face is one that seems too long and narrow, almost stretched out. This appearance may have been caused by allergies, mouth breathing, birth trauma, flaccid muscles of mastication, trauma or incorrect height of restorative treatments which have increased the vertical dimension by too great a degree (Enlow 1975, Gelb 1994, Mahoney et al 2003, Mew 1999).
- A ‘short’ face is noticed by an overall appearance of compressed facial features. This can be caused by clenching or grinding of the teeth secondary to trauma or emotional/psychological stress. Sacroiliac joint instability can also cause a TMJ clenching reflex to occur in an effort to stabilize the sacroiliac joint

(Enlow 1975, Feeley 1988, Frymann 1998, Gelb 1977).

IMPORTANCE OF MULTIDISCIPLINARY APPROACH

Multidisciplinary care can enhance the quality, efficiency, speed and effectiveness of cranial/TMJ/TMD treatment (Gelb 1971). Though more time and effort are required, the patient, therapist and doctor all benefit from the communication and joint treatment plans which result. In the words of Gelb (1977), a foremost author and proponent of these approaches, 'There is no place for intellectual isolationism in the holistic approach to the diagnosis and treatment of this clinical entity (TMJ dysfunction)'.

CONCLUSION

The strength of the cranial/dental connection cannot be overstressed. Without one or the other,

the best planned treatment can fail. It is this author's opinion that cranial therapy can have immediate positive effects on the general health and well-being of any individual. This especially includes those who are medically compromised. The author believes that cranial therapy is beneficial for all dental patients and should be included in most – if not all – dental regimens. That being said, he also believes that dentistry has a powerful effect (positive and negative) on the cranial mechanism and thus, can enhance or thwart the best efforts of the cranial therapist. The body needs to be viewed as an entire structure and the dental professional (dentist, orthodontist or oral surgeon) must be encouraged to understand and consider this interrelatedness. Only in that way can he or she truly appreciate the long-term impact their choice of treatment will have on their patient's overall health and welfare. It is this author's hope that through increased education and awareness, the health professions will make a concerted effort to utilize the information in this book.

REFERENCES

- Arbuckle B 1948 Early cranial considerations. *Journal of the American Dental Association* 52: 415–422
- Arbuckle B 1954 Effects of uterine forceps upon the fetus. *Journal of the American Dental Association* 53: 499–508
- Baker EG 1971 Alteration in width of maxillary arch and its relation to sutural movement of cranial bones. *Journal of the American Dental Association* 70: 559–564
- Becker RO, Selden G 1985 *The body electric: electromagnetism and the foundation of life.* William Morrow, New York
- Bowbeer G 2003 The seventh key to facial beauty and TMJ health – part 2: proper condylar position. The functional orthodontist (archive). American Association for Functional Orthopedics, Langhorne, PA
- Breiner M 1999 *Whole-body dentistry.* Quantum Health Press, Fairfield, CT
- Burr Saxton H 1972 *Blueprint for immortality. The electric patterns of life.* Neville Spearman, Essex, England
- Carlson J 2004 *Physiologic occlusion.* Accu-Liner Products, Woodinville, WA
- Carpi A 1998 *The toxicology of mercury.* City College, New York
- Carter J 1993 *Racketeering in medicine – the suppression of alternatives.* Hampton Roads Publishing, Norfolk, VA
- Cathie A 1952 Fascia of the head and neck as it applies to dental lesions. *Journal of the American Dental Association* 51: 260–261
- Celic R, Jerolimov V 2002 Association of horizontal and vertical overlap with prevalence of temporomandibular disorders. *Journal of Oral Rehabilitation* 29(6): 588–593
- Chaitow L 1999 *Cranial manipulation theory and practice: osseous and soft tissue approaches.* Churchill Livingstone, New York
- Chaitow L, Delany JW 2000 *Clinical application of neuromuscular techniques.* Churchill Livingstone, New York
- Char J 1980 *Holistic dentistry.* Nutri-kinetic Dynamics, Aiea, Hawaii
- Chia M, Chia M 1993 *Awaken healing light.* Healing Tao Books, Huntington, NY
- Cohen S, Burns R 2002 *Pathways of the pulp.* Mosby, St Louis, MO
- Cutler A 1999 *Amalgam illness diagnosis and treatment.* Andrew Hall Cutler, Sammamish, WA
- Diamond J 1979a *Behavioral kinesiology.* Harper and Row, New York
- Diamond J 1979b *Your body doesn't lie.* Warner Books, New York

