
2026
SEC
Sleep
Education
Consortium
The Airway
&
TMD
Connection
Ronald S. Prehn, ThM, DDS

1


TMD/Orofacial Pain
&
Connection with
Airway Centric Dentistry
Ronald S. Prehn, ThM, DDS
Ron@prehn.co
Board Certified in Dental Sleep Medicine

2

CONFLICT OF INTEREST DISCLOSURE

Ronald S. Prehn, ThM, DDS

SEC 2026 Sleep Education Consortium

[X] 1. I do not have any potential conflicts of interest to disclose, **OR**

[ ] 2. I wish to disclose the following potential conflicts of interest:

Type of Potential Conflict	Details of Potential Conflict
Grant/Research Support	
Consultant	
Speakers' Bureaus	
Financial support	
Other	

[ ] 3. The material presented in this lecture has no relationship with any of these potential conflicts, **OR**

[ ] 4. This talk presents material that is related to one or more of these potential conflicts, and the following objective references are provided as support for this lecture:

3

CORRELATION OSA AND TMD?

PubMed® Search: "Sleep Apnea and TMD"

132 articles

4

CORRELATION OSA AND TMD?

"The interplay of sleep disorders and orofacial pain: A systematic review"

"Conclusion: There is a strong connection between chronic orofacial pain (OFP) and sleep disorders, particularly insomnia and obstructive sleep apnea (OSA). Addressing sleep-related issues could be an effective complementary approach in managing OFP, especially in female patients"

Colonques-Sanmartín P, Margaix-Muñoz M, Bagán L. The interplay of sleep disorders and orofacial pain: A systematic review. J Clin Exp Dent. 2025 Oct 17;17(11):e1390-e1396. doi: 10.4317/jced.63216. PMID: 41459132; PMCID: PMC12742657.

5

CORRELATION OSA AND TMD?

"Association between obstructive sleep apnea and temporomandibular disorders: A meta-analysis."

"Conclusion: Patients with TMD presented a significant association with OSA regardless of the OSA diagnostic method (PSG and/or validated questionnaires). OSA screening should be part of the TMD examination routine."

Machado CAO, de Resende CMBM, Stuginski-Barbosa J, Porporatti AL, Carra MC, Michelloti A, Boucher Y, Simamoto Junior PC. Association between obstructive sleep apnea and temporomandibular disorders: A meta-analysis. J Oral Rehabil. 2024 Oct;51(10):2220-2233. doi: 10.1111/joor.13794. Epub 2024 Jul 15. PMID: 39007230.

