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# TMD—a world of difference: A case study

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PUBLICATION DATE:	APRIL 2023
EXPIRATION DATE:	MARCH 2026

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# TMD—a world of difference: A case study

## Abstract

The temporomandibular joint is a unique joint that can become damaged or dysfunctional as the result of many physiologic problems, including estrogen and vitamin deficiencies. Temporomandibular joint dysfunction can result in systemic symptoms that often appear unrelated, such as tinnitus, headaches, and motion sickness. The case study presented in this course shows how important the proper function of the temporomandibular joint is to quality of life. By paying close attention to our patients' chief complaints, we can aid in the timely diagnosis and treatment of temporomandibular joint dysfunction.

## Educational objectives

Upon completion of this course, the dental professional should be able to:

1. Describe the symptoms of temporomandibular joint dysfunction
2. Investigate how estrogen deficiencies may influence myofascial disorders in patients
3. Stratify assessment of treatment approaches to increase success in temporomandibular joint dysfunction patient care
4. Provide information related to an individual case study that may improve dental professionals' assessment and treatment options for patients



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Dental professionals must be aware of the myriad changes that may occur within the temporomandibular joint (TMJ) region. This article will refer to temporomandibular joint dysfunction/disorder (TMD) when discussing the actual condition that is associated with jaw muscles, joint, and the facial nerves that have innervation in this area. TMD prevalence is around 5–12% of the adult population, occurring more frequently in females between 20 and 40 years old.<sup>1,3</sup>

The TMJ is a synovial joint that performs the most intricate movement in the human body.<sup>4</sup> Clinical and radiographic evaluation as well as extraoral/intraoral examination are critical to formulating a treatment plan that is detailed in scope. X-ray, magnetic resonance imaging (MRI), ultrasound, and cone-beam computed tomography (CBCT) scans are commonly used auxiliary imaging examinations for the diagnosis of TMD.<sup>5</sup>

## Diagnosis

Diagnostic imaging, such as MRI and CBCT scans, is crucial to tracking the function of the TMJ. MRI is a technique that uses computer-generated radio waves and a magnetic field to create detailed images of the organs and tissues of the body. It allows the clinician to track the movements of the jaw in relation to the disks within the joint. CBCT works by capturing about 150–200 images in less than a minute from various angles using cone-shaped x-rays that rotate around the patient.

Some MRI imaging shows high rates of anterior disk displacement conditions in TMD patients.<sup>3</sup> Many dental practices have recently invested in 3D and 4D imaging, which ensures a more complete assessment. With the development of imaging technology, the application of MRI in the diagnosis of TMD has become the gold standard of care.<sup>5</sup>

A thorough medical and dental history is used to determine the type of dysfunction that is present in the TMJ. In some instances, there is a tendency to overdiagnose TMD, so it is critical to thoroughly understand the criteria used to diagnose this condition.<sup>5</sup> There are varying signs and symptoms associated with TMD, and

sometimes one symptom is present or comorbidities may manifest within the head and neck region. The main clinical symptoms of TMD are abnormal mandibular movement, pain, popping, and/or snapping noise during both opening and closing movements.<sup>5</sup> Headaches and/or ear-related symptoms as well as neck dysfunction can occur.<sup>3,6</sup> Some patients do not associate their head and neck pain with TMJ issues. Stress is often blamed for these conditions, but there could be developmental issues, occlusal disturbances, and/or muscular constriction that affect function.

## Clinical symptoms

Clinical symptoms of posterior disk displacement include pain, clicking, crepitus, deviation or restriction in range of jaw movement, and posterior open bite on the ipsilateral side.<sup>7–9</sup> Muscle and/or TMJ pain, joint sounds, and movement limitations are the most frequent symptoms, which make TMD the most common cause of nonodontogenic orofacial pain.<sup>3,10</sup> Masticatory muscle tightness, headache, joint degeneration, improper range of motion, acoustic issues (crepitus, clicking, popping) can be spontaneous or with masticatory function, and this can become an issue over time.<sup>11</sup> These symptoms can develop into long-term problems and create discomfort in the muscles in the head and neck, minimizing quality of life.<sup>11–17</sup> Some patients become accustomed to chronic, long-term pain and may develop feelings of despair and depression.

