

Consideration from the Viewpoint of Chiropractic Correction on the Dysfunction of Temporomandibular Joint

This study was to investigate the needs of the functional abnormality of the Temporomandibular joint. The purpose of this study was to find out basic concept for the Chiropractic-care necessity of the neuromuscular skeletal patients with functional abnormality of the temporomandibular joint. I evaluated the change of the range of motion, neck pain, headache by post x-ray, orthopedic test and patient's charts. The range of motion at temporomandibular joint was improved and the necessity of chiropractic care was recognized in the neuromuscular skeletal patients with having temporomandibular joint problems.

Key words: *Temporomandibular Joint; Chiropractic-Care; Range of Motion*

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Received : 27 August 2013

Accepted : 4 October 2013

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INTRODUCTION

Aiming at curing the patients suffering from the pain of neck, the chiropractic correction has been implemented for the past couple of years, in orthopedics that focuses on the treatment of traffic accident patients.

While some patients showed the aftermath of traffic accidents right after accident, it was noticed that many patients have been continuously suffered from the pain of neck and waist, headache and dizziness for several months since the accident. And it was also noticed that many patients with the functional abnormality of temporomandibular joint, took a turn for the better, getting the treatment of chiropractic correction(1).

In many cases, traffic accidents lead to the whiplash injury in neck part. But, the symptoms of whiplash injuries manifest themselves not immediately but only after several months, supposing the worst. Therefore, it is very difficult to investigate to what extent the whiplash injuries would influence on temporomandibular joint(TMJ) (2).

In case of motor vehicle collision, the damage to passenger's head part is 2.5 times more than that

to car body, if the vehicle runs at the speed of about 15km per hour and the damage to head is more than 10 times more if the car runs faster than that speed. The injury of head caused by a traffic accident, frequently leads to the injuries of autonomic nervous system, brain and the central nervous system and it may also leads to injury of the TMJ.

When a vehicle is rear-ended, the driver's head and neck move backward to have the lower jaw be thrust back and move backward by muscular working. Due to the pressed disk inside TMJ, the inner part of joint is to collapse and the rear part of joint and the inside and outside of disk are to get ripped. Then, chronic synovitis are to be accompanied, some sounds may be heard from TMJ and it becomes impossible even to open the mouth(3).

The medical physicians and dentists including chiropractic physicians, have constantly studied on temporomandibular disorder for the past several decades. In particular, the temporomandibular disorder that was caused by traffic accident, is drawing keen attention from them. Most of temporomandibular disorders include such symptoms as synovitis, capsulitis, tendinitis, arthritis, and

myofascial pain syndrom(4).

However, what is important is we need to consider the situation of TMJ, distinguishing the intra articular matter from the extra articular matter.

The extra articular matter holds various problems, related to cervical vertebrae. Such various problems including the postural problem, dysfunctions caused by cervical subluxation and myofascial pain syndrome, turn up, interlinked with the matter of dental treatments. Some clinicians consider the dysfunction of cervical vertebrae as a kind of disorder of TMJ, combining the two disorders together. As we are well aware of, the intra articular matter is closely related to the situations inside the joint such as synovitis, capsulitis and etc. and is concerned with how such diseases give influence to the extent of dislocation and degeneration of joint.

The preceding researches had the view that 85%–90% of all people have the TMJ disorders(5). And this view is more influential towards the female than the male. What is interesting is that the violinists or viola players show higher rate of TMJ disorders(6). Also, the dispersion of TMJ disorders is less among the elderly who suffer from ostarthritis of TMJ(7).

Though the TMJ disorder is a local matter, the pain from that disorder spreads to the parts of neck and ear(8). The remedy for TMJ disorders is considered to be surely given to a pair number of patients who request to relieve their neck pain, the aftermath of traffic accident. Besides, even the chronic neck pain patients are appealing for the dysfunctions of TMJ together with their neck pain. In addition to this, those patients who suffered from plantar fasciitis and from the chronic low back ache, showed the dysfunctions of TMJ together.

