

TMJ deformation and airway dysfunction: A dental occlusion case study

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THE STUDY OF BREATHING AND SLEEP DISORDERS has been the hottest topic in dentistry over the last couple of years. Patients reporting symptoms—including sore masticatory muscles and temporomandibular joints (TMJs), bruxism, headaches, fatigue, and dental malocclusions—often demonstrate signs of airway and breathing dysfunction. This may involve allergies, upper airway resistance (UAR), mouth breathing, tongue-tie and thrusting, swallowing disorders, and breathing disordered sleep, including obstructive sleep apnea (OSA).

The discipline of Integrative Dental Medicine (IDM) expands Dr. Peter Dawson's original Concepts of Complete Dentistry model by addressing systemic issues such as airway, breathing, and sleep dysfunction in evaluating dental malocclusions. As such, our eyes

have been opened to a new understanding, guiding us to a key principle: dysfunctional breathing can trigger significant oral dysfunction and dental malocclusions. Our enthusiasm for the role of airway dysfunction must be tempered by a word of caution, however:

don't throw the baby out with the bathwater! The critical concept of the importance of TMJ health and integrity in diagnosing masticatory system disorders is just as important as ever, providing another key principle: joint deformation can trigger significant oral dysfunction and dental malocclusions.

The following clinical case study will demonstrate both of these important principles. A 42-year-old female presents for evaluation of progressive facial and dental occlusion changes (figures 1).

WHERE DO WE BEGIN TO ANALYZE THIS PROBLEM?

The IDM model asks seven key questions of every patient being evaluated:

1. Does the dental occlusion appear to be unstable?
2. Does the patient brux, grind, or clench?
3. Does the patient have sore muscles?
4. Are there signs or symptoms of TMJ changes?
5. Could there be an airway problem?
6. Are there signs and symptoms of local or systemic inflammation?
7. Is there an unesthetic smile concern?

Utilizing the IDM Checklist (figure 2), the seven key questions are thoroughly vetted in three major categories, which are viewed side by side in vertical columns: infection/inflammation, airway/breathing disorders, and TMD/occlusion disorders.

Each category is then studied in three ways:

- History: Signs and symptoms
- Evaluation: Clinical signs
- Screening and testing, as needed

Utilizing the checklist for our case study, red flags are identified as listed under each of the three categories.



Figure 1: "Adenoid face" is characterized by long face (top left), bimaxillary retrusion (top right), and anterior open bite (bottom).

HISTORY: SIGNS AND SYMPTOMS

Infection/inflammation: Negative—caries, toothaches, bleeding gums, oral sores, tobacco, toxins, high blood pressure, pro-inflammatory diet, chronic pain or stress, diabetes, gastric reflux, physical inactivity

Airway/breathing disorders: Positive—mouth breathing, snoring, poor sleep quality, nasal congestion with allergies, forward head posture, deviated septum; Negative—snoring, sleep apnea, daytime sleepiness, tongue-tie, chronic cough

TMD/occlusion disorders: Positive—joint discomfort, popping/clicking, sore muscles, bruxism, worn teeth, tongue thrust, crooked teeth; Negative—nerve pain, limited opening

EVALUATION: CLINICAL SIGNS

Infection/inflammation: Negative—visual inspection, periodontal probing, oral lesions, lymph nodes, swollen tonsils

Airway/breathing disorders: Positive—Mallampati score >2, scalloped tongue, nasal stenosis, skeletal profile; Negative—neck circumference >16”, 40% tongue restriction

TMD/occlusion disorders: Positive—CR to MIP slide; Negative—ROM atypical, muscle palpation, joint palpation, TMJ load testing

SCREENING AND TESTING

Infection/inflammation: Negative—radiographic imaging (abscessed teeth), oral cancer screening

Airway/breathing disorders: Positive—imaging (CBCT deviated septum, narrow posterior airway; figure 3); Negative—overnight pulse oximetry

TMD/occlusion disorders: Positive—Doppler auscultation (joint crepitus), imaging severe joint degeneration (figure 3)

DIFFERENTIAL CONCLUSION

Infection/inflammation: Negative

Airway/breathing disorders: Positive for upper airway resistance syndrome (UARS); bimaxillary retrusion with posterior airway obstruction

TMD/occlusion disorders: Positive for severe degenerative joint disease (DJD); severe anterior open-bite malocclusion

KEY PRINCIPLES REFLECTED

In this case study, the dental malocclusion reflects the two key principles. *Dysfunctional breathing can trigger significant oral dysfunction and dental malocclusion changes.* It appears that airway dysfunction in the form of UARS has been caused by allergy congestion and a deviated septum. This could have led to mouth breathing, tongue reposturing and thrusting, forward head posture, bimaxillary retrusion, and bite changes, but that is not the whole story of this case.