Tinnitus, or phantom ringing in the ears, is more prevalent in patients who exhibit TMD than in the general population.<sup>18–20</sup> Tinnitus can be an everyday occurrence that may be intense and extremely annoying to patients.

Occlusion disturbances may be evident and have a progressive decline to a class II malocclusion, anterior open bite, mandibular shift/retrusion, or even obstructive sleep disorders due to severe retrognathic jaw presentation and narrowing of the oropharyngeal airway.<sup>21–23</sup> This discovery is important for the treatment of other conditions such as sleep apnea and snoring. Maintaining a collaborative assessment is key in TMJ/TMD cases, because

many professionals should work together to guide the best approach to treat the patient for long-term success.

Orthodontic assessment and care help to relieve TMD symptoms by restoring the occlusion and causing the masticatory muscles to rebound into an ideal position. Retention devices used after orthodontic treatment to maintain the corrected occlusion play an invaluable role.<sup>11,24</sup>

## The role of hormones in TMD

Although numerous studies have shown the etiopathogenesis of idiopathic condylar resorption (ICR) may be related to estrogen deficiency, the decisive role of estrogens remains controversial, and other sex hormone disturbances have not yet been investigated.<sup>23</sup> Estrogen and progesterone in blood are bound with plasma proteins and impact the metabolism of other tissues and organs. Fluctuations in estrogen levels at the childbearing age may intensify myofascial pain, while the high level of estrogen in pregnant women predisposes to gingival hyperplasia and periodontitis. Abnormalities in female reproductive hormone levels correlate with the frequency of TMD, intensified symptoms, extended symptoms, or hindered effectiveness of treatment.<sup>11</sup>

Females with amenorrhea, which is an absence of the menstrual cycle, are prone to condylar resorption.<sup>23</sup> Reduced estrogen levels and thyroid hormones, improper pituitary gland function, amenorrhea, and infertility are common in females with primary ovarian insufficiency.<sup>11</sup> Elevation in parathyroid hormones (PTH) is more prominent in patients with TMD.<sup>25</sup> Decreased estrogen can also occur later in life when females are entering menopause, and the TMJ can succumb to degeneration.<sup>26</sup>

## TMD and women

TMD is common in young and middle-aged adults, mainly manifested by joint pain, clicking, limited opening, and other functional disorders.<sup>5</sup> Women tend to be more susceptible than men and are three times as likely to develop TMD and seek treatment for the condition.<sup>5,26–30</sup> Women are more prone to having a wider range of symptoms and worsening symptoms



and conditions.<sup>11,31,32</sup>

Degenerative conditions of the TMJ such as osteoarthritis (OA), rheumatoid arthritis (RA), and progressive condylar resorption are caused by multiple etiological factors, such as hormonal imbalance and excessive mechanical stress.<sup>4</sup> Severe conditions in the TMJ that involve OA can be present in young females with low estrogen levels and is related to female reproductive hormones such as estrogen.<sup>4</sup> ICR is an aggressive form of TMJ disease that frequently occurs in adolescent girls during the pubertal growth spurt.<sup>23,33,34</sup>

### Vitamin deficiencies and TMD

Vitamin D is an important component in calcium homeostasis, which is known to have a key role in bone health, including articular structures and muscles. Low vitamin D levels are associated with musculoskeletal disorders and chronic pain.<sup>25</sup> Vitamin D is a key component in calcium metabolism, and previous studies have shown that reduced serum levels of 25 (OH) vitamin D are associated with musculoskeletal disorders, chronic low back/leg pain, and fibromyalgia, but data is limited regarding vitamin D and TMD.<sup>25</sup> Decreased levels of vitamin D have been linked with radiographic changes in the TMJ.<sup>25</sup> Vitamin D supplements may help patients who have low levels to prevent TMD or assist in pain reduction. Tension headaches correlate with low levels of vitamin D and melatonin.<sup>35</sup>

Magnesium deficiency can disturb muscle function and excite muscle tension and stress within the head and neck region. Other vitamin deficiencies have been assessed and found to be prominent within the population with TMD issues. Those vitamins are iron, ferritin, vitamins C, B<sub>1</sub>, B<sub>6</sub>, B<sub>12</sub>, and folate.<sup>36</sup>

### Case study

This case study will present the journey of Patient A, how TMD was successfully discovered, and how ongoing treatment regimens have improved her quality of life. Detecting TMJ changes and documented assessments are critical in the treatment and overall care of the patient.