6

Start with basic TMD

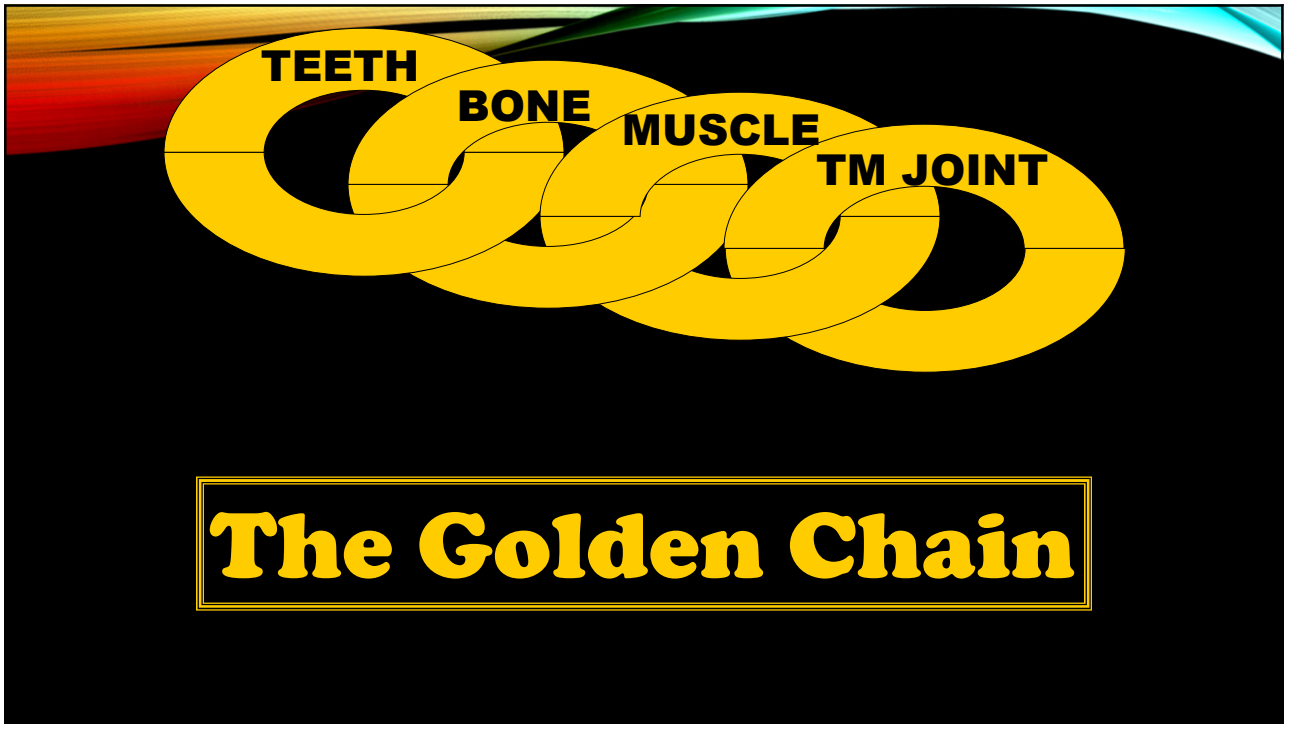
↓

Review of SDB

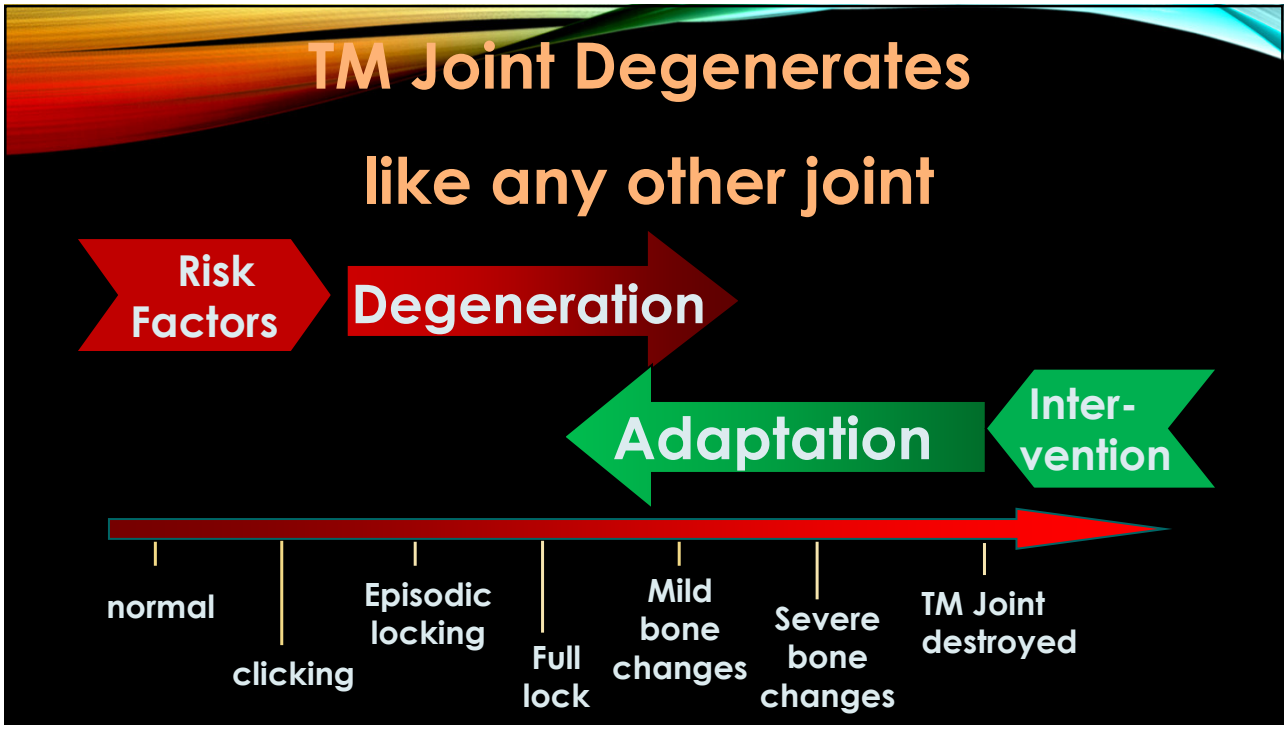
↓

Integrate the two

7



8



9

Risk Factors

