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Case Report

Occlusal Disease

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Abstract

This is the review of our practice for temporomandibular disorders. Some current articles have concluded that the available evidence does not support occlusal adjustment as a reasonable therapy for temporomandibular disorders. However, occlusal adjustments in previous studies were used the centric relation (retruded contact position) as a reference position. Therefore, the treatment outcome of occlusal adjustment using the bite plate-induced occlusal position as a muscular reference position to make coincident with habitual occlusal position was reviewed.

Introduction

Occlusal disease is a comprehensive term for various symptoms caused by occlusal discrepancy between the habitual occlusal (HOP) and muscular (MP) positions. These are referred to as temporomandibular disorders (TMDs); however, it is appropriate to use the term "occlusal disease" because these symptoms are strongly related to the discrepancy between HOP and MP. In 1959, Brill et al. postulated that the coincidence of the muscle and tooth position (intercuspal) constitutes a physiological condition, whereas the lack of a coincidence of these two positions may be indicative of a pathological condition [1].

MP is defined as the position when the jaw is closed by voluntary muscular activity with an upright posture. HOP is an arbitrary closed position (tooth position). Generally, MP is coincident with HOP; however, in some individuals, it is not, which results in the manifestation of various symptoms in these individuals. To alter a patient's occlusal habit and obtain a physiological muscular position, the bite plate-induced occlusal position (BPOP) is used for reference of muscular position during voluntary jaw closing, while in an upright position, and after wearing an anterior bite plate for a short period of time.

It has been reported that these two positions do not coincide in patients with the temporomandibular joint (TMJ) clicking sounds [2]. Symptoms associated with occlusal disease include oral dyskinesia, glossodynia (painful tongue), burning mouth syndrome, tension-type headache, tinnitus, earache, coxalgia and vertigo. [3-9].

Oral dyskinesia

Case 1:

This patient visited us with her chief complaint of TMJ pain on the right side accompanied by clicking sounds (Figure 1). She was a 17 year-old high school student and the daughter of a dentist. She has been aware of TMJ clicking since the age of 12.

She had been diagnosed with bilateral disk displacement with reduction, along with arthralgia.

After wearing a bite plate, her pain was relieved and occlusal analysis in BPOP was performed. The analysis indicated premature occlusal contacts on the second molars on both sides (Figure 2).

The first examination of March 23, 1993; impressions were taken to fabricate a full coverage-type bite plate (Figure 3). The patient first wore the bite plate on March 30. On April 1, her pain relieved and BPOP wax records were taken; the casts were then mounted on an articulator with the record. The occlusal adjustment was performed on the models and then in the mouth referring the models.



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Figure 1: Treatment record

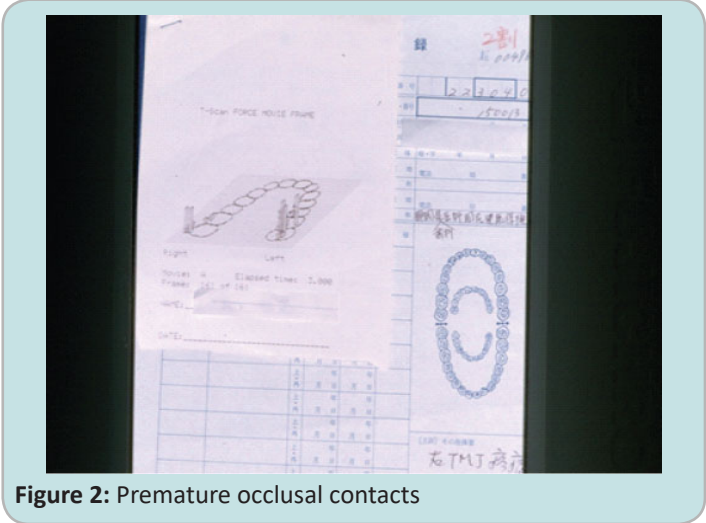


Figure 2: Premature occlusal contacts

Table 1: Treatment outcome of TMD patients with aural symptoms in our practice. G: Gender; Visits: Number of visits; Period: Treatment period (month); Follow-up: year; Disc Disp: Disc displacement; Myofascial: Myofascial pain; M: Male; F: Female; (R), (L) and (B): Mainly affected side on the (R): Right;(L): Left; (B): Both sides.