In this context, the researcher came to conceive that the dysfunctions of TMJ which are common among most of musculoskeletal patients, should be healed surely. Accordingly, this research intends to systematically study on how to approach the matter of curing the dysfunction of TMJ from the viewpoint of chiropractic correction and on the cases of systematic treatment.

METHODS

This research intends to rapidly relieve the patients of pain by treating the dysfunction of TMJ from the viewpoint of chiropractic correction and to present the ways to solve the problems of headache and neck pain caused by the functional abnormality of TMJ.

Procedures

The researcher checked and analyzed the assessment and treatment of TMJ disorders, based on the chiropractic correction. Three patients who were suffering from neck pain and headache after traffic accident, were treated for 6 months, applying the chiropractic care for musculoskeletal disease on the basis of the results of chiropractic type measurement and the prognoses among them were compared each other.

Data Collection Method

3 traffic accident patients, hospitalized in 'S' orthopedic hospital in Anyang city, were selected as subjects. The researcher examined carefully their radiographs before the treatment and after the treatment and the assessment items for chiropractic therapy on diagnosis records. After this steps, the researcher investigated the conditions before the treatment and that after the treatment for 6 months and compared the difference between them.

TMJ and CHIROPRACTIC THERAPY

For chiropractic treatment, the spasticity and functional change of muscle is considered, based on the structural constituents of body. The movement of TMJ, explained by dentists, was investigated and the matter how human health is influenced by the structure and muscle function of TMJ, was researched in the field of chiropractic therapy. In this research, the muscles linked with TMJ, testing the related muscles, the viewpoint of kinematics regarding TMJ and TMJ's correlation with other body organs are to be discussed in order to furnish the future researches with strong foundations.

Physiological Viewpoint

The striated muscle is generally classified into 2 groups in terms of muscle function. One group is the group of postural muscles that resists the gravity and the other group is the one of motor muscles that move fast. Recently, the method of muscle classification, based on the attribute of rotation and the extent of solidity, has been discussed(2).

The muscles that are far from the axis of joint, may be of great solidity and the muscles that are

near the axis of joint, may have the attribute of rotation much.

Such features of muscles as were mentioned above, make muscles perform various momentary motions of contraction and relaxing, responding to stimuli and setting the range of motion. Simply mentioning, the muscle is the one which is to prepare for its shortening. However, the antagonistic muscle for relaxation is existing while there exists agonist for contraction. Some muscles perform similar motion, being attached to the same joint. They are tibialis anterior muscle and extensor digitorum longus. The tibialis anterior muscle perform the motion of adduction and the motion of dorsi flexion at the same time, while the extensor digitorum longus perform solely the motion of dorsi flexion. Also there are synergists that help these muscles. It is considered that there should be a definite rule by which so many muscles are engaged in continuous actions. The autonomic movement of body is based on the automatic response which is caused by the pertinent harmony between the solidity and the fluidity of body. Fortunately, most of autonomic nervous system performs cautiously the automatic controlling over muscles.

The muscle spindle is one type of proprioceptor that provides information about changes in muscle length. The Golgi tendon organ is another type of proprioceptor that provides information about changes in muscle tension. The Golgi tendon organ works reversely, compared to muscle spindle. The Golgi tendon organ is the tendinous tissue between muscle fibers of skeletal muscle and tendons. It is located between contractile muscles. The Golgi tendon organ is placed at the terminal of muscle and under impetus from strong passive stretching. But it is not so sensitive as muscle spindle. The Golgi tendon organ responds more intensively to the contraction of released muscle. It is to be constantly under impetus if it is located between contractile muscles. The muscle's contraction by the Golgi tendon organ is to relax the stretch of muscle spindle. If manipulative therapy gives direct influence to the Golgi tendon organ or muscle spindle, it is because that therapy brings about special responses. For instance, if the rigidity of a muscle is worsened to cause a trouble, the direction of pressurizing by the therapist should be towards the outside of the muscle belly. In the same manner, if muscle spindle has problem, the direction of pressurizing by the therapist should

be towards the central part of muscle to make the muscle relaxed. The muscle spindle is apt to forget the original proper state after a shock and damage. For example, the muscle becomes weak as muscle spindle forgets its original function after a damage and the antagonistic muscle on the other side stretches improperly. Therefore, if a muscle is in trouble, the function of muscle spindle should be strengthened. Thus, we can prevent the normal muscle and the abnormal muscle from fighting each other continuously, because of the information wrongly input.