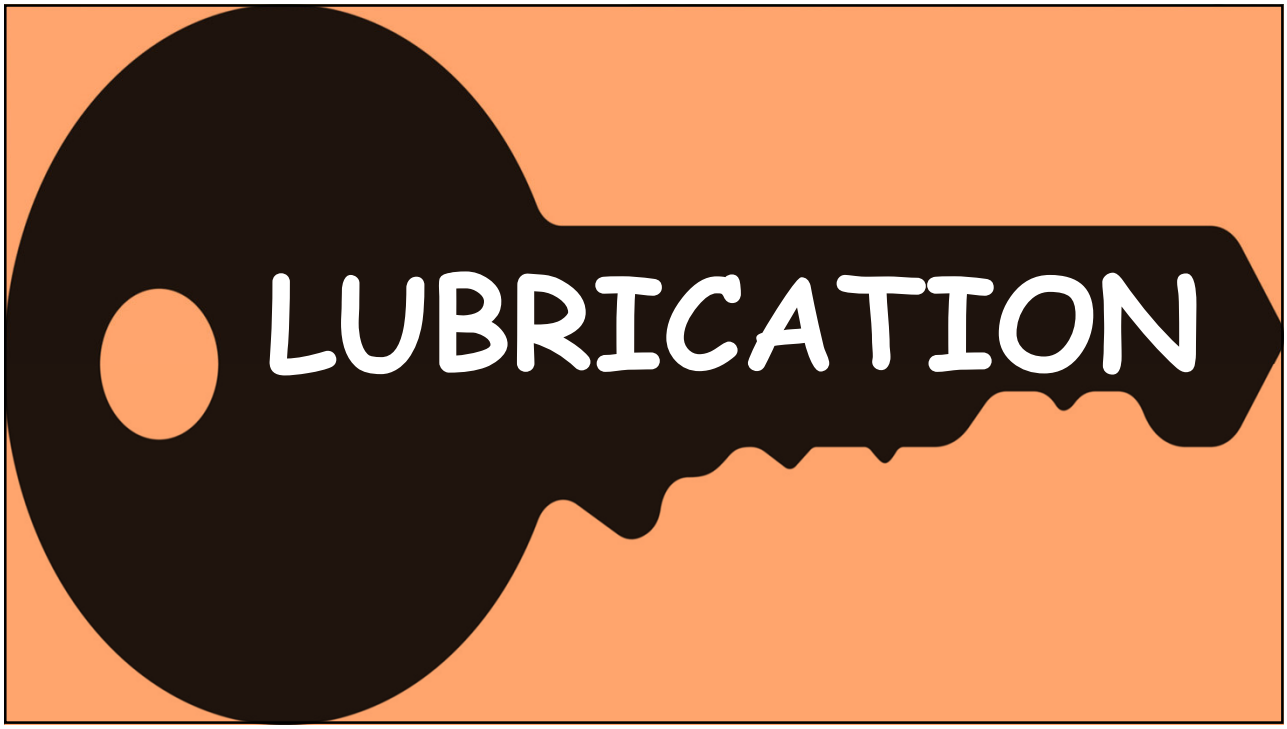
- Pain
- Sleep disorders
- Bruxing
- Gender
- Malocclusion
- Stress/Habits
- Systemic
  - Arthritides
  - Autoimmune
  - Fibromyalgia
  - Hormones

