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The Temporo-Mandibular Joint in the Combined View of a Dentist and a Rolfer

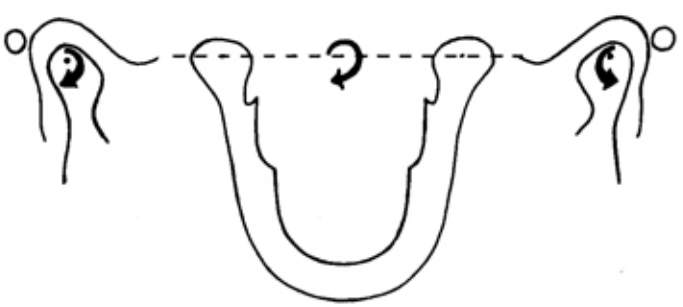
Dentistry and Structural Integration approach the TMJ complex from quite different perspectives: While dentists focus primarily on pathology and the painful symptoms of this special area, Structural Integration considers the TMJ to be *one* unit which is interrelated by connective tissue components with *all* other segments of the body. Structural Integration aims for balance of the mandibula in relationship to the cranium, the neck, and the dynamics of the whole body. This intention is frequently – even before we enter the pathological field – difficult to pursue as soon as the TMJ is in trouble. For dentists pain in the TMJ is a symptom of functional disorders in the myofascial system of the masticatory muscles. It has more and more been realized that the pain is often accompanied by irritations in the cranial, neck, and thoracic areas of the body. Such disorders may be causing structural degenerative changes, especially in the elastic cartilaginous parts, which result in additional functional problems. How can Structural Integration achieve its goals in a situation like that? What should a Rolfer know about the basic interventions a dentist carries out? And what can a dentist expect practically from the work done by a Rolfer around the TMJ?

This article aims at providing the Rolfer with simple diagnostic auxiliaries used in dentistry so that he is able to find a basic orientation in this complex structural field. And the eye of the dentist might receive insight into the structural analysis and manipulative potential of Structural Integration.

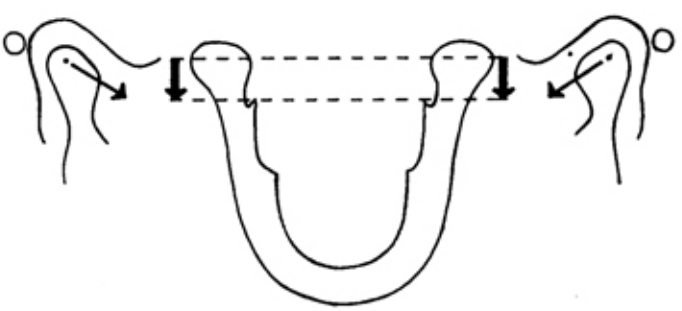
An understanding of the functional anatomy of the masticatory organ, and especially of the TMJ, is made difficult by the fact that the mandibula is «attached» to both mandibular joints in which the condyloid processes of the mandibula describe either consistent and synchronized or inconsistent and asynchronized curves in space during any kind of movement conceivable. Both joints are pivot and ball-and-socket joints at the same time.

During movement around the hinge axis (up to 12 mm),

Ill.1 Movement around the hinge axis



Ill.2 Protrusion on both sides



the condyle remains in the joint cavity; in all other movements one of the two condyles, or both, migrate toward the lower front direction, more or less at an angle to the sagittal plane. If the joint is worn out, an immediate sideshift of the condylus can be observed in case of mandibular laterotrusions and latero-protrusions. In a position of rest, the mandibula is kept in opposition to gravity during what is called free-way space, i.e. with upright posture a continuous activity of the masticatory muscles is necessary.

The delicate structure of the TMJ corresponds to the double function of the pivot and ball-and-socket joint and is characterized by a great deal of elasticity, especially in the dorsal part.

Dentists start with their anamnesis in the area where pain can be observed: they try to trace the nature and degree of the pain in a context of time and space. Important auxiliaries they use are X-ray pictures (showing joints with mouth open and closed) in order to be able to discriminate functional against structural changes and in order to recognize pathological factors such as tumors or systemic and chronic degenerative diseases in the mandibular and cranial areas.

In our analysis we could, of course, follow either the structural approach of Rolfing or the function-oriented method used by dentists. In this paper the authors try to combine both perspectives:

I. When and where can pain be observed:
   1. when the mouth is opened
   2. when the mouth is closed
   3. during extended periods of mastication
   4. in time correlation with other diseases

II. What kind of disturbances in the structural pattern can be observed:
   1. Limitation of oral aperture (usual range between 48-60 mm)
   2. Deviations from middle-line during opening or closing of mouth (Ill.5)
   3. Distinct and direct side-movement of the condyloid processes of the mandibula during immediate laterotrusion
   4. Clicking of joints at the beginning, during, or at the end of the functional movement

Ill.5

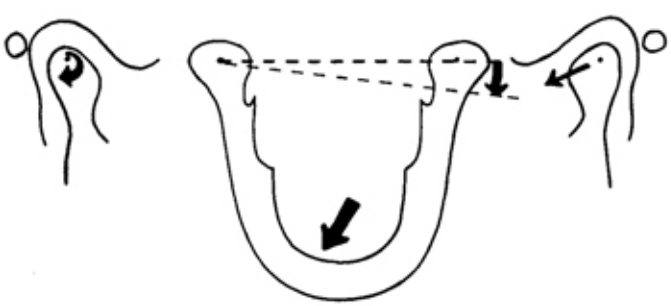
What are the main factors contributing to the conditions mentioned above?