Muscle Test

The method to decide the effects of muscle function is simple and direct. The result of muscle test is useful only when it is accurate. Because the inaccurate test creates only chaos instead of clarifying. The muscle test gives a good experience for doctors to improve their clinical competence as well as the directing competence. Besides, it is an important tool for diagnosis. Taking an instance, it is noted that the posture is closely related to the extent of muscle weakness, when we analyze the posture. The latissimus dorsi is associated with the height of shoulder and the sternocleidomastoid muscle and scalenus anterior are related to the slope of the neck. Generally speaking, the muscle weakness is closely related to lymph gland, the venous blood, the cerebrospinal fluid, improper nutrition and the flow of meridian system. Once the muscle weakness is verified, it is possible to suggest various opinions for treatment. The smallest unit of muscle fiber can be torn off and it can be cured if its origin and cutoff point are properly pressed. Based on this principle, the functional abnormalities of TMJ can be discovered and solved out.

Motions of Temporomandibular joint and Masticator Muscles

The TMJ is the most active joint in our body. The degeneration of articular surface of TMJ is deepened due to the rigidity of muscle and this can be seen through radiology report. The TMJ sound, occurring while opening one's mouth, comes about because the joint is pushed out forwards. This type of problem can be solved through relevant exercise.

Also, the sound, occurring while closing one's

mouth, is related to the problem on horizontal plane of TMJ. From kinematic point of view, the sound when opening one's mouth is caused by the brittleness of either one or both temporalis. And this can be cured when we prevent the joint from being pushed out forward by pushing the temporalis bidirectionally, from the rear side of temporalis to the mandibular condyle and at the same time, from the mandibular condyle to temporalis. The sound when closing joint is related to the hypertonicity of buccinator and masseter. Such malfunction can be cured by strengthening the origin and cutoff point of masseter. And the Golgi tendon organ is to be activated through spreading internal pterygoid and buccinator. Such steps as explained above, can effectively cure the damaged part on the horizontal plane.

1) Case 1

- ① Name of patient : Park/○○ (Male, 18 years)
- ② Occupation : Student
- ③ Major symptom : Pain at left TMJ
- ④ The time of disease onset : not definite
- ⑤ Causes to increase pains : Opening of the mouth, Biting the hard things
- ⑥ Causes to decrease pains: relaxing
- ⑦ History of disease: The patient had fallen down from the lavatory roof to have his forehead wounded 3 years ago. He has been feeling stiff in his neck and sore in his waist since that time.
- ⑧ Test
 - Progress : Left masseter and temporalis are stiffened.
 - Observation : When trying to open mouth, the patient's chin was deviated to the right side. While the patient was trying to keep his mouth opened, it was impossible for him to put his three fingers into his own mouth. He leaned his head back much when opening mouth. He stuck his chin out and could not align his neck and back along the same line. His neck inclined to the left and the height of left pelvis and left shoulder was higher than those of right side.
- ⑨ Deciphering X-Ray Report
 - The mandibular condyle of TMJ showed almost no motion when it was seen on the X-ray photo of the patient's open mouth.
 - The spinous process of cervical vertebra was not seen in a direct line.
 - No degenerative change was found.

- The syndrome of forward head posture and flat back was seen from the photo taken laterally.

- ⑩ Diagnosis
 - Functional disorder of TMJ and Chronic neck pain
- ⑪ Cure
 - Everytime the patient came, the myofascial release and the technique of hypertension/counter strain were performed on the pressing points of masseter, internal pterygoid, lateral pterygoid and temporalis where pains were felt at the time of muscle test.

Table 1. To adjust vertebral subluxation: the Palmer/Gonstead technique was used.