10

Basic orthopedic principle:

The key to the health of the TM joint is…

11



12

The lack of lubrication:

1. disc instability (gets sticky –drags)
2. lack of nutrients to surface of condyle
3. pain from inflammation

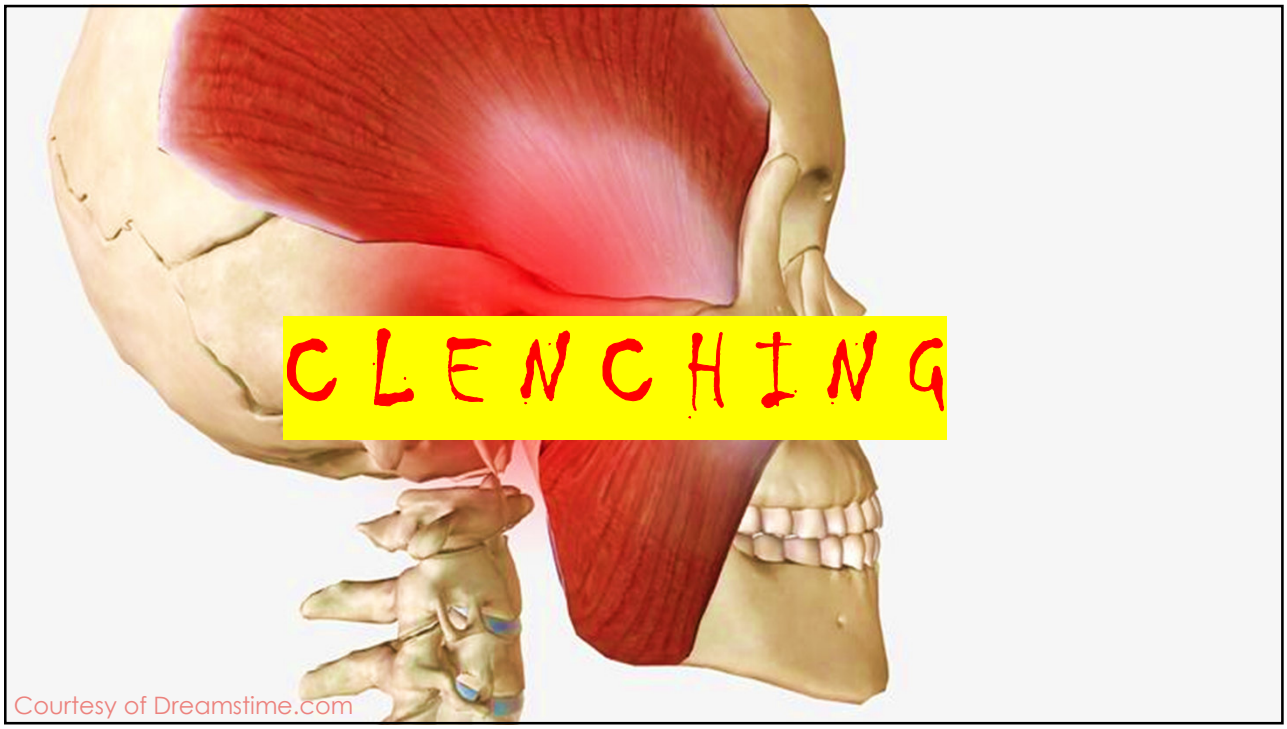
Goal: restore the lubrication

13

Goal of TMD Therapy…

…restore the lubrication

14