Dentistry
1. Chronic degenerative diseases (osteoarthrosis) and systemic diseases such as rheumathoid arthritis and diabetes.
2. Cranial, cervical, and mandibular traumata.
3. Malocclusion and disturbed articulation (logophasia) due to position of teeth.

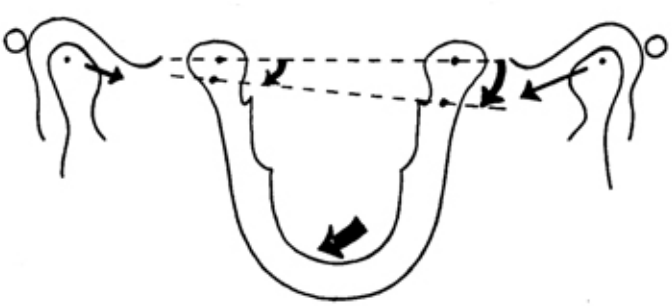
Rolfing
4. Overstrain resulting from stress, especially due to parafunctions at night such as pressing and grinding of teeth against each other.
5. General structural deviations from the normal state; intra- and intersegmental (cervical, thoracic, and lumbar spines, pelvis, and legs down to the foot).

While it is rather easy to explain the causes described under point 1 and 2 by way of anamnesis, a special diagnostic method is required for point 3 and 4 with which it is possible to recognize differences between the muscularly-guided joint position and the teeth-guided joint position and the mandibular body respectively.

Ill.3 Laterotrusion (right side)



Ill.4 Latero-protrusion



Test referring to point 3

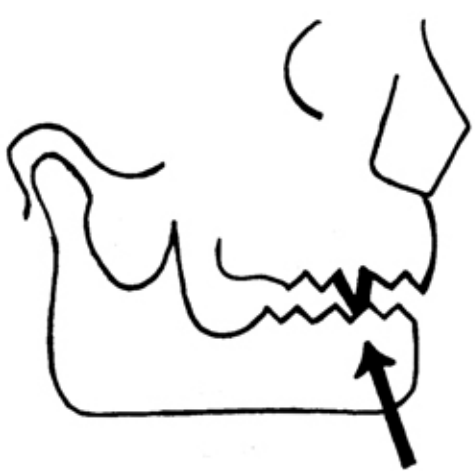
a) Is the occlusion correct?
The difference between muscularly-guided and teeth-guided movement of the joints can be found out without difficulty: while palpating the joint areas with the index fingers, we open our mouth slightly (10-12 mm). Then we start to close until we can feel the first contact of opposing teeth, and we finally proceed from there to a firm occlusion, maximal intercuspidation (Ill.6 and 7).
Big differences (› 5 mm) between both positions are of little relevance in the muscularly-guided phase *in the daytime* (only during swallowing do the teeth touch each other, not during mastication), *during sleep*, however, they may cause considerable parafunctions, especially in dream phases.
The presence and degree of this difference is easy to diagnose using what is called Dawson's grip (Ill.8): Take position behind the sitting patient and guide with both hands but without force (!) the mandibula in the hinge-joint axis position with delicate opening and closing movements (no contact of teeth). In further closing guide to the first contact of teeth, then until maximal intercuspidation. This may result in a slight or considerable slipping towards the ventral plane. Also an excursion to the lateral plane may occur. We might find a combination of both as well. As a consequence, a compression or luxation of the discus is likely to occur.
A trained ear is also capable of diagnosing the successive sounds of the early-contact encounters and of contrasting them with a «dull» contact situation of the «good» occlusion. In a situation of a longer period of missing teeth in the side-teeth area or with full dentures being too low, the capitulum may be pressed towards the upper rear (Ill.9).

b) Is the articulation, i.e. the chewing movement, in order?
Definition of terms:
Working side is the side of the jaw towards which the mandibula is moving and where it carries out grinding movements. This means that during right mandibular side-shift the right side is the working side.
Balance side is the term for the opposite side, i.e. during right side-shift this side is the left side of the jaw.
In the normal constellation, only the incisors and canines, and maybe also the cusps of the molars of the working side, touch each other. This means that the two condyles and one incisor or canine form together a stable triangle. (Seen from a neuromuscular view, this results in a minimization of masticatory power.) Now, if any of the molars is in the way during front or side shift, this tooth is either mobile or abrased, or the ligaments of the joint are overstrained (Ill.10).
It is easy to find out whether this is the case or not by putting a thin foil between the molars of the *balance side*. If, during movement towards the working side, the foil sticks to the teeth at the balance side, we have reason to believe that there are articulation disturbances.
How can we diagnose parafunctions? Apart from habitual activities such as thumb-sucking, pipe-smoking, excessive mastication of chewing gum, etc., it is primarily pressing and grinding of teeth during sleep we mean when talking about parafunctions. The reasons may be insufficient occlusion and articulation, lack of minerals (magnesium $^{++}$), and stress or a combination of these factors.
Apparent features apart from anamnestic considerations (lockjaw and sensation of pressure in the morning) are especially an early wear and tear of the occlusal surfaces (abrasion facettes), but also a gum recession or loosening of teeth.