Patient A is a 23-year-old Caucasian female dental hygiene student; 5 foot

2 inches; 110 pounds; blood pressure 106/73; pulse 98; temperature 97.1. Vitals are consistent at each appointment. She has a chromosomal translocation, diagnosed by a geneticist and endocrinologist in February 2012. This translocation is best described as if a piece of chromosome no. 4 and a piece of chromosome X broke off and switched places (the condition has no official name). She experienced a delay of growth (fell off all growth charts) with hormone levels at the postmenopausal stage and has been on hormone treatment since November 2011 to reach normal levels. She had experienced menopause before hormone levels reached normal. Doctors label this primary ovarian insufficiency, premature menopause/amenorrhea, and other similar terms because there is no true name. This condition also resulted in infertility for Patient A. She currently takes Junel Fe 1.5/30 for hormone replacement therapy to maintain healthy levels and for a proper menstrual cycle. The patient also suffers from vitamin D deficiency for which she has been prescribed 2,000 IU vitamin D daily. She also has an allergy to sulfa drugs.

Patient A had full-arch maxillary and mandibular braces from November 2012 to May 2016 and had all four third molars removed in June 2020. Before beginning initial orthodontic treatment, Patient A had tooth no. 4 extracted because tooth no. 5 was coming in palatally and needed room to be pulled into alignment with the other teeth. This was due to a primary molar being extracted prematurely due to an abscess (**figure 1**).

The patient presented with tinnitus; chronic headaches; ear pain/pressure/congestion; neck pain/stiffness; sinus pressure/pain; facial pain; jaw clicking mainly on the right side when eating certain foods; jaw locking and cracking/popping on the left side; TMJ pain bilateral (worse on the left with the cracking of the

jaw); difficulty chewing; limited opening; and jaw pain that was aching, sharp, and tender on both sides. The patient takes Nasacort and acetaminophen for headaches and sinus pressure as needed, but reports they have not been very effective. Nasacort will sometimes dull the pain, while acetaminophen does not seem to touch the pain. If the headaches are too severe, she will keep a cold compress on her forehead and try to sleep.

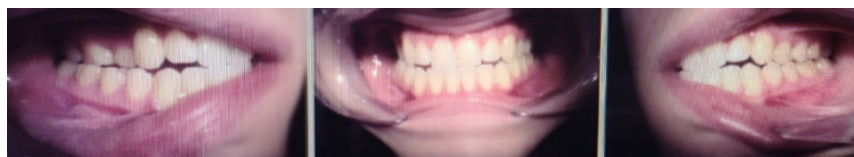
The diagnosis of TMD was based on the patient's medical history; review of symptoms; and oral, neuromuscular, and joint evaluation. The patient was a candidate for an intraoral, reversible prosthetic device.

### INITIAL VISIT

**1/12/21:** Patient A presents for a TMD consult. The patient was referred to Dr. G (TMJ and sleep-breathing specialist) by Dr. R (general dentist). She has been having issues for a long time. When the patient opens her jaw too wide, it locks, and she must crack it back into place on the left side. There is pain when popping happens. Occasionally, she gets a pop on the right side when chewing on the left canine area. Her ears have been ringing. She gets headaches and tension in her neck. The patient has completed ortho treatment and that is when she started having issues. Dr. G spent 40 minutes with Patient A going over appliances, exam information, reviewing symptoms, and providing instructions to proceed with treatment.