No	Age G	Complaints	Diagnosis	Visits	Period	Outcome	Follow Up
1	16 M	Limited Opening Tinnitus (R) Headache	Disc disp.(R)	4	2m	Resolved No recurrence	5y
2	20 F	Limited Opening Tinnitus (R) Facial pain	Disc disp.(B)	7	5m	Resolved No recurrence	3y
3	22 F	Limited Opening Tinnitus (L) Headache	Disc disp.(L)	16	5m	Resolved No recurrence	3y
4	28 F	Limited Opening Tinnitus (L) Ear fullness	Myofascial (L)	11	3m	Resolved No recurrence	5y
5	35 F	Facial Pain Tinnitus (L) Headache	Myofascial (L)	4	2m	Resolved No recurrence	3y
6	37 F	Limited Opening Tinnitus (L) Headache	Disc disp.	11	3m	Resolved No recurrence	3y
7	42 F	Facial pain Tinnitus (L) Vertigo	Myofascial (L)	12	2m	Resolved No recurrence	5y
8	47 F	Limited opening Tinnitus (L)	Disc disp. (L)	10	5m	Resolved No recurrence	2y
9	73 F	TMJ pain Tinnitus (R) Vertigo	Arthralgia (R)	20	5m	Resolved No recurrence	7y

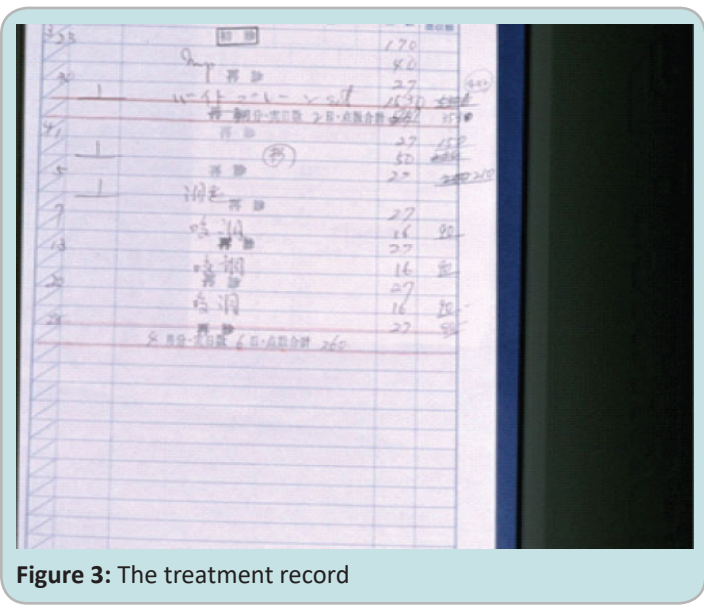


Figure 3: The treatment record

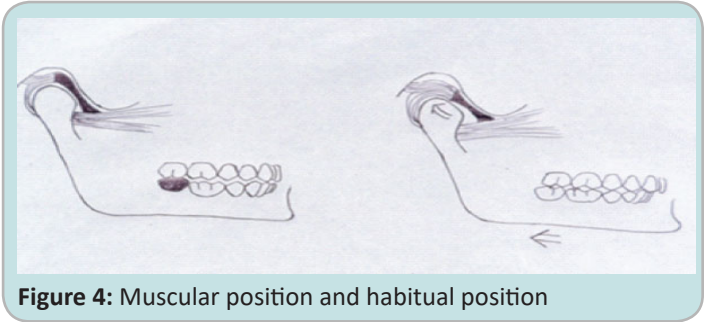


Figure 4: Muscular position and habitual position



Figure 5 (Oral dyskinesia Case-2): The patient had a limited mouth opening.

After the adjustment, impressions of upper and lower jaws were taken and the models then were mounted on the articulator. The same procedure was repeated until bilateral occlusal contacts were obtained. Occlusal adjustments in BPOP were performed four times, and the clicking and pain totally disappeared after 5 weeks of treatment.

It was proposed that premature occlusal contacts on both second molars interfered with teeth meeting together and the mandible moved back (retruded position), forcing the disc anteriorly move.

As a result, upon jaw opening, the condyle pushed, rode the disc, and then the disc moved back to its original position. During this time, the clicking sound occurred. (Figure 4) indicates that premature occlusal contacts on both second molars interfered with teeth meeting



Figure 6 (Oral dyskinesia Case-2): Wearing a Bite plate.