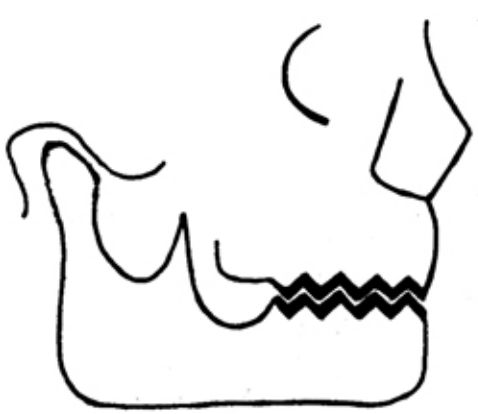
Reference to Point 3 and 4, Therapeutic Work in Dentistry

Dental therapy attempts to eliminate occlusal and articulation disturbances by way of abraiding precontacts and balance contacts. This technique is, however, limited owing to the thickness of the enamel layers. Other repair works include replacement of defective fillings, crowns, and bridges in the occlusal area aiming for balance of the mandibular joints. In cases of severe disturbances the balancing of occlusive and articulation defects is initiated by applying an occlusal splint used at night, with the occlusive and articulation pattern being tailored for individual needs. This plate is designed to relieve both the mandibular joints and the apparatus the teeth are embedded in.

Ill.6 Muscle position (centric relationship)



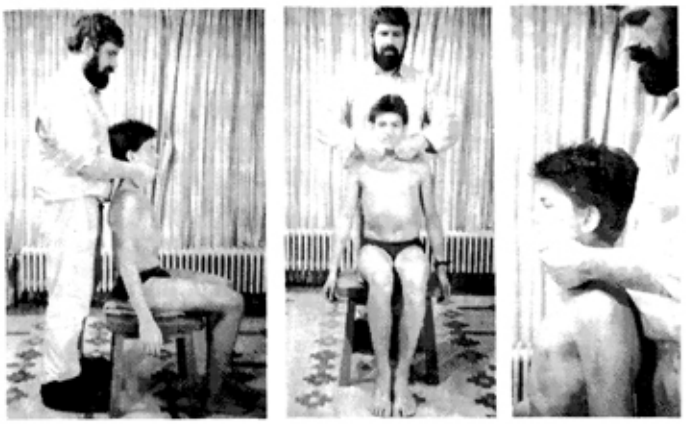
Ill.7 Maximum intercuspidation after shifting forward at the first (pre-)contact (habitual relationship)



This splint feigns a muscularly normal mandibular position in the hinge-joint axis and, by way of minimal pre-extension, results in a reduction of muscle tonus, especially in parafunctional movements carried out *during sleep*. And, at the same time, it is quite easy with such a plate to provide for a power-reduction of the frontal canine guidance.

It is, however, not possible to eliminate «abnormal» occlusion and articulation patterns occurring during the day-time with this device[1], neither can it remedy already manifest transformations of the bone and connective tissue systems.

The discussion of this dilemma leads us to point 5 («General structural deviations ...»). Before we take a look at the functional anatomy of the masticatory muscles and the mandibular joint, let us recapitulate some basic principles of Structural Integration.



Ill.8 «Dawson's grip»

Excursion: Standard Structural Integration of the Craniomandibular Relationship

The traditional concept of Structural Integration emphasizes the relationship of segments, the relationship of shoulder-girdle, neck, and cranium. The mandible is seen as an additional component which can only be balanced on the basis of balance accomplished in the human structure as a whole. It is known that the founder of the work used a simple metaphor to define the spatial adequacy between cervical spine and cranium by demanding that the cranium be treated as a kind of «extra-vertebra» on top of the spinal column. According to this image, the cranium would find its position relative to the curvatures of the whole spine and allow for mobility between the axis-atlas-cranial base.

This general guideline has been supplemented by a more specific analysis of fascial strain phenomena around the critical area: Is the jaw bound to the cranium? Is the jaw bound to the neck or even downwards to the shoulder-girdle? The answers to these and similar questions describe the geometrical framework of the craniomandibular relationship as a consequence of rigid tensional patterns. And the work done in the standard sessions of Structural Integration guarantees that the tensional abnormity gets somewhat eased, and we arrive at least at a certain order of spatial relationship of the cranium and the other segments of the body.

Frequently there is no detailed movement analysis included in the spatial («static») analysis which would allow the practitioner to evaluate the TMJ activity from a functional standpoint. This situation is in contradiction at least with an episode at the starting point of the discipline: It was the observation of movement dysfunction and not static analysis which led to intraoral manipulation[2].

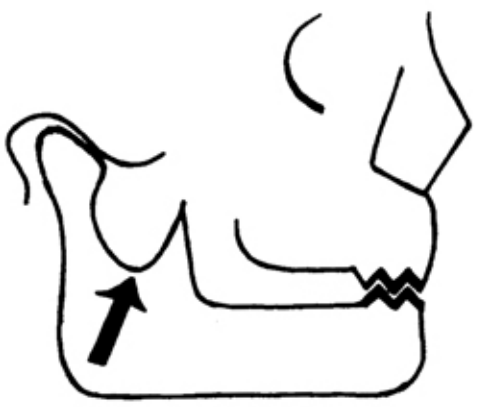
Traditionally, the intraoral work is limited to one session. There is some structural logic in the fact that this session is placed at the end of the organizational journey through the body: The more subtle junctions of neck-cranium-mandible require a foundation coming from balance between the more solid segments, especially from leg-pelvis relationships. And the psychological implications, which are often found around this most expressive part of our body, require a certain level of clear interaction that has to be established prior to entering the critical area.

The limitation of intraoral manipulation to one session

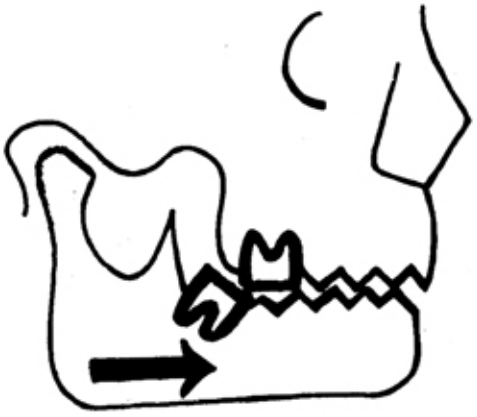
[1] This is where Garliner's myofunctional therapy comes in.