15

Clenching

Nightime – Many theories

1) Occlusal trigger
2) Anxiety driven
3) Brain stem arousal
4) Airway protection

16

Airway protection Theory

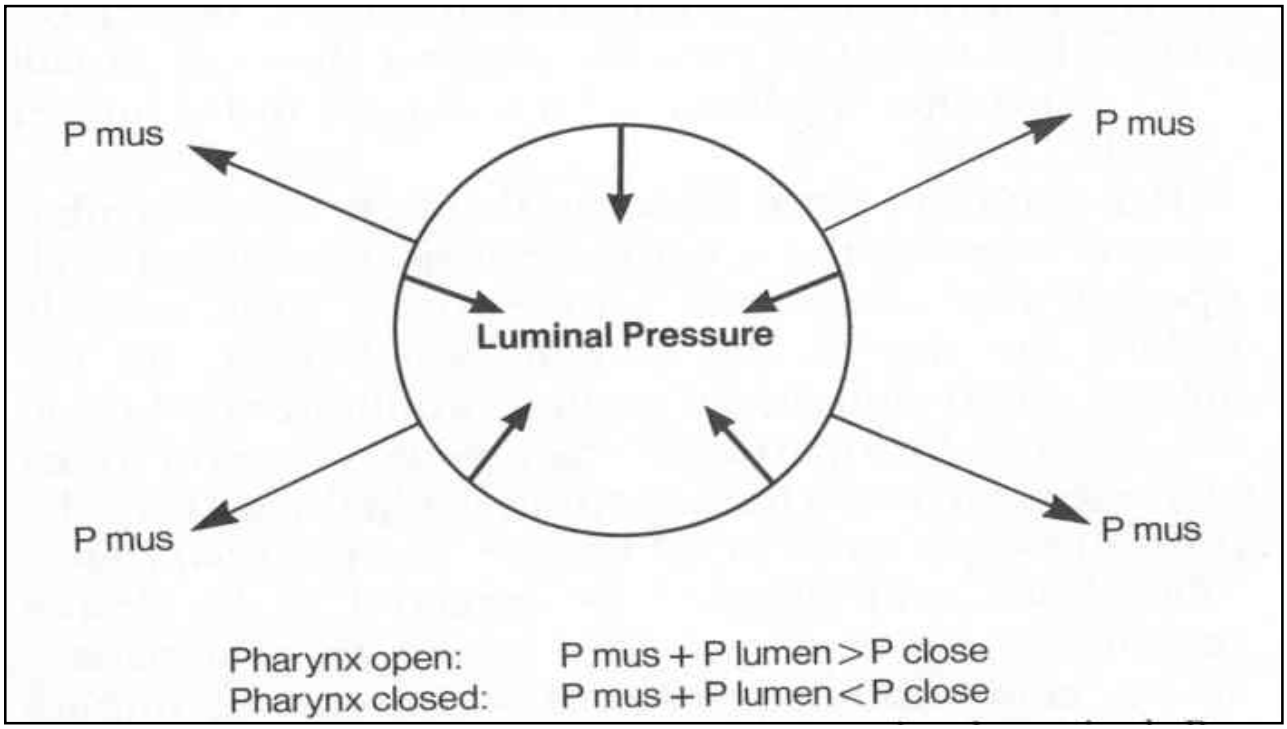
Clenching as a compensatory mechanism to stabilize a collapsing airway

17

What determines the size of the airway?

Anatomy?
Collapsibility?
Physiology?