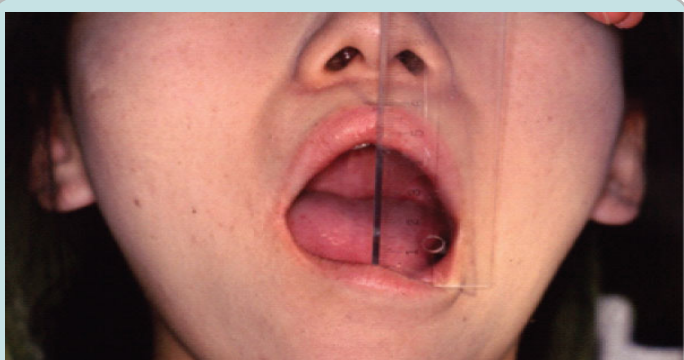


Figure 7 (Oral dyskinesia Case-2): Releasing symptoms.



Figure 8 (Oral dyskinesia Case-2): Left: After removing the muscular position wax record. Right: The upper model makes contacts with the lower model.



Figure 9 (Oral dyskinesia Case-2): The occlusion in the muscular position.

together and the mandible then moved back and the disks were forced to anteriorly move. Upon opening, the condyles pushed, rode the disks and then disks moved back to its original position. During this time, the clicking sounds occurred. When the condyle can't ride the disks, the mouth opening will be disturbed.

Case 2:

This 25 year-old female patient visited us with the chief complaint of limited jaw opening and pain in the right temple, neck and shoulder (Figure 5). She reported that she was often aware of the left TMJ pain and limited jaw opening. Her medical history was not remarkable. Regarding her occlusion, midline deviation was not detected and vertical and horizontal overlaps were very small. The maximum unassisted opening was 28 mm.

She reported tenderness on the palpation of the left TMJ, the right anterior temporalis, the right platysma and sternocleidomastoideus, and the left external and medial pterygoideus. The opening path deviated



Figure 10 (Oral dyskinesia Case-2): Premature contacts.

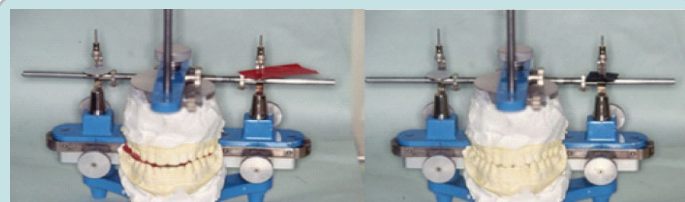


Figure 11 (Oral dyskinesia Case-2): Left: Recording the muscular position; Right: Recording the habitual occlusal position.

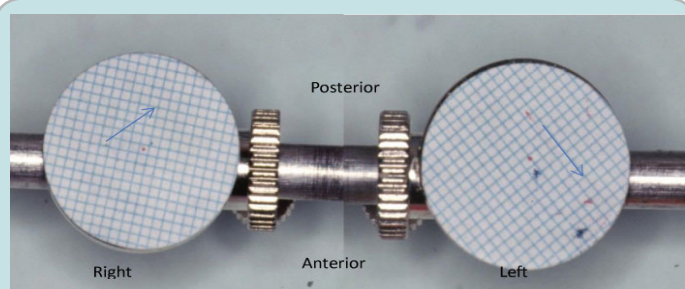


Figure 12 (Oral dyskinesia Case-2): Recorded shifts from MP to



Figure 13 (Oral dyskinesia Case-2): Removed premature con-

to the left side. She reported a stuffed ear on the left side and eye symptoms (flashing in the bottom of the eyes). She was diagnosed as having myofascial pain with limited jaw opening.

A bite plate was fabricated and worn in her mouth (Figure 6).

After 1 week of wearing the bite plate, the maximum unassisted jaw opening increased 45 mm (Figure 7). After 2 weeks of wearing the plate, all muscle tenderness disappeared, except the left external and medial

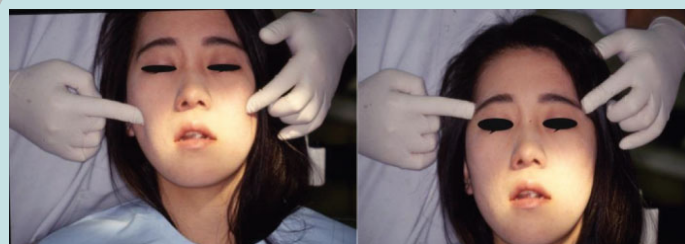
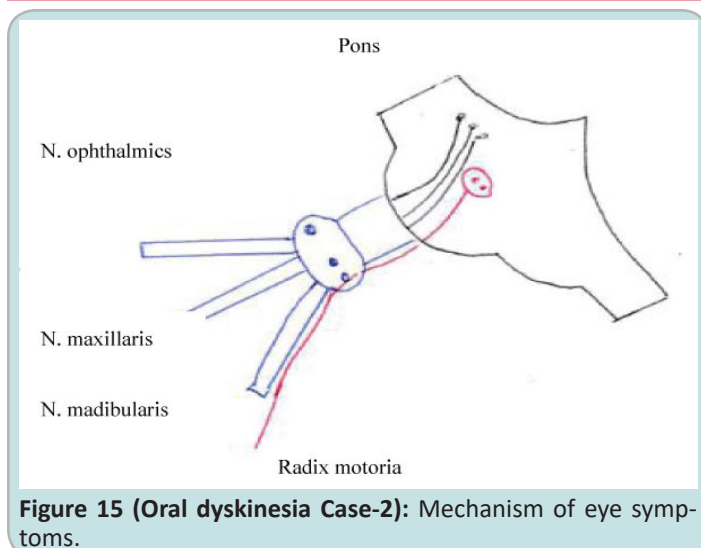