[2] The founder of Structural Integration «extrapolated» the work done on external muscles to the internal construction of the jaw-neck relationship. Her starting point was the observation of a dysfunctional movement pattern of a singer who couldn't open his mouth symmetrically (see «Ida Rolf Talks about Rolfing and Physical Reality», p. 155).

Ill.9 Compression caused by lost teeth



Ill.10



certainly works in cases showing «normal» movement patterns. However, this limits additional trauma-searching efficiency or just doesn't deal with a specific case as soon as significant TMJ imbalance is involved.

Recently it has been discussed that the standard work of Structural Integration should comprehend a more careful evaluation of mandibular structures[3]. Such an evaluation could lead to an expanded map of standard manipulation. The prevertebral structures of the neck and the floor of the mouth might be addressed as early as the fourth standard session and a part of the TMJ in the fifth standard session. There are indeed some anatomical considerations which might support this strategy: The standard fourth hour creates a lift deep inside the body. If this lift is manifest through the ankle and the knee and travels up to the pelvic floor and the longitudinal ligament to the front of the spinal column, there will be an area of «critical transition» around the upper cervical vertebrae and the cranial base. And more than that, if the area lacks resilience, the lift coming from below will increase compression around the atlanto-occipital membrane and rotations of vertebral bodies appear to be more obvious.

Certainly some cases will be resolved easily by applying manipulation to the lateral compartments of the neck. But this approach mainly influences the position of the middle cervicals, and even quick action around atlas and axis rarely affects the «inner dimension» of the neck.

Of course, this «inner dimension» is more or less a principle of «form» which is not identical with the combination of anatomical elements. Let's see whether we find a more efficient way of manipulation if we try to translate the form into anatomical details.

Ill.11 shows some of the inner elements of the neck. As soon as all the external compartments of the neck have been balanced, there are mainly the connections through the hyoid ruling strain across cervical and craniomandibular areas. Seen from a muscular perspective, it is especially the m. digastricus with its anterior and posterior part that binds the inferior part of the mandible to the mastoid notch of the temporal bone. Seen from a «connective tissue perspective», it is the fascial differentiation between mylohyoideus and digastricus and especially the origin of the digastricus at the fossa digastrica mandibulae which limit the range of movement between the floor of the mouth and the occiput.

Some Aspects of Structural Analysis

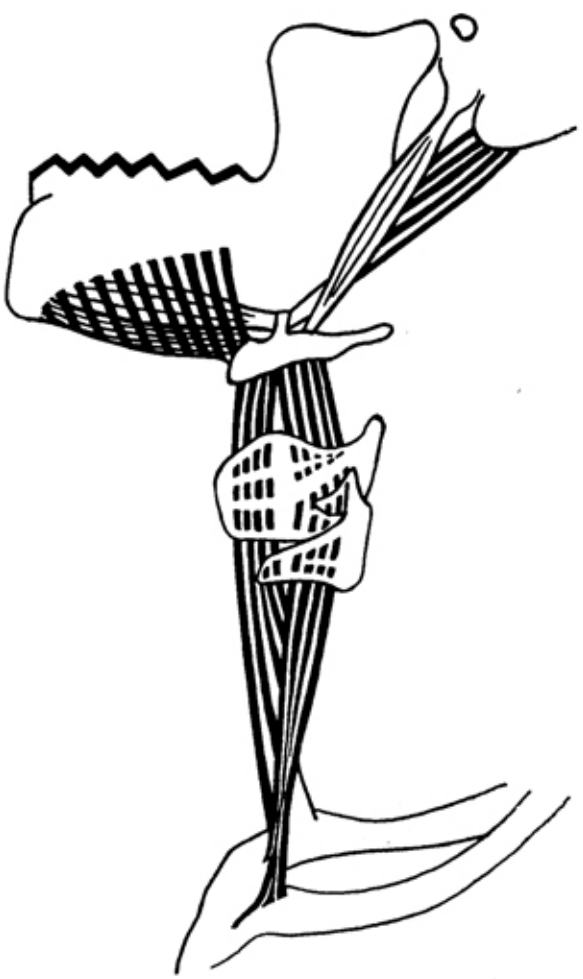
Due to its special importance as a suspended hinge, the temporo-mandibular junction responds to any random pattern of the upper pole of the body. Before movement is tested, a «static» analysis of the segmental alignment should be made. This is especially true for the lateral alignment of shoulder-girdle, neck, and cranium. Practical observation has shown that a structural («chronic») fixation of the head in anteriority will reduce the range of opening of the TMJ. This seems to be true for the opposite pattern, the hyperextended neck, as well. The analysis of the lateral alignment leads to the description of intersegmental strain patterns. Which layers of the shoulder-girdle, of the arms, the neck, and the cranium shape the fixation of a structural deviation? How are those layers related to the whole structure of the body, especially to the pelvis and the legs? How are the curvatures of the cervical and lumbar spines related to each other (Ill.12)?

The analysis of the lateral views is followed by cautious observation of the upper pole from the front. This view is secondary for the recognition of intersegmental strain patterns. However, it provides some information on side-shifts in the relationship of neck, shoulder-girdle, and of the cranium-neck relation (Ill.13).

For the trained eye this frontal analysis provides already some information about the movement patterns around the TMJ by recognition of the symmetrical or asymmetrical suspension of the jaw (Ill.14).