### EXAM

- Tongue: level 2
- Mallampati classification: class 2 (complete visualization of uvula)
- Tonsils: grade 2 (less than 50% of space between pillars)
- Uvula: enlarged and elongated
- Soft palate: firm
- Gag reflex: absent



**FIGURE 1.** Patient A's pretreatment occlusion and relationship as of February 2021

- Maxilla: highly vaulted
- Jaw deviates to the right
- Joint palpation: early closing click and late opening click bilateral
- Maximum opening: 32
- Left lateral excursion: 11
- Right lateral excursion: 7
- No tenderness in sinuses or salivary glands
- Bruxism
- Gingival recession
- Incisal wear pattern
- Mandibular tori
- Points of contact: 8, 9, 24, 25
- Tension on left joint area and pain in right masseter when retruding jaw
- Moderate muscle tenderness: masseter left, occipital right, pterygoid right, stylo-mandibular right, temporalis right, and trapezius right. The rest of the muscles have either no or mild tenderness.

#### RECOMMENDED TREATMENT

TMD impressions for MORA (mandibular orthopedic repositioning appliance) and CBCT scan; possible Farrar appliance in future.

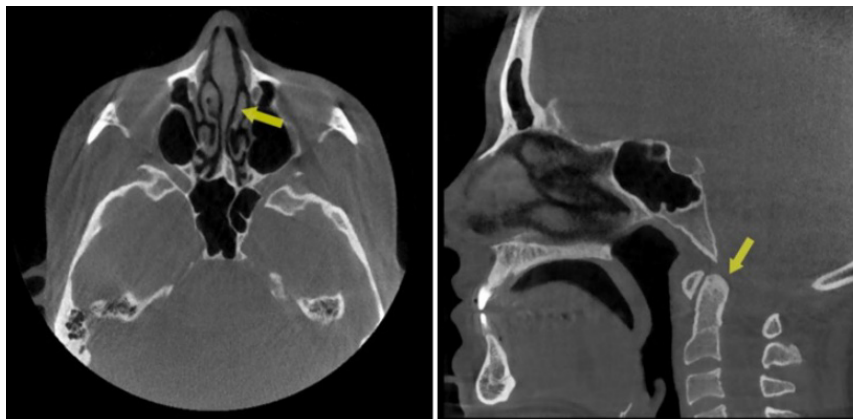
#### TREATMENT

**2/25/21:** Patient A presents for TMD primary impressions for MORA appliance. Consent form signed. Impressions taken with iTero digital scanner. Took protrusive bite with orange stick and scanned into iTero. CBCT taken.

**3/22/21:** Patient A presents for delivery of MORA appliance (**figure 2**). Patient signed proof of delivery form. Went over care instructions with patient. Adjusted prongs, bite, and flashing of acrylic. Cleaned and polished. Dr. G spent 40 minutes with patient adjusting the appliance,



**FIGURE 2.** MORA appliance in Patient A's mouth



**FIGURE 3.** CBCT results showing deviated septum and subchondral sclerosis

reviewing symptoms, and providing instructions for continued use of appliance. Full range of motion pops on left at the end and then closes, deviating severely to the right.

**4/12/21:** Patient A is wearing MORA appliance as instructed. She states no issues. Right side a little sore this last week and ears are 85% better per patient. Reviewed CBCT scan with patient. Deviated septum and subchondral sclerosis on the dens portion of vertebral body C2 as seen in **figure 3**.

**5/26/21:** Patient A is very happy with results from the MORA appliance. Maintained 85% improvement of symptoms and no complaints or concerns. Jaw only clicks when she yawns and is not careful. Dr. G stated that was normal as long as it is minimal. Patient states appliance is a little loose and ball clasps were adjusted.

**6/28/21:** Maintaining 85% improvement of symptoms. Patient A is very happy with MORA appliance. No longer gets motion sickness (she had just taken a mission trip to the Dominican Republic and did not have to take Dramamine that would normally be required). No complaints or concerns. Continue to wear appliance 24/7.

**8/18/21:** Stiffness in neck. No adjustments were made. Talked about possible ortho in future. Discussed weaning-off process for the MORA, two hours the first week and add another hour or two each week for six weeks. Adjusted ball clasps of appliance. Patient A is happy with bite and fit of appliance. Occasionally, the jaw catches on the left when yawning, but it does not lock. Patient reports not

getting headaches every day and MORA has made a world of difference. Patient to start weaning-off process.