C1	ASRP
C3	PL-L
T5	PRI-T
L4	PLS
Pelvis	left PIEX

- Treatment
- First month(May)
 - First week : daily treatment
 - Second week : every other day
 - Third week : once every three days
 - Fourth week: once every three days
- Second month(June)
 - Fifth week : once a week
 - Sixth week : once a week
 - Seventh week : once every two weeks
 - Eighth week : once every two weeks
- Third month(July) : once a month
- Fourth month(Aug) : once a month
- Fifth month(Sep.) : once a month
- Sixth month (Oct) : once a month
 - Relaxation : When the patient was held in one position for about 40 minutes, he was advised to change his position. He was instructed not to chew such things as dried cuttlefish and chewing gum and etc.. He was advised to change his sleep habits and to correct the pillow height.
 - Exercise : The manual on how to perform the whole body stretching exercises or the gymnastics for vertebra health, was printed and given to the patient. Whenever he came, and was corrected if anything wrong was found. In particular, he was prohibited from

turning his neck while exercising his neck and advised to get rid of his habits of making a sound by moving his neck violently. Additionally, the patient was briefed on how to strengthen his neck by exercising.

Prognosis

- ⑫ - The pains disappeared completely after 1st week.
- The sound generated while opening the mouth disappeared after two weeks had passed.
- Not only the discomfort of TMJ but also that of neck and shoulder disappeared after 3 weeks.

- Same conditions were maintained till the end of 5th week.

- After seven weeks had passed, the patient could concentrate on studying more and the extent of postural inconvenience was much lessened.

- Upon taking X-Ray photo again in Oct., the motion of mandibula condyle was turned out to have made a salient improvement.

- For the period of 6 months from the 2nd week, the patient never appealed for TMJ pains. He also remarked that his concentration on studies was improved.

Table 2, Case 2, 3

	Case 2	Case 3
Patient	Kim/00, female, 25years, office worker	Lee/00, female, 35years, housewife
Major symptom	Pain at TMJ and neck	Pain at TMJ and neck
Disease Onset	aftermath of traffic accident	aftermath of traffic accident
History of disease	the pain of neck and shoulder was repeated intermittently	the pain of neck and shoulder was repeated intermittently
Check	The movement of TMJ was decreased on the X-Ray photo	The movement of TMJ was decreased on the X-Ray photo
Diagnosis	functional disorder of TMJ and whiplash injury	functional disorder of TMJ and whiplash injury
Cure	ice, muscle treatment, Palmer-Gonstead technique	ice, muscle treatment, Palmer-Gonstead technique
Listing	cervical vertebra No.1- ASLP cervical vertebra No.2- PRS thoracic vertebra No.4- PLI-T Pelvis-left PIIN	cervical vertebra No.1- ASLP cervical vertebra No.3- PLS lumbar vertebra No.5- PLI-M Pelvis-left PIEX
Treatment	1st week : every day 2nd week : every other day 3rd week : once every three days 4th week : once every three days 5th-8th week : once every two weeks For the remaining 4 months : once a month	1st week : every day 2nd week : every other day 3rd week : once every three days 4th week : once every three days 5th-8th week : once every two weeks For the remaining 4 months : once a month
Exercise	whole body stretching exercise, gymnastics for vertebra health	whole body stretching exercise, gymnastics for vertebra health
Prognosis	deciphering X-Ray, it was noticed the motion of mandibular condyle was improved	deciphering X-Ray, it was noticed the motion of mandibular condyle was improved

DISCUSSION

The major chiropractic test on masticatory muscle is to evaluate the proprioceptor of muscle. The test is conducted through investigating whether the index muscle (which had been judged to be strong in muscle test) is still judged to be strong even when they are retested, putting a hand on the patient's TMJ. If the index muscle turned out to be weakened in this retest, the TMJ portion on which hand were placed, should be judged to be positive.

The individual test on masticatory muscle is being conducted, while the patient is opening and closing his mouth repeatedly. This time, the muscle test would be in trouble if the patient were instructed to open his mouth too wide or hold his upper and lower teeth tightly. It is because the former might cause the stimulation on the proprioceptor of periodontal ligament or the functional abnormality of cranium and the latter might lead to malocclusion.