We suggest to do a dorsal analysis as the next step. The dorsal view gives information about the role of the back for the temporo-mandibular junction. How are those intersegmental strain patterns, which we have seen from the sides and the front, rooted in the back, how does the back contribute to an overall compensation? Sideshifts within cranium-neck or neck-thorax are usually accompanied by thoracic rotations or pelvic torsions/rotations. Deviations of the lateral line are accompanied by disturbances in the inner construction of the pelvis and the dorsum. In both cases the stabilizing capacity of the legs (leg-pelvis relationship, leg-back relationship) should not be ignored.

Ill.11 The «inner dimension» of the jaw-neck relationship (based on Rauber/Kopsch)



[3] We are referring to a workshop taught by Jan Sultan and Peter Schwind in Munich in spring 1985.

To get more into details, we continue with an evaluation of *intrasegmental* strain patterns. We focus on those layers which have their origin in, and end within, one segment of the body and look at the shape of bony structures. Only part of this analysis can be done visually, a good deal has to be explored by palpation. This is relevant for the intraoral elements mentioned above: especially the anterior venter of the digastricus, the whole condition of the floor of the mouth, and the atlanto-occipital junction. We have the basic structural components at our disposal now. On this basis we begin with the observation of movement.

Seen from the front, we observe whether the capacity of opening (a) is regular. Secondly we evaluate whether there is deviation from the middle line in opening and closing (b). To understand the normal and abnormal situation we have to test movement function according to the scheme of Ill.1-4.

Some Aspects of Functional Anatomy

In case of a reduced capacity of opening (a) we frequently find a lack of resilience of the connective tissue of both neck and cranium. This is true for the galea aponeurotica and for the lamina of the neck, especially for those connective fibers reaching down to the posterior mediastinal cavity of the thorax. Apart from the obvious meaning of the masseter and buccinator, it is the temporal muscle which plays a significant role[4].

We have called the special situation of the TMJ a «suspended hinge». The temporalis contributes largely to the structural quality of this hinge because of the activity of its posterior part which stabilizes the jaw in a position of rest. If opening is reduced, there are two main restrictions: either the lateral pterygoid and its junction with the discus do not allow the second phase of opening (after phase one – minimum opening – the discus has to move forward), or the restrictions of the fascia temporalis bind the whole jaw to the cranium so intensively that movement is restricted[5].

In this context we must not forget that one of the main «muscles» that opens the jaw is gravity. The function of the temporalis during (a) is to allow gravitational impact on the jaw through extension. This is especially significant as the temporalis rules both macro- and microstructure of the TMJ. The temporalis muscle connects at its lowest part with the fascia of the m. buccinator, with the temporalis being the strongest muscle of mastication (macrostructure), and deep inside the temporalis can connect the TMJ to the discus articularis (microstructure). This double determination of the temporalis is the basis of its unique function.

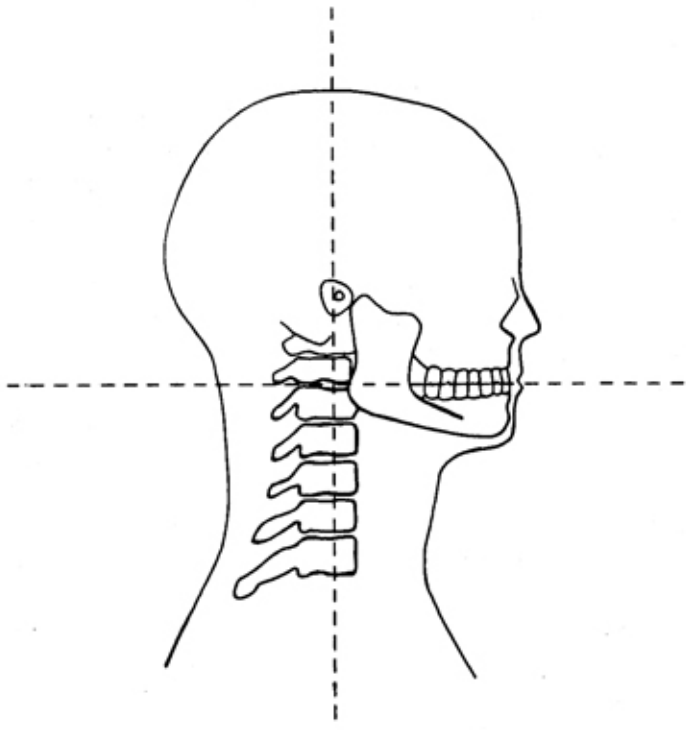
In case of side deviation (b) in opening and closing we have to observe the activity of the lateral pterygoids carefully.

Side deviations as a movement pattern have their proper place during the grinding activities of the teeth. The pattern means that the caput mandibulae and the discus articularis are moved forward only on one side while the other side is kept back and rotates around a vertical line. This is functionally meaningful in certain chewing activities because it allows the molars to shift sidewards a little less than their actual breadth. As a permanent pattern of opening and closing movements it shifts the phenomenon of grinding movements to the inside of the TMJ and creates a vicious circle of

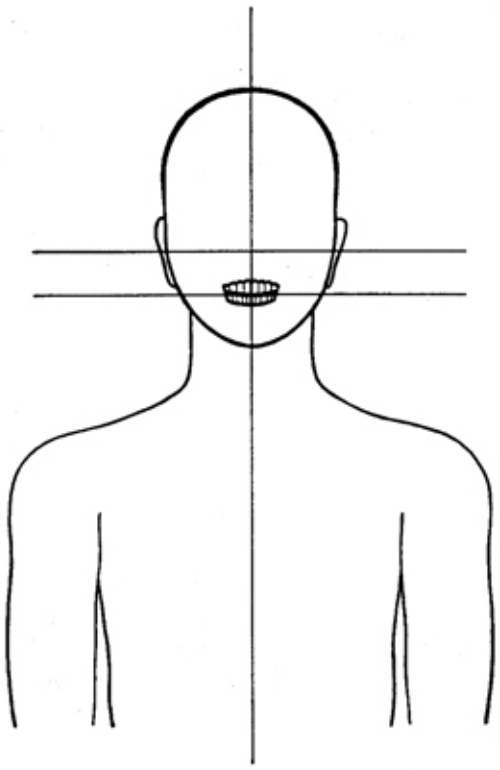
[4] In osteopathic theory the temporal bone and its movement within the cranial system is considered to be the keystone to resolve TMJ dysfunction.