**10/6/21:** We have been trying to wean Patient A off MORA appliance. She states that she does not wear appliance when going out of the house, but wears it when at home. She states that the longer she goes without wearing it, the more symptoms return. Patient states ear-ringing returns. Can go eight hours before symptoms start to come back. No other complaints or concerns. Vertical of MORA appliance is still good. Without appliance in, patient is only hitting on anterior with no posterior occlusion. Checked bite and fit of MORA appliance and no adjustments needed. No popping/clicking. Patient to be referred to Dr. P (an orthodontist who has worked with Dr. G on other TMD cases) for orthodontic treatment.

**12/9/21:** There is slight ear-ringing occasionally, but nothing serious. Patient A states no other symptoms at this point. Patient saw Dr. P today and is in orthodontics now with brackets on maxillary arch. Dr. G made some adjustments to patient's appliance around tooth no. 5 due to hard contact being made with the MORA.

**1/31/22:** Patient A has been wearing MORA as requested. Patient states she has not had a return of symptoms since last visit. She is currently in orthodontics and has upper brackets. No complaints or concerns. Patient A had ortho appointment with Dr. P today. Dr. G checked bite and fit of MORA and adjusted the appliance. Patient happy with bite and fit

and was instructed to continue wearing appliance 24/7.

**3/9/22:** Patient A is wearing appliance as instructed and is doing great with no return of symptoms. Patient had an ortho adjustment today. Dr. G adjusted the appliance, reviewed symptoms, and discussed continuation of appliance. Patient has shown stability of joint, so Dr. G approved the addition of lower brackets when Dr. P is ready. Small adjustments made to MORA and patient happy with bite and fit. Continued wear of MORA 24/7 recommended.

#### PATIENT EXPERIENCE

**Pretreatment:** Patient A started experiencing some mild TMJ problems after completing ortho treatment in high school. It was gradually getting worse, but when she started the dental hygiene program and students began working on one another, she had difficulty keeping her mouth open for long periods of time. This accelerated the progression of pain to a point where something needed to be done. The right side kept locking and cracking. When yawning, the jaw would lock open and crack painfully. If she bit into a sandwich the wrong way, the jaw would crack, and the patient could no longer continue eating. Patient A had been experiencing chronic headaches 80% of the time. She occasionally tried Tylenol, Nasacort, and a cold compress for relief, but mostly just pushed through the pain. Patient A believed the pain was caused by sinus pressure and nonallergic rhinitis, a condition diagnosed in high school. She had chronic headaches when she was younger, so she assumed it was just a return of that. Patient A had been experiencing extreme tinnitus to the point where she could not be in a room without music or some other distracting noise. At times the loud ringing in her ears caused physical pain. The ringing was worse in the right ear. Patient A compared the high-pitched ringing sound to that following an explosion.

**In treatment:** When Patient A received the MORA appliance, symptoms were immediately relieved. The tinnitus was almost gone and she enjoyed sitting in a quiet room for the first time in

years. She was finally able to open her jaw completely and eat foods without fear. Patient A had been experiencing dizziness at work and had to wear an earbud for balance and to reduce the headaches. After starting treatment, she no longer needed an earbud, the headaches mostly stopped, and she was no longer dizzy. Additionally, she no longer had motion sickness. This was something that had been getting worse with age, and she had no idea it was connected to her TMJ. Patient A's ears popped properly on flights during takeoff and landing. Dr. G enjoys seeing Patient A's smiling face at appointments because he remembers how miserable she was before treatment (**figure 4**).

Special note from Dr. G: Ear issues repeatedly manifest themselves in 90% of patients with TMD. Symptoms can include:

- Sensation of fullness or clogged ears
- Tinnitus on one side or bilateral
- Vertigo that can occur in varying degrees of severity. Some patients are completely debilitated to the point where they can't drive, focus, or even work.
- Hearing loss if untreated for any great length of time

#### Conclusion

More emphasis should be placed on thorough assessment of the TMJ during a dental appointment. This, combined with an evaluation of the possible causes of TMD, will enhance the success of treatment. Medical and dental team interdisciplinary collaboration must take place to ensure patients receive the best care possible for their individual conditions.