Figure 2: Integrative Dental Medicine (IDM) Checklist

	Infection/Inflammation		Airway/Breathing Disorders		TMD/Occlusion Disorders				
History: signs and symptoms	Caries/toothaches	-	+	Mouth breather	-	+	Joint discomfort	-	+
	Bleeding gums	-	+	Snoring	-	+	Popping/clicking	-	+
	Oral sores	-	+	Sleep apnea	-	+	Limited opening	-	+
	Tobacco/toxins	-	+	Daytime sleepiness	-	+	Sore muscles	-	+
	High blood pressure	-	+	Poor sleep quality	-	+	Nerve pain	-	+
	Pro-inflammatory diet	-	+	Nasal congestion	-	+	Bruxism (grind or clench)	-	+
	Chronic pain/stress	-	+	Forward head posture	-	+	Poor bite	-	+
	Diabetes	-	+	Tongue-tie	-	+	Worn teeth	-	+
	Gastric reflux	-	+	Chronic cough	-	+	Tongue thrust	-	+
	Physical inactivity	-	+	Deviated septum	-	+	Crooked teeth	-	+
Evaluation: clinical signs	Visual inspection	-	+	Neck circumference >16"	-	+	ROM atypical	-	+
	Periodontal probing	-	+	Mallampati score >2	-	+	Muscle palpation	-	+
	Oral lesions	-	+	Scalloped tongue	-	+	Joint palpation	-	+
	Lymph nodes	-	+	40% tongue restriction	-	+	TMJ load testing	-	+
	Swollen tonsils	-	+	Nasal stenosis	-	+	CR to MIP slide	-	+
				Skeletal profile	-	+			
Screening and testing	Radiographic imaging	-	+	Overnight pulse oximetry	-	+	Doppler auscultation	-	+
	HbA1c testing	-	+	Home sleep test	-	+	Imaging (CBCT/MRI)	-	+
	Salivary testing	-	+	Heart rate variability (HRV)	-	+	Dawson photo series		
	Oral cancer screening	-	+	Polysomnogram (PSG)	-	+	Diagnostic study models		
	Reflux symptoms index (RSI)	-	+				Dawson wizard analysis		
Differential conclusion	- Negative	+ Positive		- Negative	+ Positive		- Negative	+ Positive	

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TMJ DEFORMATION AND AIRWAY DYSFUNCTION

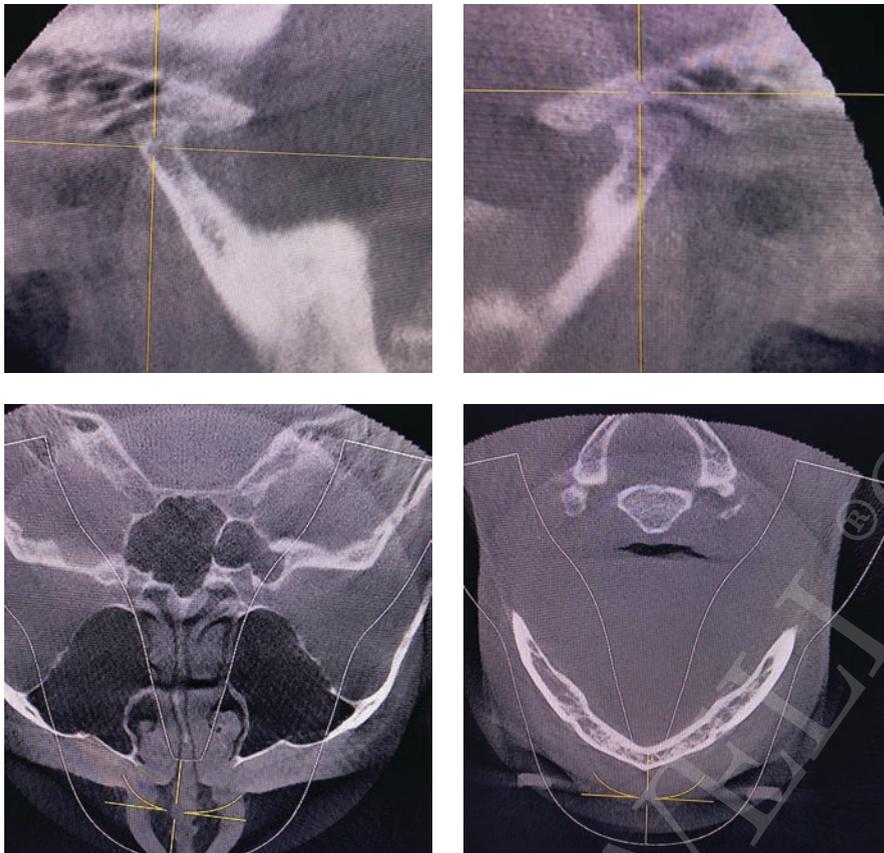


Figure 3: Degenerative joint disease (DJD) bilaterally (top left and right); deviated septum (bottom left); narrowed upper and posterior airway (bottom right)

Joint deformation can trigger significant oral dysfunction and dental malocclusion changes. The patient was not aware of a specific history of injury initiating bilateral changes in the temporomandibular joints. She did recall a period of time in her 20s when joint clicking was present, but without pain. She has a history of chronic clenching and grinding.

