Orthoposturodentics: new contributions to patients' health using splints

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ABSTRACT

Many derangements in the cranio-mandibular relationship can contribute to the etiopathogenesis of tempero-mandibular disorders and postural anomalies. Orthodontists should understand their characteristics in order to prevent their development or correct them if they appear during the course of orthodontic treatment. Occlusal splints for re-positioning the mandible to restore it to a healthy physiological position are an invaluable tool in dealing with this aspect of orthodontic therapy.

KEYWORDS

TMJ

Posture

Occlusal splint

Elastopositioning.

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1 - INTRODUCTION

In 1996² Michel Clauzade first described orthoposturodentics, an occluso-postural concept whose reference points are derived from the patient's cranio-mandibular relationships. By adjusting them, the orthodontist influences or corrects the patient's posture. When examination reveals that patients have disorders of the tempero-mandibular joint or of posture, the orthodontist strives to find a therapeutic position of the mandible, as determined from a clinical study, an axiographic examination, and mounting of casts on an articulator. In this search the orthodontist takes a variety of silicone bite registrations of the mandible in different positions and selects the optimal one by postural tests and the disappearance of any symptomatology in the region of the tempero-mandibular

joint. Then a splint is constructed that will guide the teeth into this cranio-mandibular position³.

A stage for stabilizing the teeth in this new therapeutic position must begin immediately. It can be carried out in a variety of ways, by bonding composite onlays into place, by the orthopedic guidance of the splint, or by elastopositioning.

In order to improve the dental condition of the majority of patients, it has become clear that bonding and extended prosthetic restorations are not the most satisfactory way to proceed. Quite naturally, orthodontics has become the treatment of choice for those patients who have problems of the tempero-mandibular joint whether or not they are associated with postural anomalies.

2 - PREVENTION OF ARTICULAR AND POSTURAL PROBLEMS – A BIOPROGRESSIVE UNLOCKING SCENARIO

The unlocking notion, as it is developed in the bioprogressive philosophy of Carl Gugino⁵ is particularly appropriate for this concept. It meshes perfectly with the global thinking attitude that practitioners need to adopt if they wish to extend their treatment approaches beyond the teeth to encompass the whole patient (fig. 1).

Serious functional problems in young infants are likely to lead to a locking of the mandible in inappropriate positions that can, in turn, lead to orthodontic and orthopedic problems. These same difficulties will be at the root of concomitant TMJ and postural disorders that will make their appear-

ance when dental and facial discrepancies begin to develop.

2 - 1 - Importance of breathing

In an integrated system, if one element is altered, an adaptive response appears in some other part of the functional unit. In this way, in accordance with the principle of cause and effect, a malfunction can become the cause of other malfunctions especially if the culprit is faulty breathing that can influence muscular function, which, in turn, can be responsible for other functional disorders.

Figure 1

Figure 2

Figure 3

Prolonged mouth breathing and the change in muscular behavior that it provokes over time, can change head and cervical posture, and even the stance of the entire body. Typically, the head is thrust forward, the spinal column is tilted, and the dorsal and lumbar curvatures are affected. Even the position of the pelvis may be implicated. All of these changes can provoke mal-adaptations of facial structures, of the thoracic cage, of the pelvis, of the legs, and of the feet (fig. 2 and 3).

The oral cavity and the nasal fossas have an intimate relationship.

The distance between the maxillary canines and the dimensions of the floor of the piriform orifice are correlated with each other (fig. 4).

Muscle function and the size of the lower base of the piriform orifice also have an intimate connection.

Crowding of the incisors and canines is immensely important in the development of symptoms⁷.

Figure 4

2 - 2 - Objectives of unlocking

The objectives of unlocking the mandible can be defined in these terms:

- Establish normal breathing and swallowing patterns;
- Obtain muscular equilibrium;
- Establish normal posture;

- Correct unhealthy habits;
- Make it possible for physiologic centric relationship to return;
- Obtain stable therapeutic results.

2 - 3 - Different types of dental locking

Vertical and sagittal:

- in cases of lingually inclined upper incisors (Class II, division 2);
- in cases of excessive over-bite (Class II, division 1);
- in cases of anterior cross bite (Class III);
- in cases of unilateral or bilateral buccal cross bite (fig. 5 and fig. 6).