Figure 14 (Oral dyskinesia Case-2): Muscle palpations



pterygoideus and the sterno-cleido-mastoideus.

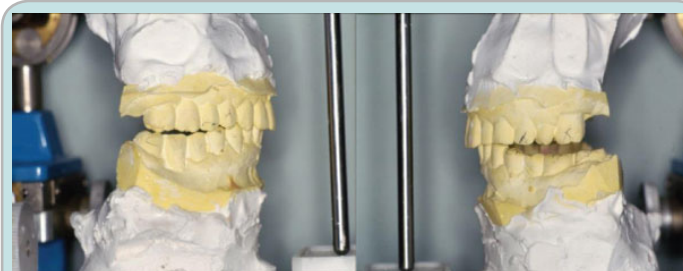
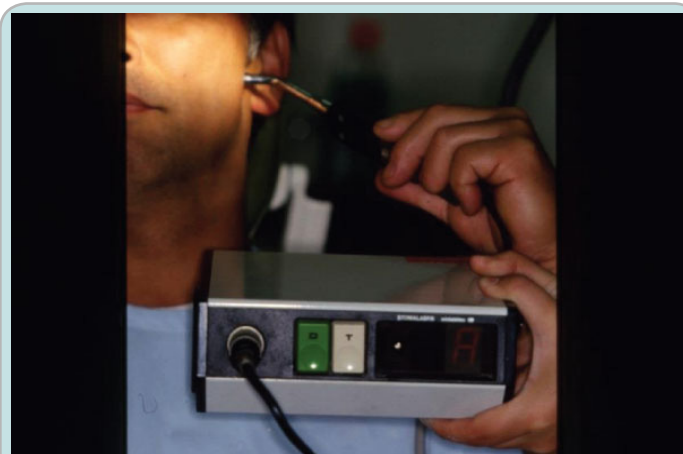
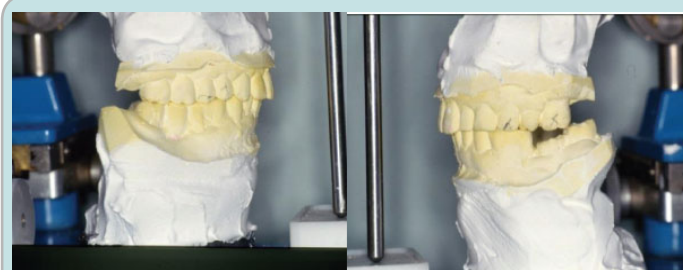
Dental models were mounted on an articulator with the BPOP wax record and the upper mounting plate was moved down until the teeth made contact. This movement is not a hinge movement, but vertically downward movement which is important for reproducing the occlusion on an articulator (Figure 8). Premature occlusal contacts were analyzed on the articulator (Figure 9). Premature occlusal contacts of molars on both sides were detected (Figure 10).

The occlusal discrepancy was examined in HOP and BPOP on the articulator (Figure 11). Occlusal discrepancies were recorded on the disks. Red indicates BPOP and blue indicates HOP (Figure 12).

Her HOP was antero-laterally deviated on the left side and postero-medially deviated on the right side.

The premature contacts were removed on the casts and ground out in her mouth according to the casts (Figure 13).

After occlusal adjustment, she did not report any tenderness upon



muscle palpation (Figure 14). After removing the interferences, the muscle tenderness of the shoulder, neck, and occiput on the right side completely disappeared. Eye symptoms also disappeared. She completely recovered 3 months after the first examination.