If the index muscle of TMJ, touched by hand turns out to be positive while opening the mouth wide, it means that the muscle for opening the mouth, that is, the lateral pterygoid might be related to. Otherwise, the anterior belly of digastric muscle might be related. If the upper and lower teeth do not contact with each other while closing the mouth, the masseter, temporalis or internal pterygoid that works to close the mouth could be troublesome.

If neuromuscular spindle cell of the masseter does not work normally, it is recommended to rub the masseter with thumbs of both hands, having one thumb move in lengthwise direction of the masseter and the other thumb move in transverse direction of buccinator. This process have proven to be effective clinically(9).

If the neuromuscular spindle cell of temporalis (a temporal muscle) is functionally abnormal, it is recommended to rub the temporalis with thumbs of both hands, having one thumb rub from mandibular condyle to the rear side of temporalis and the other thumb rub in the opposite direction, in order to prevent spindle cell from being activated.

If problem happens when closing the jaw, the internal pterygoid might be related to. In this case, it is necessary to verify whether the strong index muscle is weakened, placing hand on the suspicious internal pterygoid. If weakened, it can be corrected by sweeping down the relevant internal pterygoid with fingers. Normally, the internal pterygoid is situated in the lateral side and lower part of pterygoid process.

When the problem happens while closing the jaw, the treatment of lateral pterygoid should be considered. When we need to promote lateral pterygoid, we should promote along the surface of mouth cavity near the alveoli of last upper molars, using the index finger. If promotion is difficult as index finger is too thick, it is required to use little finger instead of index finger.

It is required to have the finger reach the lateral side of lateral pterygoid platetry, keeping on moving finger behind the tubercle of maxilla(10). If the curer move his finger backward upon arriving at this part, the patient feels a keen pain in the part of functional abnormality. The curer can reach the target part more easily, if he advances while keeping on opening and closing the patient's mandibula. At the moment the finger makes contact at lateral pterygoid best, the curer should move his finger rapidly as if he picked out that muscle with finger.

There exists other way. If the strong index muscle shows a positive response though the curer did not touch TMJ with hand, it is presumed this was caused by disharmony of the fascia of both temporal muscles and both masseters. So, it is necessary to find out the strong index muscle by touching each temporalis and masseter, keeping the patient's mouth opened. Then, the curer rubs the fascia of discovered part 10-15 times towards the direction of heart.

In order to clear the last matter of jaw deviation, we need to have the patient twist his lower jaw to the left. If any positiveness were found, then the lateral pterygoid of that part of positiveness and the rear temporalis in the opposite side should have problems(11). In this case, the method how to correct lateral pterygoid is same as was explained previously and in order to correct the rear temporalis, it is necessary to ease the hypertension of muscle spindle, rubbing the rear part of temporalis with both fingers. This time the rubbing direction of each finger crosses each other.

If the problem continues in spite of above remedy, the curer should test the index muscle after the patient makes his upper teeth and lower teeth tightly contact with each other. If any positive response appears by this test, the probability of malocclusion is high and the dental treatment is recommended. Also, if the patient appeals for the keen pain while opening jaw wider even though he did not feel pain so much in the beginning stage of opening jaw, this may be because of the internal derangement, arthritis or the diseased parts around joint. This also requires different interpretation of physical tests.

However, we need to further consider the abnormality

of cervical vertebra and cranium and the correction of muscles around cervical vertebra, in particular the sternocleidomastoid muscle and scalene muscles, even after the treatment of neuromuscular spindle and Golgi tendon organ of TMJ. Additionally, we could notice that the pains and abnormalities of TMJ disappeared marvelously when we observed the troubled parts after we had meticulously cured the abnormal part of pelvis, the thoracic vertebrae and even foot.

This is because of the fact that the musculoskeletal system is a wholeness and it influences on the whole body, depending on closed kinematic chain and open kinematic chain(12).

Aiming at the normalization of joint motion, the remedy of TMJ disorder and the correction of the subluxated vertebral joint were conducted also for the patients in above instances. Even though it was important for the patients mentioned in this research to clear the problem of TMJ itself, it was revealed that it was also important for them to clear such problems as the scoliosis, neck pain, shoulder discomfort and many other latent problems. That is, after all these related problems had been settled, the normal state of TMJ was maintained and no other abnormalities showed up. In other words, the TMJ problem did not merely mean the problem of TMJ itself and the fact that a joint has got some disorders could be interpreted to be a signal informing that the other organs of body also have got disorders to be cured.