Vertical and transverse:

- in cases of rotated molars, especially if there is a disto-buccal turning of the maxillary first molar, the palatal cusp will play the pivotal role in rotating the mandibular molar (fig. 7);

Figure 5

Figure 6

Figure 7

Figure 8

Figure 9

- in a restricted dentition: when the constraint is alveolar with the upper molars in palatal inclination, or when the constraint is basal when the upper molars are tilted buccally. For all of these a frontal cephalogram will provide invaluable diagnostic information (fig. 6 and fig. 8);

- when the upper arch is constricted into a narrow V shape (fig. 9).

2 - 4 - Malfunction of the TMJ

The principals causes of TMJ malfunction are:

- distal displacement of the condyle in Class II, division 2 cases with shortening of arch length (fig. 10);

- E excessive fonctional amplitude in Class II, division 1 cases with an increase in arch length (fig. 11);

- mesial and/or upper thrust in cases of loss of posterior support, through molar rotation or anterior cross bite (fig. 12 and fig. 13);

- interference with lateral excursion, especially on the balancing side, in cases of laterally constricted arches or narrow V shaped arches.

2 - 5 - Case N° 1 Transverse maxillary deficiency with functional problems

The clinical examination before prospective orthodontic treatment should not be limited to the dentition. It is the ideal time for the orthodontist to assess the dynamics of the masticatory system, the behavior of the patients, their posture, and, in

Figure 10

Figure 11

Figure 12

Figure 13

general, the extent and freedom of their mandibular movements.

The concept of unlocking requires an elimination of mouth breathing with the patient being taught to rely upon "active" nasal breathing with the diaphragm taking part in coordination with correct tongue posture so that the proper nasal reflex is restored and the thorax liberated from any constrictions.

At the same time, in accordance with the suggestions of Maryvonne Fournier, Françoise Girardin and Alain Chauvois¹, the patient's musculature must be taught to act properly in elongation, in contraction, and in relaxation, so that there will be a need for oxygen that will demand efficient and permanent nasal breathing.

This case illustrates that necessity particularly well.

Patient: Miss Angéla S... Born: 21/07/1989.

Consultation date: 29/03/1996 – Age: 6 years 8 months.

Her mother brought her in to see us to find out what could be done about her severe overbite.

The clinical examination revealed a number of functional problems, all resulting from her continuous mouth breathing. The child was often ill, with nasal problems and repeated ear aches. We noted especially deep, dark circles around her eyes, with bluish skin covering suggesting venous stasis and a lack of oxygen in this zone. Her lip closure was incompetent and accompanied by sharp contraction of the peri-oral and menton muscles. The naso-labial angle was open and the lower jaw seriously retruded in a profile view. The buccinator muscle is

excessively active exerting continual pressure on the alveolar processes. She sucks a finger and the low position of her tongue, which interposes itself during deglutition, completes this clinical picture of a typical mouth breather (case n° 1: fig. 14 a to c).

The dentition is in a full Class II relationship with a 14 mm overjet. Anteriorly there is a 2 mm open bite. The upper arch is the form of a narrow V. The only permanent teeth to have erupted are the first molars although the lower central incisors are beginning to make their appearance. The upper molars are rotated disto-buccally. All in all, there are numerous factors contributing to the mandibular locking and the effects on the temporomandibular joints must already be considerable and relatively severe (case n° 1: fig. 15 a to f).

The panoramic X-ray shows that the maxillary canines are lying in sharply oblique positions in relation to the lower parts of the nasal fossae. The cephalometric films, both frontal and profile, give a clear picture of the transverse deficit of the maxilla, the retruded position of the mandible, and the apparent posterior rotation of the mandible, confirmed by the presence of a pre-gonial notch, an abnormal finding for a child of this age. The mandibular angle is located above C2-C3 and the spinal column shows a pronounced cervical lordosis, causing, undoubtedly, the cervical pain that afflicts the patient primarily in the morning when she awakens (case n° 1: fig. 16 a to c and fig. 17).

We implemented our treatment plan promptly with an initial quad helix appliance to expand the pre-maxilla not only as an orthodontic necessity but

also to assist the myo-functional re-training whose objective was to restore normal nasal breathing and correct deglutition (case n° 1: fig. 18 a to f).