When habitual occlusal position and muscular position are not coincident, masticatory muscles require additional muscle activities to adapt the mandible to habitual occlusal position from the muscular

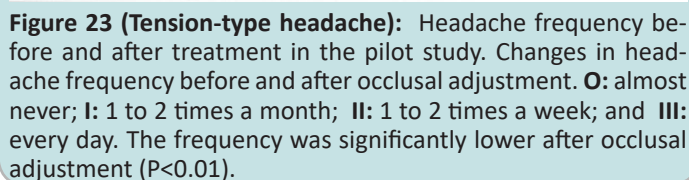
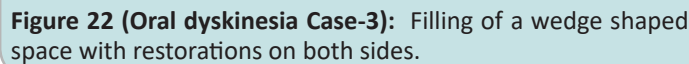
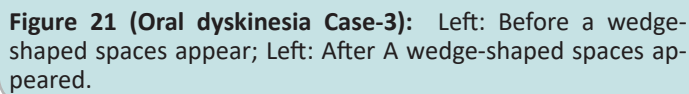
position. This extra muscle activities may cause abnormal excitement of motor nucleus of the trigeminal nerve. This abnormal excitement may cause the excitement of sensory nucleus of the trigeminal nerve. Eye symptoms may be caused by excitement of ophthalmic nerve provoked with overload of the mandibular motor nerve (Figure 15).

Case 3:

This 51-year-old male patient visited us with a chief complaint of limited jaw opening and left TMJ pain (Figure 16). He was unaware of

disappeared. Because his TMJ clicking left untreated for an extended time, the relationship between the disk and condyle was permanently distorted. After the TMD symptoms disappeared, a wedge-shaped space formed in BPOP.

Bite plate and laser therapy were continued for 3 months. After the two therapies, the left condyle could smoothly move and the TMJ pain



Wedge-shaped spaces were apparent on both sides, particularly the space on the left side was larger than that on the right side (Figure 20). How did these spaces appear? (Figure 21) shows lateral views of BPOP and habitual occlusal position before and after the symptoms

Figure 24 (Painful tongue and burning mouth syndrome):
Patient's report

Figure 25 (Painful tongue and burning mouth syndrome): Burning mouth syndrome.

In our pilot study, thirteen patients reported headache symptom.

Aural symptoms (earache and tinnitus) are thought to be caused by synchronous contraction of the tensor tympani and masticatory muscles

She was 24 year-old. Her chief complaint was burning sensation of the upper jaw (Figure 25). She visited two departments of oral surgery in independent hospitals. However, no abnormalities were found



Figure 29 (Coxalgia and lumbaigo): Complaining TMJ noise and coxalgia.



Figure 30 (Coxalgia and lumbaigo): Existence of lower third molars and lack of both first premolars.

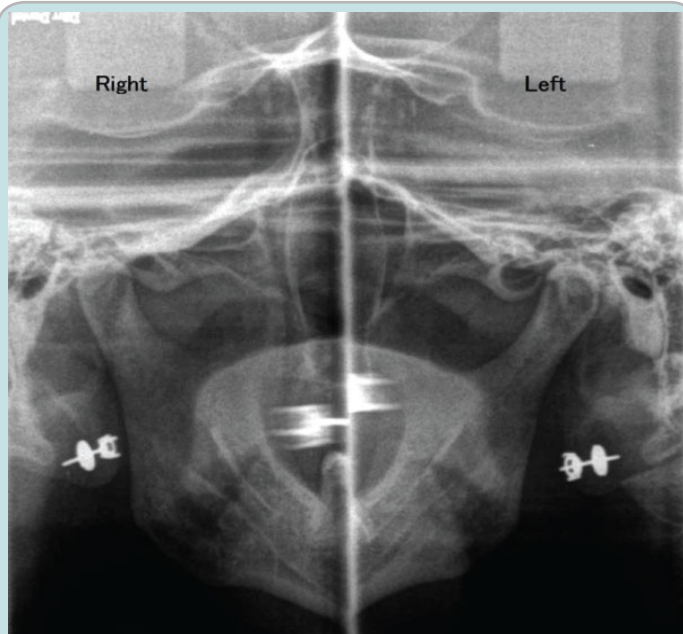


Figure 31 (Coxalgia and lumbaigo): Roentgenogram of TMJs.