18



19

Bernoulli's principle

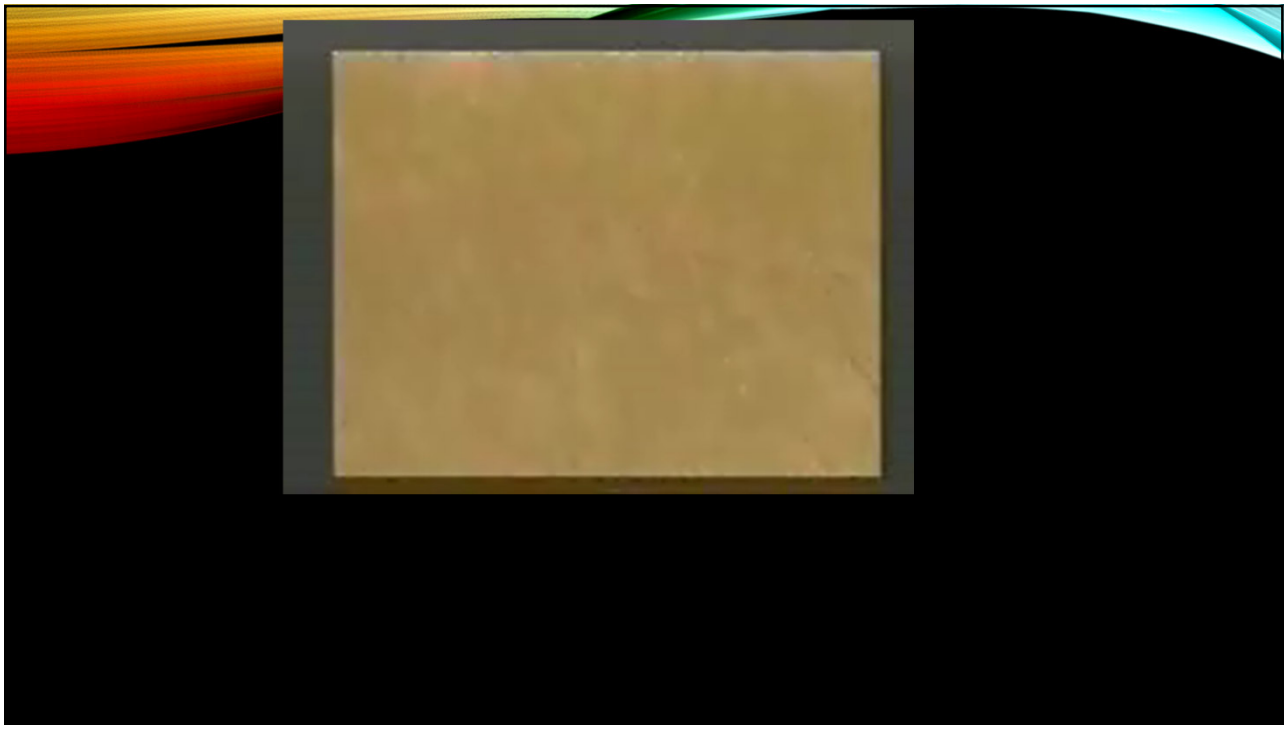
"As the speed of a moving fluid (liquid or gas) increases, the pressure within the fluid decreases."

Wikipedia

*****Increased speed = decreased pressure*****

Examples: shower curtains, sail boats and jet wings

20



21

Problem: Airway Obstruction at Base of Tongue

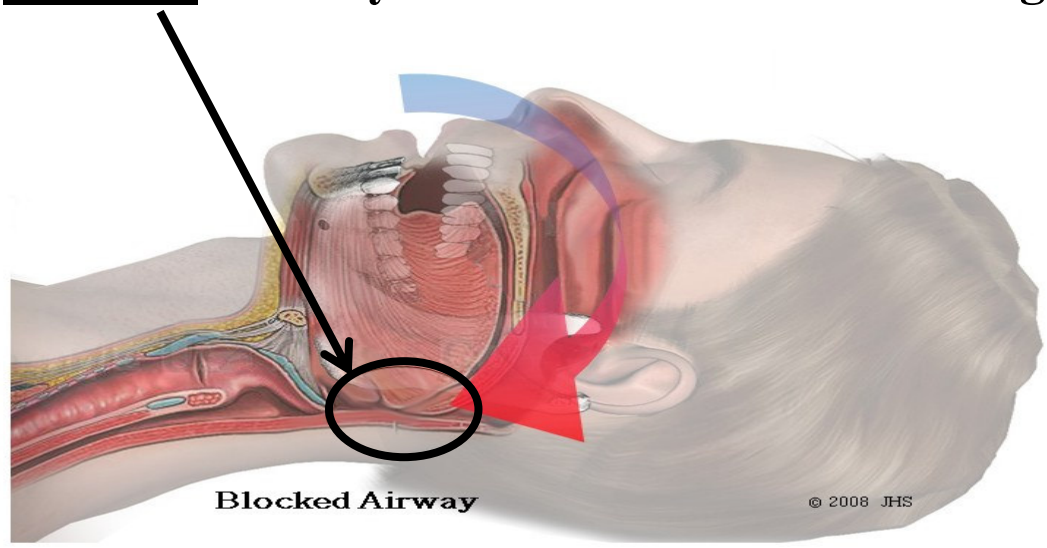


Image courtesy of Jerald H. Simmons MD

22

"The upper airway reflex opposes the negative pressure collapsing forces generated during inhalation."