We put a second quad helix into place to continue the widening and re-shaping of the narrow maxillary arch. In this phase of treatment, we anticipated that the patient would begin to breathe through her nose, the mandible would start to re-position itself, and the pre-maxilla and maxilla begin to approach normal dimensions. Also at this stage the lateral deviation of the mandible having been eliminated, the condyles had been restored to their normal physiological positions and the matinal cervical pain had completely disappeared. The child was sleeping better which meant that the problems associated with nocturnal mouth breathing were essentially corrected. We also noticed, as a result of the combined benefits of all these developments, a virtual elimination of the maxillary over-jet with the occlusion approaching a Class I relationship (case n° 1: fig. 19 a to e).

After the adult dentition had erupted, when the patient was about 13 and a half, final definition of tooth position could be achieved while of course the functional and growth

improvements would be maintained (case n° 1: fig. 20 a to f).

We used a full-banded appliance to level the arches, with a segmented technique in the maxilla, and a full nickel titanium base arch with piggy-back appliance ligated to it in the mandible. We finished with a typical Class II set-up to bring the arches into a full Class I relationship (case n° 1: fig. 21, fig. 22 a to e and fig. 23 a to e).

At the end of active treatment, the patient wore an individualized positioner constructed on models set up on an articulator in order to continue and complete the functional re-training, reinforce the established ideal occlusion and functional objectives, which would guarantee long term stability. In re-examining the patient when had reached the age of 18 and a half we found that there had no relapse in any aspect of her masticatory system (case n° 1: fig. 24 a to c, fig. 25 a to e and fig. 29 a to e).

On the check-up cephalograms taken at the close of treatment, it can be seen that the mandible has stopped rotating posteriorly; the mandibular angle has descended acceptably, and the cervical sector of the spinal cord has assumed an upright position (case n° 1: fig. 26 a and b, fig. 27 and fig. 28).

Cas n° 1

Figure 14 a

Figure 14 b

Figure 14 c

Figure 15 a

Figure 15 b

Figure 15 c

Figure 15 d

Figure 15 e

Figure 15 f

Figure 16 a

Figure 16 b

Figure 16 c

Figure 17

Figure 18 a

Figure 18 b

Figure 18 c

Figure 18 d

Figure 18 e

Figure 18 f

**Cas
n° 1**

Figure 19 a

Figure 19 b

Figure 19 c

Figure 19 d

Figure 19 e

Figure 20 a

Figure 20 b

Figure 20 c

Figure 20 d

Figure 20 e

Figure 20 f

Cas n° 1

Figure 21

Figure 22 a

Figure 22 b

Figure 22 c

Figure 22 d

Figure 22 e

Figure 23 a

Figure 23 b

Figure 23 c

Figure 23 d

Figure 23 e

Cas n° 1

Figure 24 a

Figure 24 b

Figure 24 c

Figure 25 a

Figure 25 b

Figure 25 c

Figure 25 d

Figure 25 e

Figure 26 a

Figure 26 b

Figure 27

Figure 28

Figure 29 a

Figure 29 b

Figure 29 c

Figure 29 d

Figure 29 e

Cas n° 1

3 - TREATMENT OF TEEN-AGERS WITH ADULT DENTITIONS AND ADULTS

3 - 1 - Case N°2 Managing treatment with splints

Patient: Geoffray M... date of birth: 22/06/1991.

Consultation date: 7/07/2004 – Age: 13 years 1 month.

This young man's parents brought him in for a consultation about his mal-aligned teeth, especially in the maxilla. In our clinical examination we soon noted that there was bi-lateral clicking of the temporo-mandibular joints. We knew that a systematic evaluation of the joints would be required even though the parents were completely unaware of this problem and their son had never mentioned it to them (case n° 2: fig. 30 a to c).

From a functional point of view we determined that the boy was afflicted with persistent noisy nocturnal mouth breathing. He was allergic to cereals and to pollen. Adenoidal tissue had been removed in 1997 and the tonsils were hypertrophic. His type of mouth breathing often causes postural difficulties associated with locking of the mandible, which, in turn, has unfortunate consequences for the temporo-mandibular articulation.