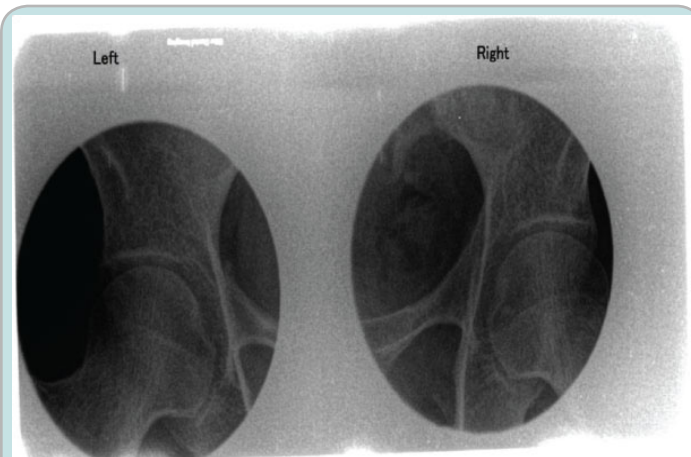


Figure 32 (Coxalgia and lumbaigo): Roentgenogram of coxae.

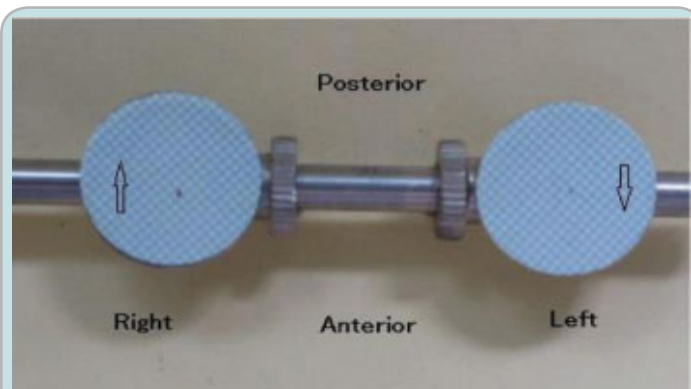


Figure 33 (Coxalgia and lumbaigo): Condylar shifts from MP to HOP.

in the mouth. Total 10 appointments of occlusal adjustment were undertaken (Figure 26). Remounting of the models was performed at each appointment. Resolution of the symptom had required 4 months (Figure 27).

Glossodynia (painful tongue) and burning mouth syndrome are thought to be due to the chorda tympani being squeezed between the malleus and incus with tensor tympani tension synchronously produced with the contraction of masticatory muscles (Myrhaug 1965)[7]. Chorda tympani is branched from facial nerve and passes through between malleus and incus, then joining to lingual nerve, in charge of function for taste and secretion of saliva.

Painful tongue or burning mouth syndrome is caused by the chorda tympani being squeezed between the malleus and incus with the tensor tympani tension synchronously produced with the contraction of masticatory muscles (Figure 28).

Coxalgia and lumbago

A 44-year-old female patient presented with a chief complaint of severe pain and noise in the left TMJ (Figure 29). She reported that she had not previously experienced these symptoms. She reported coxalgia on the left side had started 6 months prior to the first examination. Her medical history was unremarkable. Upon palpation, she reported tenderness on the left TMJ but not the masticatory muscles.

Her four first premolars were missing because of previous orthodontic treatment, but the lower third molars remained (Figure 30). Dental occlusion was anatomically normal. The TMJs appeared normal bilaterally, and both hip joints also appeared normal (Figure 31,32). Her HOP was deviated 1 mm posteriorly from BPOP on the left side and 1

mm anteriorly on the right side. These deviations are opposite directions each other which may cause a twisting effect of the mandible. It may affect the body posture (Figure 33).

Occlusal adjustments in BPOP were performed during the first two visits (Figure 34,35). On third visit, she reported no noise in her left TMJ and no coxalgia or lumbago on the left side; however, she complained of cheek, tongue, and lip biting, which disappeared by the fourth visit.



Figure 34 (Coxalgia and lumbaigo): The spots marked with a pencil indicate occlusal adjusting spots.

Case 1:

This is another case. A 72 year- old man visited us for renewing his small partial denture. However, he complained about severe pain of his left thigh and coxalgia on the left side. He also complained lumbago on the left side (Figure 36,37). His occlusion then was examined. His habitual occlusal position deviated 2 mm anteriorly on the left side and 1 mm posteriorly on the right side. These deviations were opposite directions each other which might cause twisting effect of the mandible. It might affect the body posture (Figure 38). These symptoms immediately disappeared after occlusal equilibration in the muscular position (Figure 39).

TMD patients have an occlusal discrepancy and the posture of the mandible, head, and neck may be imbalanced. Accordingly, iliopsoas and quadriceps femoris muscles may compensate to maintain the body posture, resulting in an overall poor posture in the TMD patients. The continuous action of quadriceps femoris muscle on articulation coxa may cause pain in the hip joint. Coxalgia of the patient in the present case may have resulted from this mechanism (Figure 40).