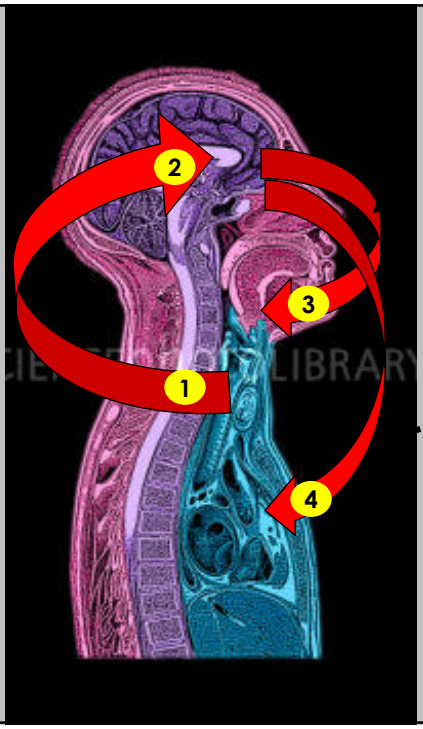
(This reflex is accomplished through activation of pharyngeal dilator muscles ["and increase activity in the genioglossus"], which can increase airway patency. … Most of these receptors seem to be located in the upper trachea and transmit information through the superior laryngeal nerve as well as the glossopharyngeal and trigeminal nerves")"

Guilleminault, C., Savani, A., *Neurological Basis of Sleep Breathing Disorders*; Sleep Med Clin 7 (2012), 557