His malocclusion could be classified as a bi-lateral partial Class II with an overjet of 4 mm and an incisal overbite of 20%. There was a mid-line deviation, with the mandibular incisors strayed to the left.

The maxillary arch was V shaped with the first molars rotated distobuccally (case n° 2: fig. 31).

The radiological examination showed that the patient's type was

mesiofacial with no skeletal discrepancies. But the frontal head film seemed to demonstrate that there was a deviation of the upper portions of the nasal cavities owing, probably, to the patient's mouth breathing. We referred the boy to an otolaryngologist who confirmed our diagnosis and corrected the nasal deviation surgically (case n° 2: fig. 32 a and b).

The patient responded well to myofunctional therapy and soon his nasal breathing was entirely satisfactory even throughout the night.

With everything having gone so well up to this point, we could easily have under-estimated the difficulty of this case and abandoned our search for other functional problems in the upper airways or the temporo-mandibular joints. Even when patients and parents are aware of breathing abnormalities they usually do not, indeed cannot, have any notion of the existence of TMJ problems. The mechanotherapy was uncomplicated. Both arches were leveled with full arch wires after a quad helix had corrected the shape of the maxilla and the mandible was re-centered, completely correcting the initial lateral deviation. But, on the negative side, the unlocking had accentuated the overbite (case n° 2: fig. 33 a to f). However, the problem in the temporo-mandibular joint was still present with bi-lateral clicking on opening and closing.

As we had explained to patient and parents in the important effort to keep communication with them open and fruitful, we then took new impressions in order to construct a mandibular repositioning splint, on an arbitrary hinge axis after taking a wax reference bite. After mounting the models on a SAM

Cas n° 2

Figure 30 a

Figure 30 b

Figure 30 c

Figure 31

Figure 32 a

Figure 32 b

Figure 33 a

Figure 33 b

Figure 33 c

Figure 33 d

Figure 33 e

Figure 33 f

Cas n° 2

Figure 34

Figure 35 a

Figure 35 b

Figure 35 c

Figure 36 a

Figure 36 b

Figure 36 c

Figure 37 a

Figure 37 b

Figure 37 c

Figure 37 d

Cas n° 2

Figure 37 e

articulator, we sought to establish a new mandibular position with silicone key bites at 2 and 3 mm of mandibular advancement. We tried them each on the patient to find the mandibular position that allowed the best repositioning of the condyles under their discs with the best symmetry as determined by postural tests. Finally, we selected the 2 mm propulsion block, the yellow one. On this basis we fabricated the splint and the patient wore it for 3 months to insure that the joint symptoms had dis-

appeared and that he was comfortable with his mandible in its new position.

At this point the orthodontic treatment could resume but the patient would continue to wear the splint after we had cut away the section from the lower left canine to the molar on that side. We used sectional arches on the maxilla and added elastic force on the left side to move the teeth progressively into proper occlusion. When this side was stabilized, we could discontinue the splint entirely

and displace the elastics to finish stabilization of the occlusion (case n° 2: fig. 34 and fig. 35 a to c).

As soon as we had obtained maximum inter-cuspal contact of the two arches in occlusion, we were able to remove the full banded appliance and begin retention with a thermo-formed, individualized positioner made from final models mounted on a SAM articulator. In this phase we obtained final detailed positioning of the teeth and continued myo-functional therapy working on the functional matrix by assuring proper nasal breathing and good tongue posture (case n° 2: fig. 36 a to c and fig. 37 a to e).

This type of problem is not rare in adolescents. It is relatively easy to treat provided that a proper diagnosis has been carried out under rigorous conditions. To do this, we follow the Zero base flux diagnosis[®], that CF Gugino⁶, M. Delamaire, and F. Froger⁴ have described.

Using this as a foundation, the orthodontist must visualize the desired objectives and establish an individualized treatment plan that will insure attainment of these specific goals.

3 - 2 - Case N° 3

Importance of postural tests and the use of a splint to assist in the myo-functional re-education treatment

This case will serve as an example of the many patients who regularly arrive for consultations in orthodontic office complaining of TMJ problems with pain and episodes of blocked mandibles, some, as with this patient, also reporting cervical, lumbar, brachial, and problems located at some distance from the oral cavity.

Should orthodontists neglect to include them in their diagnosis and treatment plans they may later be accused of causing them with some "therapists" going so far as to ipso facto indict orthodontics in general.