It is possible that chronic joint overloading, bite imbalances, hormonal dysregulation, and ligament breakdown have occurred for many years, producing bilateral discal displacements and osteoarthritis, despite minimal painful inflammation with continual adaptation. The severe degenerative joint changes observed have affected craniofacial respiratory integrity and grossly modified the dental occlusion, resulting in a significant retrognathic anterior open bite.

What we are learning is that just as form follows function, so deformation follows dysfunction. Dysfunctional airway and breathing precedes deformation of the craniofacial-respiratory-occlusal (CFRO) system. Also, dysfunction follows deformation. Deformation of the temporomandibular joints, breaking down due to internal derangements, precedes dysfunction of the

Figure 4: Treatment guided by the Integrative Dental Medicine (IDM) Checklist options

	Infection/Inflammation	Airway/Breathing Disorders	TMD/Occlusion Disorders
	Oral Infections & Systemic Inflammation	Management & Resolution	Phase 1 & Phase 2
Treatment	↓	↓	↓
	Eliminate caries	Nasal breathing	Phase 1
	Periodontal protocol	<ul style="list-style-type: none"> • Buteyko training • Mouth taping 	
	Tx/extract abscessed teeth	Oral myofunctional therapy	<ul style="list-style-type: none"> • Appropriate orthotic • Anti-inflammatory meds/diet • Physical therapy prn • C1/C2 therapy prn • Injection therapy prn • Surgical referral prn
	Counsel anti-inflammatory diet	Allergist-allergy testing	
	<ul style="list-style-type: none"> • Chronic pain/soreness • Reduce blood pressure • Reduce blood sugar/diabetes • Alkaline for gastric reflux 	E.N.T.-airway evaluation	
	Counsel anti-inflammatory lifestyle	Management protocol	
	<ul style="list-style-type: none"> • Physical activity • Stress management • Sleep hygiene • Smoking cessation • Avoid toxins 	<ul style="list-style-type: none"> • Increase vertical airway • Increase horizontal airway • Sleep position, nonsupine • Weight loss • Retest • Work with sleep MD 	
	Refer oral lesions	Resolution protocol	Phase 2
		<ul style="list-style-type: none"> • Expand oral airway • Expand upper airway • Expand posterior airway • Release tongue-tie 	<ul style="list-style-type: none"> • Definitive occlusal therapy • Post Tx orthotic prn

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Note: Systemic inflammation, airway-breathing disorders, TMD, and malocclusion are linked.

CFRO system. And, *dysfunction and deformation may occur simultaneously*. Which came first is impossible to determine with certainty: it's a chicken-and-egg scenario.

Is there a primary airway and breathing issue? Yes. Is there a primary TMJ breakdown issue? Yes. That is what we observe in evaluating this particular case example.

HOW DO WE TREAT SUCH A CASE?

We evaluate the signs and symptoms of instability, prioritize their importance, and utilize the IDM checklist treatment to determine our general options (figure 4).

Our primary objective is to stabilize the CFRO system. Several unstable components of the system will be addressed by the dental-medical team, including:

- Ear, nose, and throat (ENT) evaluation for allergies, as well as upper and posterior airway obstructions
- Oral surgeon evaluation of TMJ disease and bimaxillary retrusion
- Orthodontist evaluation of a severe malocclusion
- Restorative dentist evaluation of severe wear on posterior teeth and malocclusion
- Orofacial myofunctional therapist evaluation of tongue dysfunction, swallowing, and forward head posture

Treatment recommendations in this most complex case include management of allergies, presurgical orthodontics (to match the upper and lower arches), followed by bilateral joint replacements, orthognathic surgery, orofacial myofunctional therapy, restorative dentistry on the posterior teeth, and occlusal equilibration.

CONCLUSION

Beware of having tunnel vision regarding airway or occlusal disorders. If we think everything is airway and that it's always the answer, we will have failures. If we think everything is occlusion and that it's always the answer, we will have failures. Look at the airway just as you would look at periodontal disease or joint derangements.

In a rapidly changing world of information and discovery, remember these important lessons:

- Always look for signs of instability.
- If a chief complaint is present, treat it first.
- The desired end result is joint stability,

occlusal stability, airway stability, and the elimination of inflammation.

- Failure to successfully treat a problem is often due to failure of proper diagnosis.

The role of dentistry in the future of integrative medicine is very exciting. Hopefully, this case example will stimulate many dental professionals to seek further training to increase their diagnostic and treatment skills so they can become master problem-solvers in their communities. **DE**



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