Vertigo

A 75-year-old man presented with a chief complaint of looseness of his upper complete denture (Figure 41). He reported suffering a strong impact injury to his left ear that required a hospital emergency department visit 2 years prior to the first examination, after which he developed severe rotatory vertigo. No brain abnormalities were detected.

A semi-rotatory shift from BPOP to HOP was detected on the disks of the mandibular position analyzer (Figure 42). Because the occlusion of the denture in BPOP was unstable because of premature contact

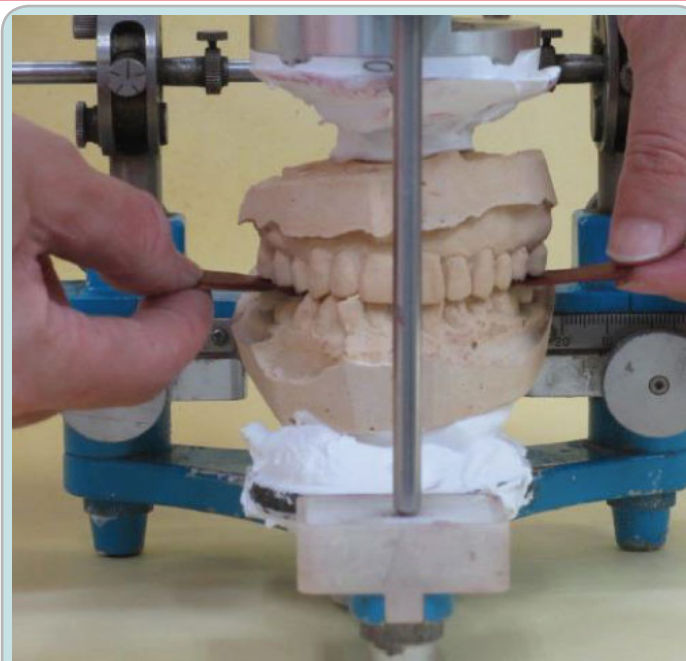


Figure 35 (Coxalgia and lumbaigo): Bilateral occlusal contacts in MP.



Figure 36 (Coxalgia and lumbaigo): Severe pain of left thigh and coxalgia.

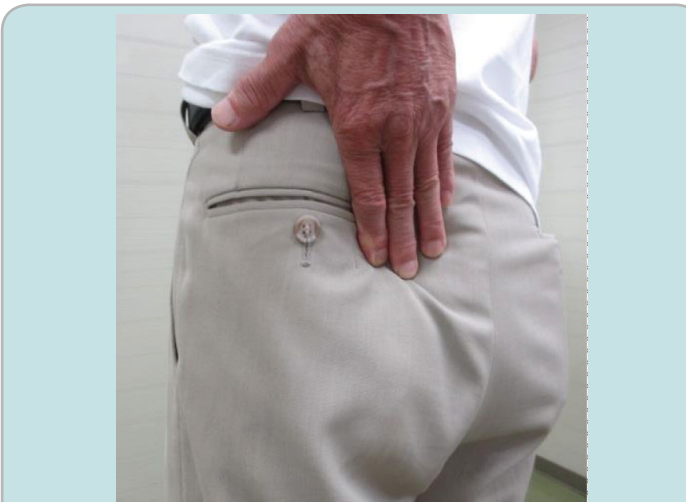


Figure 37 (Coxalgia and lumbaigo): Left lumbago.

and lack of bilateral posterior occlusal contacts, the upper denture was modified by adding self- curing acrylic resin to the occlusal surface of the posterior teeth on both sides. The vertigo disappeared, and his tinnitus had diminished.

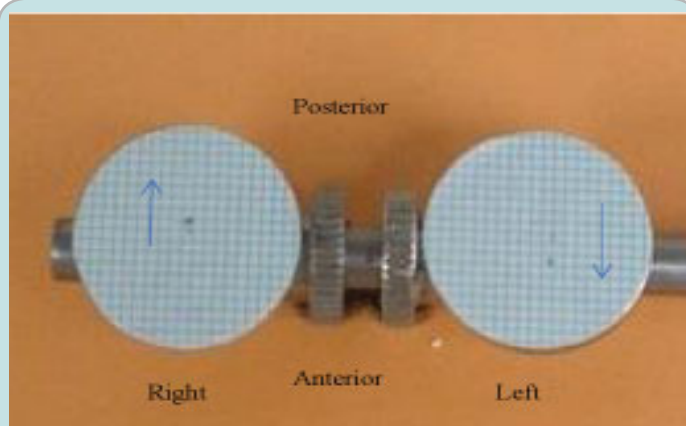


Figure 38 (Coxalgia and lumbaigo): Condylar shifts from MP to HOP.