The real problem in these types of cases derives from the examining orthodontist's failure to look for the pre-existence of temporo-mandibular joint and postural problems during the course of the preliminary clinical examination and to establish a diagnosis associated with centric occlusion or at least a position in reference to the articulation and not one simply based on centric relation. When these steps are not taken the orthodontic treatment cannot be concluded with the dentition in a position of physiological centric relation.

Patient: Miss Manon B. Date of birth: 05/07/1984.

Consultation date: 12/07/2006 – Age: 22 years.

This young woman consulted us because of pain that had appeared in her right temporo-mandibular joint, together with an episode of blockage on awakening, almost two years previously in January 2005. Since then pain had occurred regularly when she arose in the morning and during meals. The cracking that accompanied opening and closing of her mouth was more pronounced on the right side than on the left. Her mandible deviated to the left on opening. She had had orthodontic treatment to correct a crowding problem when she was between 17 and 19 years old. In conjunction with this therapy she had had four premolars and four wisdom teeth extracted. She was still wearing a bonded mandibular wire retainer from canine to canine.

In studying her face from a frontal view we noted slight asymmetry with the left side slightly larger than the right

side. In profile we noted an open nasolabial angle and a fairly seriously retruded mandible. In smiling she exposed a small amount of the maxillary gingiva.

The functional clinical examination revealed that her mouth breathing was associated with an allergy to pollen, that her tongue posture was habitually low, but that in deglutition she thrust it between her teeth as the menton muscles contracted. She also reported cervical pain essentially in the morning on arising (case n° 3: fig. 38 a to c and fig. 39 a to e).

Her upper and lower teeth were in a Class II relationship with a 3 mm overbite and 60% supraocclusion. The maxillary incisors were inclined palatally and there was a slight deviation of the mandibular mid-line to the right. The maxillary arch was V shaped and the mandible was locked transversely and sagittally.

When she opened her mouth to the full extent of 38 mm and when she propelled the mandible forward there was a deviation of the left side indicating the presence of hypomobility there.

Skeletally she could be classified as dolichofacial with a facial axis of 82° and a facial plane of 85° (case n° 3: fig. 40 a and b, fig. 41 a and b and fig. 42 a and b).

An MRI examination had already been performed and it revealed the existence of a complete bilateral anterior meniscal luxation with posterior displacement of the condyles in the glenoid cavity with mouth closed. With her mouth open we noted on the left an irreducible anterior subluxation with a poorly shaped meniscus while on the right side the meniscal luxation was reducible with the condyle re-centered on the middle third of the meniscus; the anterior excursion of the meniscus was exaggerated.

We mounted study models on an articulator. These showed that the deviation of the mandible to the right was even greater than it had appeared clinically. We completed our file of diagnostic information with an axiographic exam that showed the condylar trajectories were seriously disturbed and also that mouth opening laterally confirmed the irreducibility of the meniscal luxation. And, finally, we conducted postural examination (case n° 3: fig. 43 and fig. 44).

We informed the patient that for the first phase of treatment she should wear a mandibular re-positioning splint to correct the discrepancies that we had found clinically before mechano-therapy could begin (case n° 3: fig. 45 a to c).

In order to incorporate the desired movements in the splint we performed a series of postural tests with the jaws closed and with silicon blocks in place to find the most favorable position for the mandible. The one we selected was obtained with green propulsion to the right block of 3 mm and red, of 5 mm on the left. We noted with considerable interest that in this most favorable position the deviation to the right of the mandibular incisal midline was, in fact accentuated. The patient began wearing the splint in August 2006 and at the same time received appropriate osteopathic treatment. At the first check-up visit the patient told us that the articular cracking noises, the blockages, and the pain had all swiftly disappeared. We performed the postural tests again and noted that wearing the splint appeared to have beneficially affected her stance.