Dental professionals must begin utilizing complete health history assessments and follow up with state-of-the-art x-rays and full disclosure of hormonal or vitamin deficiencies. If a standard panoramic radiograph is not anatomically detailed enough, 3D/4D images and/or scans would prove beneficial in completing the interpretation and diagnosis of the condition.



**FIGURE 4.** Patient A's occlusal relationship preorthodontic treatment (December 2021) and 3 months into ortho treatment (as of March 2022—still receiving treatment)

We must listen to our patients' chief complaints and attempt cohesive strategies for complete and effective care.

**Authors' note:** Special thanks to J. Todd Gray, DDS, DASBA, who specializes in sleep and TMJ disorders, for his support and contributions.

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## QUESTIONS

1. What are the two primary methods of diagnosing TMD?
  - A. CBCT and MRI scans
  - B. Bitewings and panoramic x-rays
  - C. Palpation and exploration
  - D. Health history and debridement
2. All the following are symptoms of TMD except:
  - A. Locking/popping of jaw
  - B. Headaches
  - C. Nausea
  - D. Tinnitus
3. What are suitable methods for a dental professional to find TMD so that patients can be given a referral for further treatment?
  - A. Debridement
  - B. Palpation of the TMJ movement and thorough health history
  - C. Visual examination of the joint
  - D. Watch the patient eat a sandwich
4. Which hormone deficiency has a connection to TMD?
  - A. Testosterone
  - B. Progesterone
  - C. FSH
  - D. Estrogen
5. Who most commonly develops TMD?
  - A. Males 12-21 years old
  - B. Males 20-40 years old
  - C. Females 12-21 years old
  - D. Females 20-40 years old
6. What may be something that could develop from chronic and long-lasting TMJ pain and discomfort?
  - A. Depression and other mental health concerns
  - B. Lack of concern for others
  - C. Malnutrition
  - D. Nerve damage to the surrounding tissue
7. What symptom is more prevalent in patients with TMD than in the general population?
  - A. Weight loss
  - B. Astigmatism
  - C. Tinnitus
  - D. High blood pressure
8. Which professional can help collaborate with TMJ specialists and general dentists to treat TMD and tinnitus?
  - A. Oral surgeon
  - B. Orthodontist
  - C. Orthopedist
  - D. Ophthalmologist
9. What type of TMD symptoms are women more prone to experience than men?
  - A. A narrowing and stability of symptoms/condition
  - B. A narrowing and worsening of symptoms/condition
  - C. A wider range and stability of symptoms/condition
  - D. A wider range and worsening of symptoms/condition
10. Which of the following is an aggressive form of TMD that commonly presents in adolescent girls?
  - A. Osteoarthritis
  - B. Rheumatoid arthritis
  - C. Idiopathic condylar resorption
  - D. Progressive condylar resorption
11. The insufficiency or reduction of estrogen can lead to resorption of what part of the TMJ?
  - A. Condylar process
  - B. External auditory meatus
  - C. Articular disk
  - D. Mandibular fossa
12. Which vitamin deficiency has been linked to radiographic changes in the TMJ?
  - A. Vitamin A
  - B. Vitamin D
  - C. Vitamin E
  - D. Vitamin K
13. What other symptom may be related to vitamin D and melatonin deficiencies?
  - A. Brittle bones
  - B. Tension headaches
  - C. Pale skin
  - D. Heat sensitivity
14. Why is vitamin D so important to the body?
  - A. It helps maintain magnesium levels, which are crucial for balance.
  - B. It helps maintain vitamin E levels, which are crucial for ear health.
  - C. It helps maintain calcium levels, which are crucial for bone health.
  - D. It helps maintain protein levels, which are crucial for healthy growth.
15. The elevation of which hormone is seen more prominently in patients with TMD?
  - A. Parathyroid hormones (PTH)
  - B. Follicle-stimulating hormone (FSH)
  - C. Thyrotropin-releasing hormone (TRH)
  - D. Growth hormone-releasing hormone (GHRH)