CONCLUSION

As seen above, the temporomandibular joint causes various orthopaedic problems. The functional abnormality of troubled TMJ brings about the maladjustment of masticatory movement and various functional abnormalities is to take place because of this maladjustment. In the field of chiropractic correction, the lengths of both legs are usually measured to be compared with each other and thus, our body's imbalance can be detected. It is believed the functional abnormality and maladjustments of our whole body are reflected in the limb-length discrepancy. When we measure the leg length after we have detected and cured the ill part, we comes to find that the lengths of both legs are temporarily same. But our body is to rapidly respond as the sensory receptors affected by the outside stimuli such as the actions of standing up, sitting down or other forms,

militate and in this course of responding, the length of one leg might be shortened again on account of the influence from the ill part. Therefore, the discrepancy in leg length can not be overcome unless we cure the functional abnormalities of our whole body. Likewise, more than 50% of cerebral parts related to sensory function are linked with the temporomandibular joint. This is because it is necessary to prevent the musculoskeletal stimuli from outside from being entangled inside(13).

Accordingly, the habitual abnormality of masticatory movement by TMJ is to deliver bad stimulus to our brain and the function of our brain is to be continuously damaged due to this. Besides, the improper masticatory movement caused by pains are to get shown in the pains related to the functional disorder of head, neck and body.

Once the masticatory disorder were corrected, the partial damage of body would be cured and disappeared. It is believed that all the treatments start from this correction.

If we observe this matter meticulously, we can see that this is rather a dental problem and TMJ disorders than the masticatory disorder. In addition, this can be interpreted to be the tension of TMJ and surrounding muscles and also to be the related proprioceptor's disorder, which were explained hereinbefore.

REFERENCES

1. Blake P, Thorburn DN, Stewart IA. Temporomandibular joint dysfunction in children presenting as otalgia. *Clin Otolaryngol Allied Sci* 1982; 7(4): 237-244.
2. Gelb H, Tarte J. A two-year clinical dental evaluation of 200 cases of chronic headache: the craniocervical-mandibular syndrome. *J Am Dent Assoc* 1975; 91(6): 1230-1236.
3. Croft AC, Steigerwald DP. TMJ and Whiplash: Of Forces and Farces. *Dynamic Chiropractic* 1992; 10: 22-30.
4. Ballegaard V, Thede-Schmidt-Hansen P, Svensson P, Jensen R. Are headache and temporomandibular disorders related? A blinded study. *Cephalalgia* 2008; 28(8): 832-841.
5. Jokstad A. Some evidence for the management temporomandibular joint disorders. *Evid Based Dent* 2012; 13(1): 27-28.
6. Kovero O, Könönen M. Signs and symptoms of temporomandibular disorders and radiologically observed abnormalities in the condyles of the temporomandibular joints of professional violin

- and viola players. *Acta Odontol Scand* 1995; 53(2): 81-84.
7. Ow RK, Loh T, Neo J, Khoo J. Symptoms of craniomandibular disorder among elderly people. *J Oral Rehabil* 1995; 22(6): 413-419.
 8. Helms CA, Morrish RB Jr, Kircos LT, Katzberg RW, Dolwick MF. Computed tomography of the meniscus of the temporomandibular joint: preliminary observations. *Radiology* 1982; 145(3): 719-722.
 9. McComas AJ. Oro-facial muscles: internal structure, function and ageing. *Gerodontology* 1998; 15(1): 3-14.
 10. Schwartz L, Chayes CM. The history and clinical examination. Philadelphia 1968.
 11. Gatterman, Meridel I. Foundations of Chiropractic Subluxation, St, Louis 1995.
 12. Plaugher G. Text book of Clinical Chiropractic. Williams and Wilkins 1993.
 13. Leach, Robert A. The Chiropractic Theories. Williams and Wilkins 1994.