With these preliminary objectives obtained, we told the young woman that it was time to begin mechano-therapy but she was unwilling to wear

Cas n° 3

Figure 38 a

Figure 38 b

Figure 38 c

Figure 39 a

Figure 39 b

Figure 39 c

Figure 39 d

Figure 39 e

Figure 40 a

Figure 40 b

Cas n° 3

Figure 41 a

Figure 41 b

Figure 42 a

Figure 42 b

Figure 43

Figure 44

Figure 45 a

Figure 45 b

Figure 45 c

Figure 46 a

Figure 46 b

Figure 46 c

Figure 47 a

Figure 47 b

Figure 47 c

Figure 47 d

Figure 47 e

Cas n° 3

Figure 48 a

Figure 48 b

Figure 48 c

Figure 49 a

Figure 49 b

Figure 49 c

Figure 50 a

Figure 50 b

Figure 50 c

Figure 51 a

Figure 51 b

Figure 51 c

Figure 51 d

Figure 51 e

Figure 51 f

Cas n° 3

Figure 52 a

Figure 52 b

Figure 52 c

Figure 53 a

Figure 53 b

Figure 53 c

Figure 53 d

Figure 53 e

Figure 54

Cas n° 3

a full-banded appliance. We described the operation of the elastopositioning system. She agreed to wear attachments on the canines and the premolars (case n° 3: fig. 46 a to c).

We asked the France-Elastodontics laboratory to make the appliance. After again mounting models on an articular they did a maxillary set-up using as guides the same propulsion blocks that we had employed for fabricating the splint. Elastofinishers are worn full time from the bonded attachments for a 5 month period to allow the midlines to re-center and at the same time encouraging the achievement of a new occlusion that would stabilize the improved mandibular position. The patient then wore the appliance at night as a retainer for one year and after that one night per week (case n° 3: fig. 47 a to e, fig. 49 a to c, fig. 50 a to c and fig. 51 a to f).

The check-up axiographic tracing made in December 2007 demonstrated that the condylar trajectories had completely recovered, while confirming the irreducibility of the luxation on the left side. A year after active treatment had concluded, the patient reported that the articular cracking noises, blockages, and pain had not returned (case n° 3: fig. 52 a to c, fig. 53 a to e and fig. 54).

3 - 3 - Case N° 4

The importance of anatomical problems and the role of the splint in assisting myofunctional re-training

Patient: Miss Juliette B... Date of birth: 09/05/1991.

Consultation date: 11/12/2003 – Age: 12 years 7 months.

When the problems afflicting a patient are serious, it is essential that the orthodontist keep the diagnostic procedure and the subsequent treatment under a logical and rigorous control. For this reason we shall study in detail the case of Juliette daughter of physician parents who consulted us for numerous reasons. She had a problem with her temporo-mandibular joint with accompanying cervical pain. There was an esthetic deficit and a traumatic problem. The patient and her family had already refused to undertake treatment with an orthodontist whose therapeutic plan required the extraction of four premolars.

3 - 3 - 1 - Clinical examination

After a fall in March 2003 the patient's upper right central incisor had been completely avulsed from the arch. There had been partial avulsion of the upper left central incisor and a fracture of this tooth angled mesiodistally. The avulsed tooth had been reimplanted in a hospital emergency room where three brackets were bonded to the centrals and the left lateral to stabilize the tooth.

In examining the functional matrix we noted that the patient was a mouth breather, especially at night, but there were no nasal problems. She had sucked her index and middle fingers until she was 5 years old. We noted no problems of the facial musculature, but in questioning her we learned that the cervical pains that had always bothered her had worsened after the accident (case n° 4: fig. 55 a to c and fig. 56 a to e).

On mouth opening, which was limited to 41 mm, a pronounced articular clicking sound could be heard that was repeated with closing.

Cas nº 4

Figure 55 a

Figure 55 b

Figure 55 c

Figure 56 a

Figure 56 b

Figure 56 c

Figure 56 d

Figure 56 e

Figure 57

Figure 58 a

Figure 58 b

Figure 59

Figure 60

Figure 61 a

Figure 61 b

Figure 61 c

Cas n° 4

Figure 62 a

Figure 62 b

Figure 62 c

Figure 62 d

Figure 62 e

Figure 63 a

Figure 63 b

Figure 63 c

Figure 63 d

Figure 63 e

Cas n° 4

Figure 64 a

Figure 64 b

Figure 64 c

Figure 64 d

Figure 64 e

Figure 65 a

Figure 65 b

Figure 65 c

The clicking was also evident when the mandible was thrust forward to 1/3 of its possible propulsive movement.