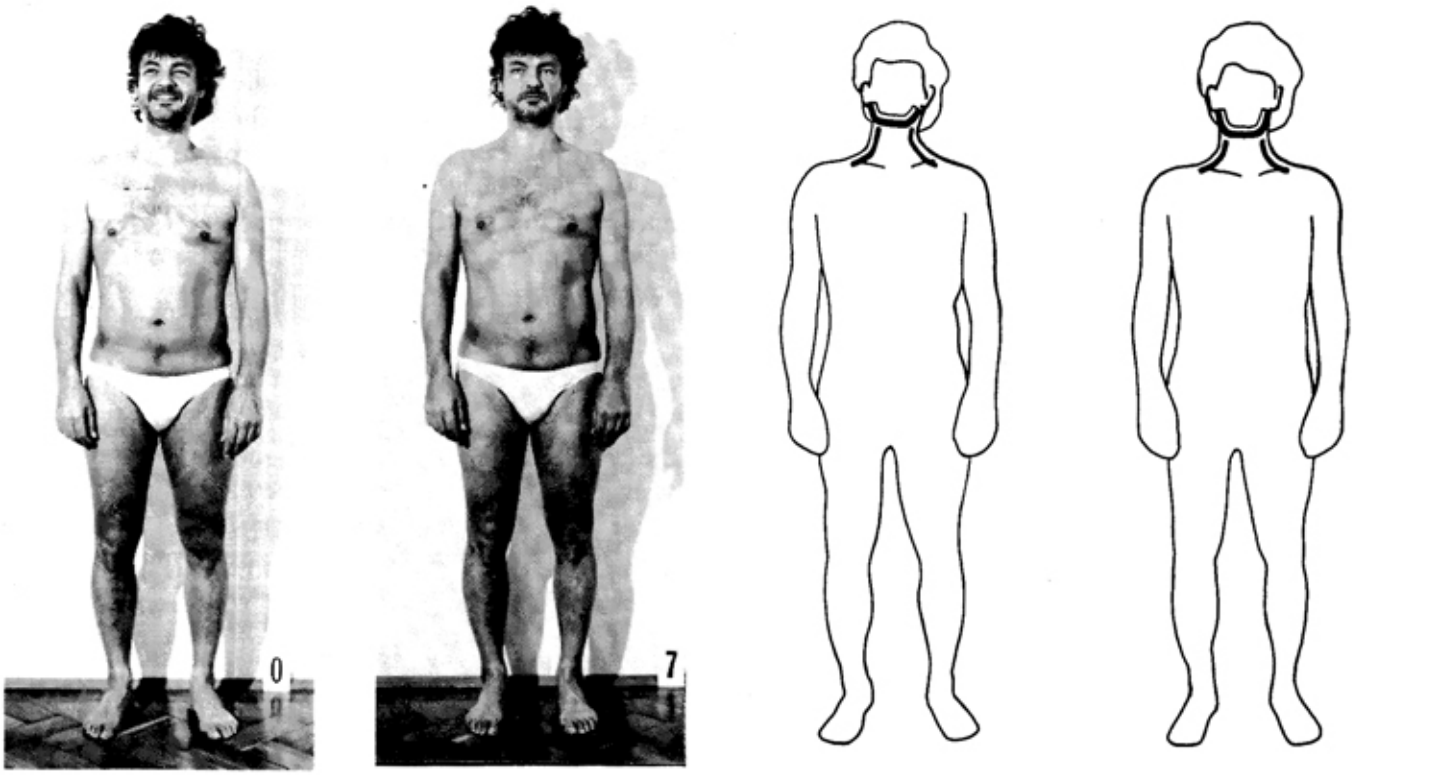
[5] The m. temporalis is attached to the cranial bone and the inside of the temporal fascia.

Ill.12 Vertebral balance related to occlusion



Ill.13





Ill.14 Minimal facial expression gives information about asymmetrical suspension of the jaws

strain in ligamentous parts of the capsule and dysfunction of movement[6].

For a proper analysis we have to look at the joint capsule in greater detail. In a balanced TMJ, the joint capsules allow on both sides sliding movements internally and externally. The internal movement articulates by the discus articularis, the external movement by the lateral temporomandibular ligament. Internal and external components contribute to shape one unit. The posterior part of the joint capsule adheres to the «bilamina» part of the discus, the lateral temporomandibular ligament is contiguous to the external part of the lateral layers of the capsule.

Traditionally, the side deviation (b) has been interpreted as an asynchronous activity of the lateral pterygoids on the two sides of the jaw. We speculate that this asynchronicity is based on strain patterns around the joint capsule, i.e. the lateral temporomandibular ligament and the part of the capsule which is connected to the posterior part of the upper head of the lateral pterygoid.

Ill.15 illustrates why the lateral pterygoid can be used as a main entrance to the inner construction of the TMJ during manipulation. The fascial layers which enwrap the lateral pterygoid are the main element to influence side deviations during opening and closing of the jaw.