- Enlow D 1975 Handbook of facial growth. WB Saunders, Philadelphia, PA
- Environmental Protection Agency (US) 1997 Mercury study report to Congress. Publication no. EPA/600/P-97/002Ab. EPA, Washington
- Feeley R 1988 Clinical cranial osteopathy – selected readings. Cranial Academy, Meridian, ID
- Fetzer J 1989 Energy fields in medicine. John Fetzer, Kalamazoo, MI
- Fischer M 1940 Death and dentistry. Charles C Thomas, Springfield, IL
- Fonder A 1977 The dental physician. University Publications, Blacksburg, VA
- Fonder A 1990 Dental distress syndrome. Medical Dental Arts, Rock Falls, IL
- Frymann V 1976 Trauma of birth. Osteopathic Annals 4(22): 8–14
- Frymann V 1998 The collected papers of Viola M. Frymann, DO. American Academy of Osteopathy, Indianapolis, IN
- Fushima K, Inui M, Sato S 1999 Dental asymmetry in temporomandibular disorders. Journal of Oral Rehabilitation
- Gehin A 1985 Atlas of manipulative techniques for the cranium and face. Eastland Press, Seattle, WA
- Gelb H 1971 Review correlating the medical-dental relationship in the cranio-mandibular syndrome. New York Journal of Dentistry 41(5): 163–175
- Gelb H 1977 Clinical management of head, neck and TMJ pain and dysfunction. WB Saunders, Philadelphia, PA
- Gelb H 1980 Killing pain without prescription. Harper and Row, New York
- Gelb H 1994 New concepts in craniomandibular and chronic pain management. Mosby-Wolfe, London, England
- Hammer W 2003 Periodical spine 1. ChiroWeb.com
- Herzberg MC, Weyer MW 1998 Dental plaque, platelets and cardiovascular diseases. Annals of Periodontology 3: 151–160
- Hockel J 1983 Orthopedic gnathology. Quintessence, Chicago, IL
- Hodgson E, Hansen R 2000 The key to ultimate health. Advanced Health Research Publishing, Fullerton, CA
- Hruby R 1985 Total body approach to the osteopathic management of temporomandibular joint dysfunction. Journal of the American Dental Association 85: 502–510
- Huggins H 1981 Why raise ugly kids? Arlington House, Westport, CT
- Huggins H, Levy T 1999 Uninformed consent: the hidden dangers in dental care. Hampton Roads Publishing, Charlottesville, VA
- JADA 2002 Periodontal disease and cardiovascular disease. Epidemiology and possible mechanisms. Journal of the American Dental Association 133 (suppl): 14S–22S
- Jecmen J 1995 Sidebending rotation. Cranio-View, Isle of Wight, England
- Jecmen J 1998 Interfacing osteopathy in the cranial field and craniofacial orthopedics and orthodontics. Cranial Letter, Indianapolis, IN
- Katsev R 2003 What is the K-flex and what will it do for the dental patient? Journal of the American Academy of Gnathologic Orthopedics 20(4): 18–19
- Laughlin J 2002a Bodywide influences of dental procedures part 1. Journal of Bodywork and Movement Therapies 6 (1): 9–17
- Laughlin J 2002b Bodywide influences of dental procedures part 2. Journal of Bodywork and Movement Therapies 6 (2):126–138
- Leistevuo J 2001 Dental amalgam fillings and the amount of organic mercury in human saliva. Caries Research 35(3): 163–166
- Lundberg J, Weitzberg E 1999 Nasal nitric oxide in man. Thorax 54: 947–952
- Magoun H 1976 Osteopathy in the cranial field. Journal Printing Co, Kirksville, MO
- Magoun H 1978 Practical osteopathic procedures. Journal Printing Co, Kirksville, MO
- Magoun H 1979 Dental search for a common denominator in craniosacral pain and dysfunction. Journal of the American Dental Association 78: 810
- Mahoney D, Mew J, Wexler G 2003 ‘Straight talk on 60 minutes.’ National Nine Network KGMB Channel 9. Sydney, Australia
- Marino A, Ray J 1986 The electric wilderness. San Francisco Press, San Francisco, CA
- Mattila K 1993 Dental infections as a risk factor for acute myocardial infarction. European Heart Journal 14 (suppl K): 51–53
- McCatty R 1988 Essentials of craniosacral osteopathy. Ashgrove Press, Bath, England
- Mew J 1986 Biobloc. Flo-Print, Langton Green, Kent, England
- Mew J 1999 ‘Dispatches’ programme. Channel 4. London, December
- Morgan D, House L, Hall W, Vamvas S 1982 Diseases of the temporomandibular apparatus: a multidisciplinary approach. Mosby, St Louis, MO
- Neutra R et al 2001 Review of health risks associated with exposure to powerline EMF at home or in the workplace. Report to the CPUC. California Department of Health Services EMF Program, Sacramento, CA
- Neville B, Damm D, Allen C, Bouquot J 2002 Oral and maxillofacial pathology. WB Saunders, New York
- Newman H 1996 Focal infection. Journal of Dental Research 75: 1912–1919
- Nord CE, Heimdahl A 1990 Cardiovascular infections: bacterial endocarditis of oral origin. Journal of Clinical Periodontology 17 (part 2): 494–496
- Nordstrom D 2003 Advanced Lightwire functional orthopedic appliance therapy and problem solving. Lecture, Hollister, CA
- Northrup C 1998 Women’s bodies, women’s wisdom. Bantam Books, New York
- Page D 2003 Your jaws, your life. SmilePage Publishing, Baltimore, MD
- Page M 1949 Degeneration regeneration. Modern Printing of St Petersburg, St Petersburg Beach, FL
- Phillips D 2001 Hands of love: seven steps to the miracle of birth. New Dawn Publishing, St Paul, MN