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## QUESTIONS

16. What mineral deficiency can cause muscles in the head and neck region to excite and cause tension and stress?
  - A. Calcium
  - B. Iron
  - C. Phosphorus
  - D. Magnesium
17. As a clinician, what preexisting conditions does Patient A have that should be red flags when evaluating for TMJ dysfunction?
  - A. Sulfa allergy and vitamin D deficiency
  - B. Primary ovarian insufficiency and vitamin D deficiency
  - C. Nonallergic rhinitis and premature amenorrhea
  - D. Sulfa allergy and nonallergic rhinitis
18. Which symptom does Patient A present with that could be easily overlooked due to the patient's belief that the condition was caused by something else?
  - A. Dizziness
  - B. Tinnitus
  - C. Motion sickness
  - D. Chronic headaches
19. All the following are abnormal findings that a dental professional may find when completing extraoral and intraoral exams on Patient A except:
  - A. TMJ cracking/locking
  - B. Bruxism
  - C. Fissured tongue
  - D. Mandibular tori
20. If the normal average maximum opening is between 35 and 55 mm, where does this patient fall in relation to this?
  - A. Below average with limited opening
  - B. Within normal average
  - C. Above average with extended opening
  - D. Not enough data given
21. What does MORA stand for?
  - A. Magnetic oral resonance apparatus
  - B. Mandibular orthopedic repositioning appliance
  - C. Medical operating radiograph aid
  - D. Maintenance of repair activity
22. How much improvement in symptoms did Patient A report after delivery of the MORA appliance?
  - A. 50%
  - B. 65%
  - C. 85%
  - D. 97%
23. What initial unreported symptom was relieved, which surprised Patient A?
  - A. Motion sickness
  - B. Tinnitus
  - C. Headaches
  - D. Nausea
24. What unfortunate occurrence happened when the patient tried to wean off the appliance?
  - A. Stability of condition
  - B. Return of jaw locking
  - C. Worsening of condition and symptoms
  - D. Relapse with return of some symptoms
25. When Patient A reported chronic headaches, what could be an indicator there is a deeper problem present?
  - A. The diagnosis of nonallergic rhinitis
  - B. Vitamin D deficiency
  - C. Typical pain remedies being ineffective
  - D. The frequency of the headaches
26. Patient A had developed all of the following coping mechanisms to deal with the symptoms except:
  - A. Wearing an earbud and constantly having noise on
  - B. Taking regular naps
  - C. Holding her jaw shut
  - D. Avoiding certain foods
27. According to Dr. G, what is an important body part to consider when there is a possible TMD diagnosis?
  - A. The ear
  - B. The nose
  - C. The eyes
  - D. The throat
28. Why is early and correct diagnosis important with TMD?
  - A. Malnutrition can result from the prevention of eating certain foods.
  - B. Delusional behavior can result from the culmination of symptoms.
  - C. Depression can result from feeling alone in the struggle.
  - D. Hearing loss can result if left untreated for long periods of time.
29. What kind of difference did the MORA appliance bring to the life of Patient A?
  - A. Immediate dramatic improvement
  - B. Gradual minor improvement
  - C. Immediate minor improvement
  - D. Gradual dramatic improvement
30. As a dental health professional, what is key to detecting a TMJ issue in a patient?
  - A. Completing a thorough debridement
  - B. Properly completing periodontal charting
  - C. Charting all previous dental restorations and noting caries location
  - D. Listening thoroughly to the patient and understanding the health history

TMD—a world of difference: A case study

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- Describe the symptoms of temporomandibular joint dysfunction
- Investigate how estrogen deficiencies may influence myofascial disorders in patients
- Strategize assessment of treatment approaches to increase success in temporomandibular joint dysfunction patient care
- Provide information related to an individual case study that may improve dental professionals' assessment and treatment options for patients

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- Were the individual course objectives met?  
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Please evaluate this course by responding to the following statements, using a scale of Excellent = 5 to Poor = 0.

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| 9. Please rate the usefulness of the references.  | 5   | 4  | 3 | 2 | 1 | 0 |
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