Before we enter into discussing the basic principles of this manipulation, we have to face the question of the different space curves the jaw shows in opening and closing. Quite often they appear to be similar but are in fact different, the opening curve takes on another form than the closing curve. This phenomenon can be explained by the antagonistic action of the two heads of the lateral pterygoid: the inferior head of the lateral pterygoid flexes during opening of the mouth, while the superior head flexes in closing.

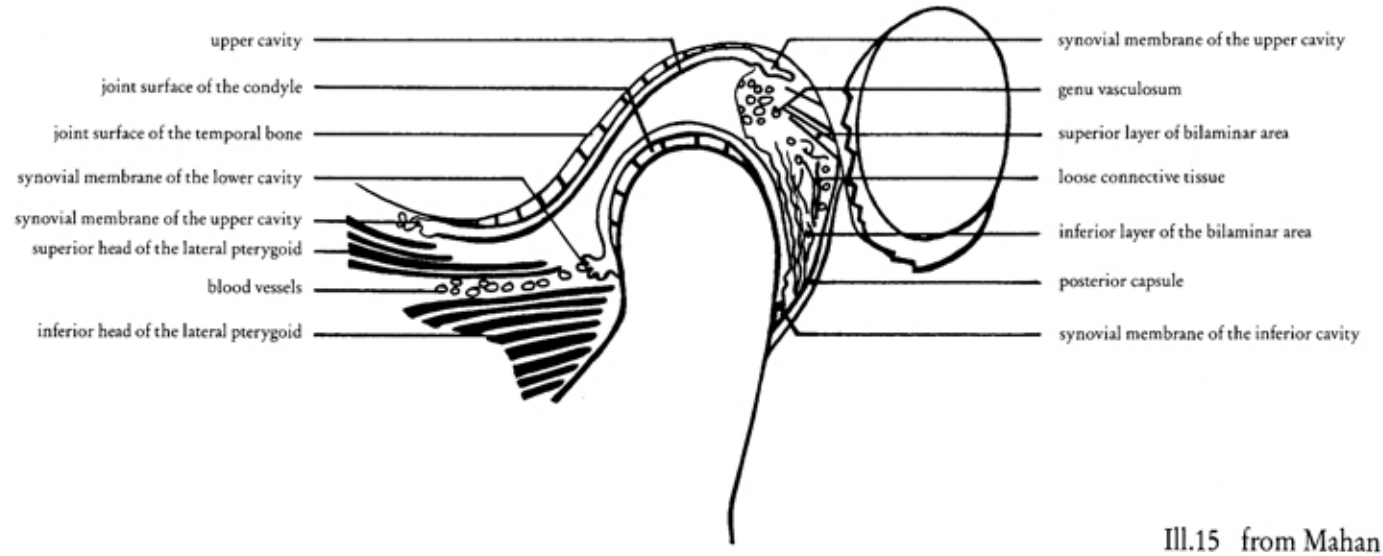
How can the complexity of the anatomical map contribute to the practical territory of manipulation?

Aspects of Manipulation

We have mentioned that standard work of Structural Integration arrives at a certain spatial order of shoulder-girdle, neck, cranial, and mandibular relationships. A good deal of the results is based on the manipulation of the neck. And these results imply improvement of opening capacity. It is often not taken into account that it is not only the mandible which moves downward and forward during the opening process: in drinking and eating activities the cranium tilts upwards and backwards while the mandible sinks. And the musculature of the neck acts as an indirect opener of the jaw, using the atlanto-occipital junction as a hinge. That's why the resilience of all the compartments of the neck is an indicator for the capacity of jaw opening. In this context we can understand why the flexibility of the atlanto-occipital membrane plays such an important role. This membrane acts as a constitutive element in the hinge function and relates downward with its anterior part to the superior portion of the longitudinal ligament.

Practitioners are usually happy with the results in the field of the neck and so are the clients if the work is done elegantly. This is not true for the more complex problem of disturbed movement patterns apparent in side deviation. It is

[6] This situation often includes a clicking of the joint.



Ill.15 from Mahan

simple to get quantitative improvement in opening, but it is not simple at all to get the two sides of the jaw balanced in movement. The dilemma starts as soon as we arrive at the layers around the hyoid bone. It is hard to develop any sort of «standard» approach because the tissue arrangements seem to be different in this area[7]. And the dilemma continues when we look at the inner construction of the TMJ because the deepest elements around the joint capsule are difficult to approach.

What can we do when opening and closing show dysfunctional sideshifts? We suggest that the TMJ is permanently observed in its relationship to the neck during manipulation. If the problem is rooted inside the TMJ, the neck has to compensate the movement restriction of the joint by activation of the anterior components. The more one side of the TMJ is under strain the more active the infrahyoid musculature has to be during opening. The authors of this article have observed cases with unilateral restrictions shifting the muscle activity during opening toward the extrinsic layers to such an extent that the platysma acted as the most active part to pull the jaw downwards against the forces of strain in the temporal fascia and around the TMJ. In situations like that all the compensations of the neck have to be taken out before we focus on the restrictions of the TMJ itself. We have to observe through palpation how the cervical fascia connects with the fascia of individual muscles. We have to watch out for details like the connection of the angular band of the cervical fascia with the masseteric fascia, and we test the resilience in the vestibule of the mouth around the depressor labii inferioris and the mentalis muscle. And apart from details we observe how the manipulation of the horizontal tissues (such as the diaphragma oris, the palate, and the atlantooccipital membrane) influences the tensional forces in other horizontal layers (thoracic inlet, respiratory and pelvic diaphragms).