The teeth were in a partial Class II relationship with a 7 mm overjet and 10% overbite.

The V shaped maxillary arch was primarily responsible for a transverse

and sagittal locking of the mandible. The mid-line of the maxillary arch was deviated to the left, the incisor teeth were nicely visible in her smile but at the corners not enough tooth structure could be seen. Dental hygiene was good and, with the exception of the upper central incisors, the teeth were healthy

3 - 3 - 2 - Evaluation of the dentition

The first molars were in a Class II relationship to the extent of the width of half a premolar. The cuspids were in a partial Class II relationship. The maxillary inter-canine distance was 24 mm so that in our diagnosis we could plan for an eventual normal arch form. There were no cross bites and no deviations

in the path of mouth closure. The current maxillary arch form was in a sharp V shape, confirming the constriction of the dentition. Total crowding of the arch was calculated at 8 mm.

The panoramic film showed that no teeth were congenitally absent but it also demonstrated that the lower right second molar was inclined so far mesially that it was erupting into the

Cas n° 4

Figure 66 a

Figure 66 b

Figure 66 c

Figure 66 d

Figure 67 a

Figure 67 b

Figure 67 c

Figure 68 a

Figure 68 b

Figure 68 c

Figure 68 d

Figure 68 e

Figure 68 f

first molar and blocked. This suggested that the buds of the all the wisdom teeth should be removed as soon as possible. Areas of bone resorption could be seen around the mesial and distal surfaces of the root of the upper right central incisor (case n° 4: fig. 57).

In a tomographic examination of the right and left temporo-mandibular joints with the mouth open and closed, we saw luxations of the meniscus, more severe on the left side, with insufficient displacement of the mandibular condyle on this side (case n° 4: fig. 61 a to c).

3 - 3 - 3 - Skeletal description

Our skeletal examination showed that the patient was a mesofacial type, which gave her a rather neutral appearance with a slight tendency to a Class III skeletal pattern. But a transverse defi-

ciency of the maxilla is evident, especially in the pre-maxilla (case n° 4: fig. 58 a and b, fig. 59 and fig. 60).

Our treatment plan called for:

- myo-functional therapy to improve breathing and tongue position;
- increase in maxillary width with rapid palatal expansion acting essentially in the anterior region followed by a quad helix to reshape the maxillary arch and expansion of the lower arch with a bihelix;
- a full-banded appliance to level the upper and lower arches;
- a new analysis of the articular joint and the patient's posture to determine what the improved position of the mandible should be and a set-up based on 2 mm propulsion blocks for the elastofinisher;

Figure 69 a

Figure 69 b

Figure 69 c

Cas n° 4

Figure 70 a

Figure 70 b

Figure 70 c

Figure 70 d

Figure 70 e

– detailed finishing and a retention period.

Unfortunately the upper right central incisor had to be extracted at the close of treatment. We replaced it temporarily with a plastic tooth carried on a plate (case n° 4: fig. 62 a to e,

fig. 63 a to e, fig. 64 a to e, fig. 65 a to c, fig. 66 a to d, fig. 67 a to c, fig. 68 a to f, fig. 69 a to c and fig. 70 a to e). On the positive side, all the symptoms associated with the temporomandibular joint and the cervical pains had completely disappeared.

4 - CONCLUSION

Orthodontics can bestow on patients much more than simple alignment of teeth with each other and with the alveolar processes. By assessing patients in their totality and correcting the deficiencies they find, orthodontists can restore normality to cranio-mandibular relationships. With this capability, the orthodontist becomes an architect of the cranium and a corrector of postural faults.

Failures in treatment are still possible, depending upon the difficulty of the case or with patients who have suffered from numerous traumatic episodes. For many a multidisciplinary approach encompassing the skills of otolaryngologists, physical therapists, osteopaths, and orthoptists may be

necessary. In some cases, especially those requiring rapid palatal expansion, orthognathic surgery will be needed. And also when severe mandibular retrusion is present, recourse to surgery may be the only way to obtain proper mandibular position.

In other cases, correction of mandibular posture alone is insufficient and a mandibular advancement through osteotomy may be indicated for obtaining good cranio-mandibular relationships.

But in every instance that a preventive measure would be helpful, it should be implemented. It is always much easier to prevent than it is to correct.