- Pierce J 1994 Heart healthy magnesium. Avery, Garden City Park, NY
- Price P 1945 Nutrition and physical degeneration. Price Pottenger Nutrition Foundation, Santa Monica, CA
- Raue H 1980 Resistance to therapy: think of tooth fillings. Medical Practice, Natural Healing House, Chula Vista, CA
- Rubin J 2003 Patient heal thyself. Freedom Press, Topanga, CA
- Sacro Occipital Technique Organization (SOTO) 2001 Compendium of sacro occipital technique. Eastland Press, Seattle, WA
- Sellars WA, Sellars R 1996 Methyl mercury in dental fillings in the human mouth. *Journal of Nutritional and Environmental Medicine* 6(1): 33–37
- Shankland II W, Boyd J, Starlanyl D 2001 Face the pain: the challenge of facial pain. AOmega Publishing, Columbus, OH
- Simon J 2001 Stop headaches now. Wellness Institute, Gretna, LA
- Smith G 1986 Headaches aren't forever. International Center for Nutritional Research, Newtown, PA
- Smith G 1992 Dental implication of cranial osteopathy. Cranio-View, Isle of Wight, England
- Smith G 2000a The world's first invisible precision attachment designed to maintain cranial motion. Reprinted in: *The best of Basal Facts 1976–1987*. International Center for Nutritional Research, Langhorne, PA
- Smith SD 2000b Neuromuscular considerations in mandibular reposturing: the visceral skeleton. Reprinted in: *The best of Basal Facts 1976–1987*. International Center for Nutritional Research, Langhorne, PA
- Solberg W, Clark G 1980 Temporomandibular joint problems: biologic diagnosis and treatment. Quintessence, Chicago, IL
- Spahl T, Witzig J 1991 The clinical management of basic maxillofacial orthopedic appliances, vol. III. Temporomandibular joint. Mosby Year Book, St Louis, MO
- Stack B 2004 What all orthodontic providers should know to prevent TMJ problems from adversely affecting their orthodontic results. IAO Annual Meeting, Savannah, GA
- Stockton S 1998 Beyond amalgam: the hidden health hazard posed by jawbone cavitations, 2nd edn. Power of One Publishing, Clearwater, FL
- Stockton S 1999 Dynamic healing through neurocranial restructuring. Power of One Publishing, Winter Haven, FL
- Stockton S 2002 Alcohol addiction and attention deficit disorder: drug free alternatives. Power of One Publishing, Clearwater, FL
- Stortebecker P 1985 Mercury poisoning from amalgam. Patrick Stortebecker, Stockholm, Sweden
- Thomas T et al 1987 Brain tumor mortality among men with electrical and electronic jobs. A case control study. *National Cancer Institute* 79(2): 233–238
- Turner J, Hode L 1999 Low level laser therapy. Prima Books, Grangesberg, Sweden
- Upledger J 1987 Craniosacral therapy II. Beyond the dura. Eastland Press, Seattle, WA
- Upledger J 1997 The inner physician and you. North Atlantic Books, Berkeley, CA
- Vimy M 1999 Your toxic teeth: mercury poisoning from fillings. Prevident Management, Calgary, Alberta, Canada
- Voll R 1978 Interrelations of odontons and tonsils to organs, fields of disturbance and tissue systems. Medizinisch Literarische Verlagsgesellschaft mbH, Ulzen, Germany
- Walker M 2000 Elements of danger. Hampton Roads Publishing, Charlottesville, VA
- Walther DS 1988 Applied kinesiology. Synopsis Systems DC, Pueblo, CO
- Wiebrecht A 1966 Crozat appliances in maxillofacial orthopedics. Crown Ltd, Milwaukee, WI
- Wiebrecht A 1969 Crozat appliances in interceptive maxillofacial orthopedics. E F Schmidt Company, Milwaukee, WI
- World Health Organization (WHO) 1991 Environmental Health Criteria 118. Inorganic mercury. WHO, Geneva.
- Zeines V 2000 Healthy mouth, healthy body. Kensington Books, New York
- Ziff S, Ziff M 1987 Infertility and birth defects. Bio-Probe, Orlando, FL
- Ziff S, Ziff M 2001 Dentistry without mercury. Bio-Probe, Orlando, FL