There is a clear indication whether the compensations in the neck are resolved. We test the neck during turning to the sides; the moment of balance is characterized by resilience in the external muscles; the external muscles only *accompany* the movement which is *guided* by intrinsic muscles. In our opinion the direct approach of the TMJ is to be based on this balance.

In order to arrive at a final correction of the side deviation, the fascial layers enwrapping the lateral pterygoids need to be manipulated. We look at the connection with the posterior part of the capsule; the lateral pterygoid is our only direct entrance to the discus because the upper portion of the muscle connects directly with the discus. In Benninghoff's book the discus is called «Sehnenplatte» of the superior head of the lateral pterygoid[8].

In differentiating the two heads of the lateral pterygoid, we influence the most significant muscle of the TMJ. It is not only this muscle's unique capacity to extend the inner dimension of the joint, it is also involved in all movements of the TMJ as a balancing and correcting element.

The question remains how to apply manipulation to layers that adhere so tightly to the microstructure of the joint. Frequently, the critical layers can not be touched directly because the junction is too narrow to allow direct palpation. We suggest to use a sort of «wedge-technique». The practitioner carefully positions his/her finger as high as possible towards the posterior part of the joint. The opening of the client's mouth should be reduced as soon as this spot is found. Then the client is asked to close his teeth while the practitioner's finger acts as a «wedge», which indirectly influences the strain in the posterior part of the capsule.

It is important to be aware that this kind of manipulation has to be applied in different modes on both sides of the TMJ respecting the difference of strain found on those sides. Bilateral application of the same manipulation usually leads to quantitative improvement in opening but not to qualitative balance on the sides. We believe that balance accompanied by modest opening capacity is of higher value for the long term development of the joint than a maximum opening accompanied by a side deviation.

And it is important to avoid unnecessary irritations in this delicate area. The nervus lingualis and the nervus alveolaris inferior cross the lateral pterygoid vertically. To avoid pres-

[7] An example of highly individual arrangements is the digastric muscle, which is functionally important but missing in some people with its anterior venter.

[8] Benninghoff, Anatomie I, p. 530

Ill.16 Left side of the jaw seen from lingual: after the medial pterygoid has been removed we find the spatial relationship between the nervus lingualis, nervus alveolaris, and the lateral pterygoid muscle (the muscle fibers are darkened in the drawing)

sure on these nerves, the practitioner has to find contact through palpating a little bit posterior and superior to the intersection of nerves and muscles (Ill.16).

Conclusion: Some Remarks on Technical Theory

Before he starts his practical work, the practitioner of Structural Integration evaluates the factors contributing to the structural deviation of the TMJ. We have designated these factors as cranial, cervical, and mandibular traumata, as impact of repetitive psycho-emotional stress, as «general» structural deviation which indirectly governs the TMJ structure.

It is the fate of many manipulative disciplines that they can correct deviations based on mechanical trauma much easier than those which are permanently enforced by psycho-emotional stress.

The technique of the work observes principles which apply to both situations:

- A symptomatic area is to be influenced by connective tissue components which are as far away from the critical area as possible before the critical area is touched.
- Deep components, i.e. layers forming the intrinsic organization of the body, are to be prepared by manipulation of the enwrapping sheets.
- Any correction is seen in the context of creating a new pattern of INTERsegmental order and INTRAsegmental shape.

The practice of Structural Integration has developed mainly towards the direction of intersegmental order in doing manipulation based on analysis of blocks and cylinders. The application of the simple block-model is highly efficient because the connective tissue rules the connection of physical units, just as the bricks of a wall are kept together by mortar. But stability of intersegmental improvement does not only depend on the way in which the elements of the structural puzzle are connected with each other, it also depends on the intrasegmental shape of the elements.

With this in mind, the stability of a structural correction depends on the relationship of intersegmental order and intrasegmental shape. We expect those intersegmental alignments to be stable which go only as far ahead of the chronic pattern as structural coincidence with intrasegmental shape allows for, or, to put it in more speculative words, the quick course of intersegmental development meets with the slow course of change of intrasegmental shape.

From this perspective we see why mechanical trauma can be resolved easily as soon as manipulative intervention follows soon after the traumatic event: in such a case mechanical forces have disturbed intersegmental structure. Unless bones have been altered in their shape or ligaments have been torn, our manipulative approach has just to re-establish an appropriate connection between elements which should be respected in their integrity. If the trauma occurred long before manipulative intervention, the long-term intersegmental disturbance may have altered a few elements in their intrasegmental shape. The situation is similar to that of repetitive or permanent psycho-emotional stress: it is not only strain patterns around a junction which are causing trouble, it is the deterioration of constitutive elements of that junction, their altered shape embedded in intersegmental disorder, which perpetuates a vicious circle of strain.

Seen from a technical theory perspective, the teeth, possessing an occlusive quality, are a main intrasegmental element. Their combinatory quality can largely be shaped by standard intervention by a dentist. There are other intrasegmental elements like the bony shape of the mandibula which can be changed slowly in their developmental direction by manipulative intervention around tensional forces coming from the tongue and connective fibers of the masticatory muscles. And there are constitutive elements inside the TMJ, inside the joint, and around the joint capsule, which are available for subtle indirect manipulative approaches. The connection of the lateral pterygoid muscles with the discus articularis is seen as a keystone in this context.

We arrive at the conclusion that we can avoid some of the «trickiness» of the TMJ by combining a dentist's intervention with the integrative work done in connective tissue manipulation. The result is a combined improvement in the structure of intersegmental order and the function of adequate intrasegmental shape.

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