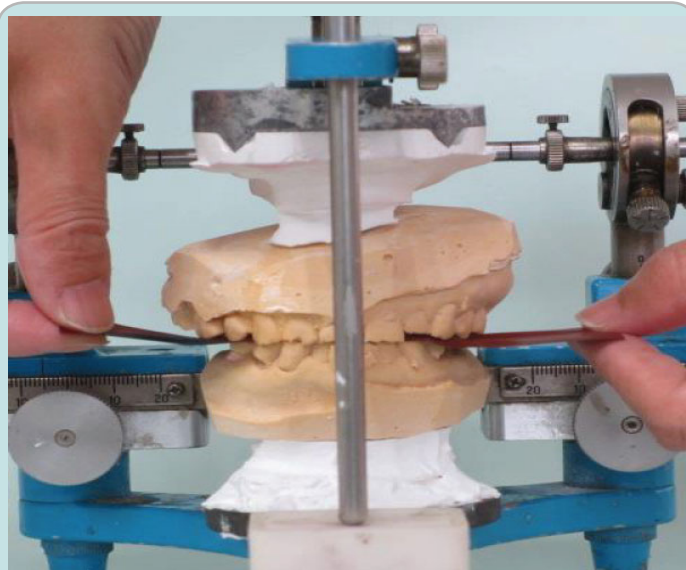


Figure 39 (Coxalgia and lumbaigo): Bilateral occlusal contacts in MP.

The headaches, spasms of the right side of the face, pain behind the right eye, and spasm of the right leg all disappeared, with no recurrence after 1.5 years.

Semi-rotatory shift, which is frequent, short, and cyclically repeated in mastication and other oral functions, would be recognized as the rotatory movement and causing nystagmus, which gives the patient an illusion of rotation that results in vertigo.

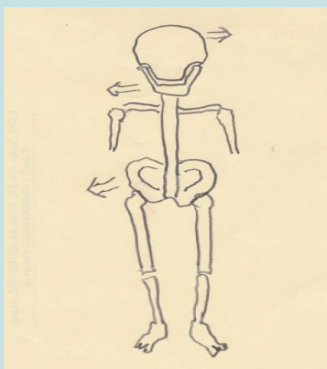


Figure 40 (Coxalgia and lumbaigo): Maintaining body posture.



Figure 41 (Vertigo): Patient's oral view.

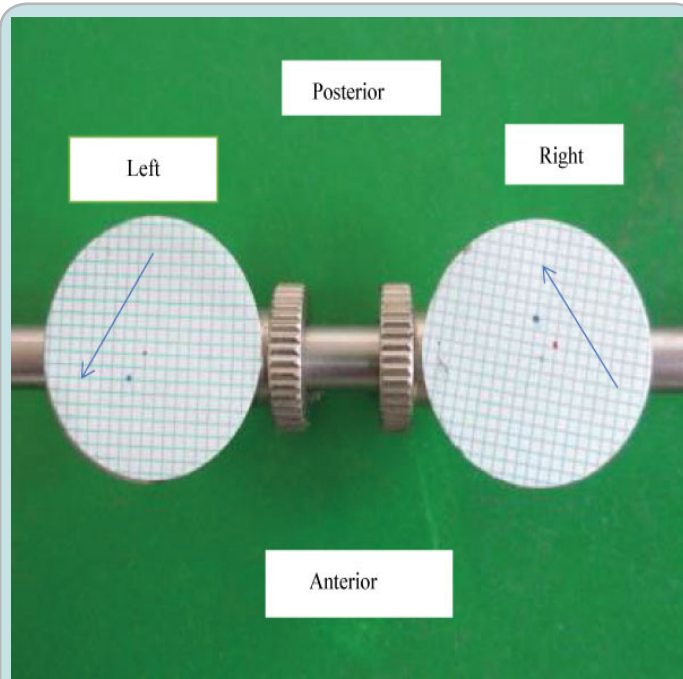


Figure 42 (Vertigo): Recorded semi-rotatory shift.

Conclusion

When you are presented with a case with mysterious symptoms, it is important to determine whether both HOP and BPOP are coincident. The coincidence indicates bilateral occlusal contacts in the muscular position, that is BPOP. If both positions are not coincident, occlusal equilibration should be performed in the muscular position. However, if both positions are coincident, then other etiologies should be investigated.

Acknowledgement

Written consent was obtained from the patients prior the publication of this study.

Competing interests

The author declares no competing interests.

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