23

1.Drop in esophageal pressure

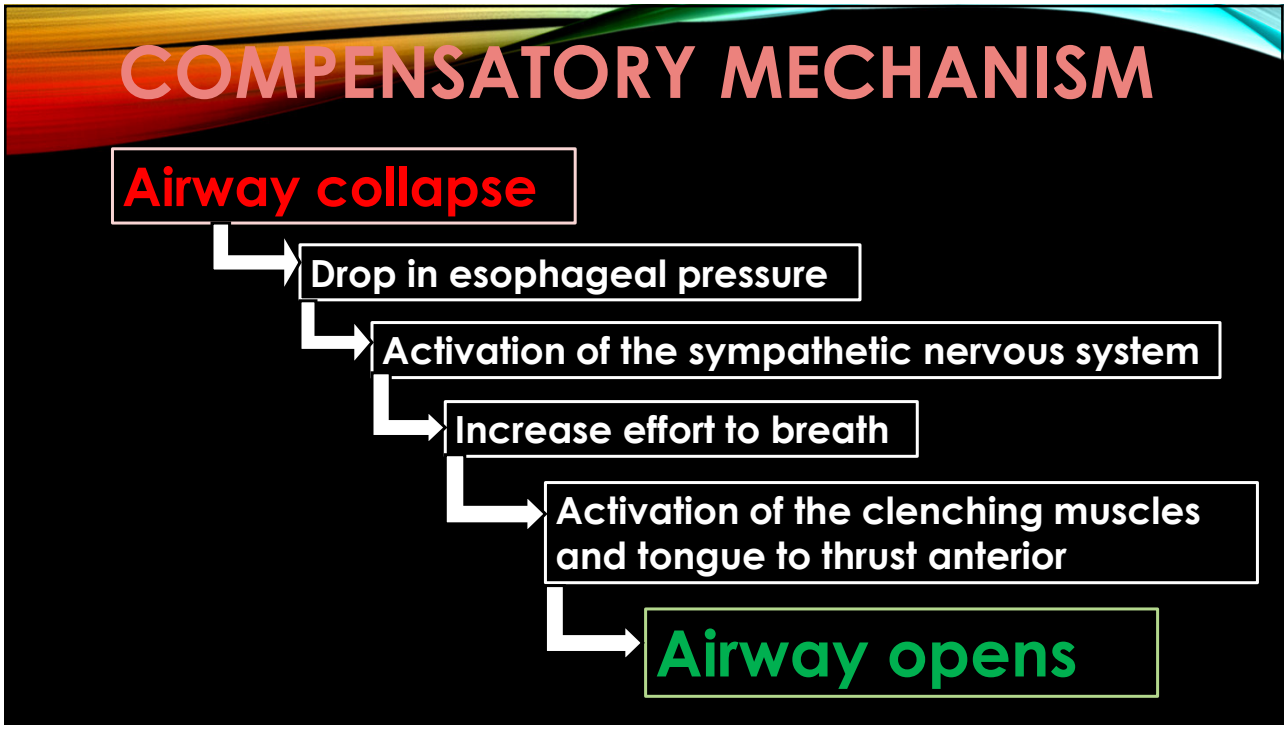
2.Reflex signal to brain



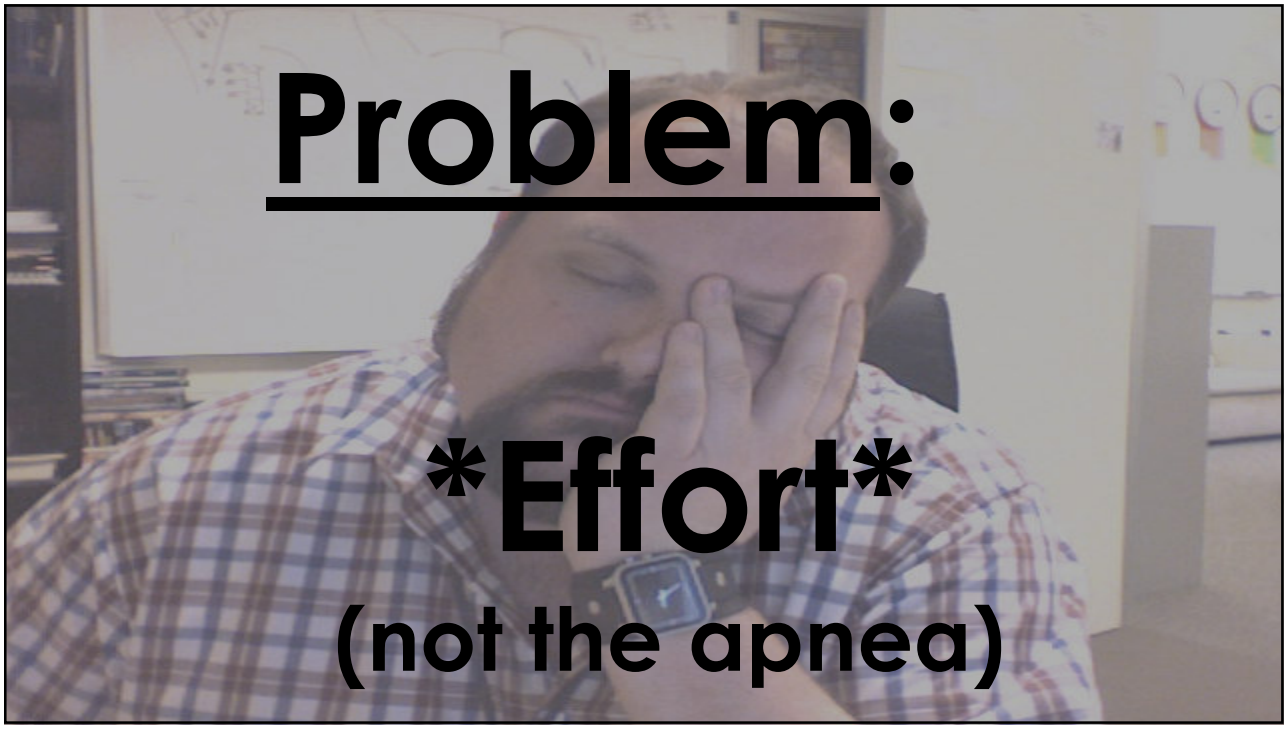
3. Reflex to clench advance tongue

4. Reflex to expand chest at greater force causing more negative pressure in Thoracic Cavity

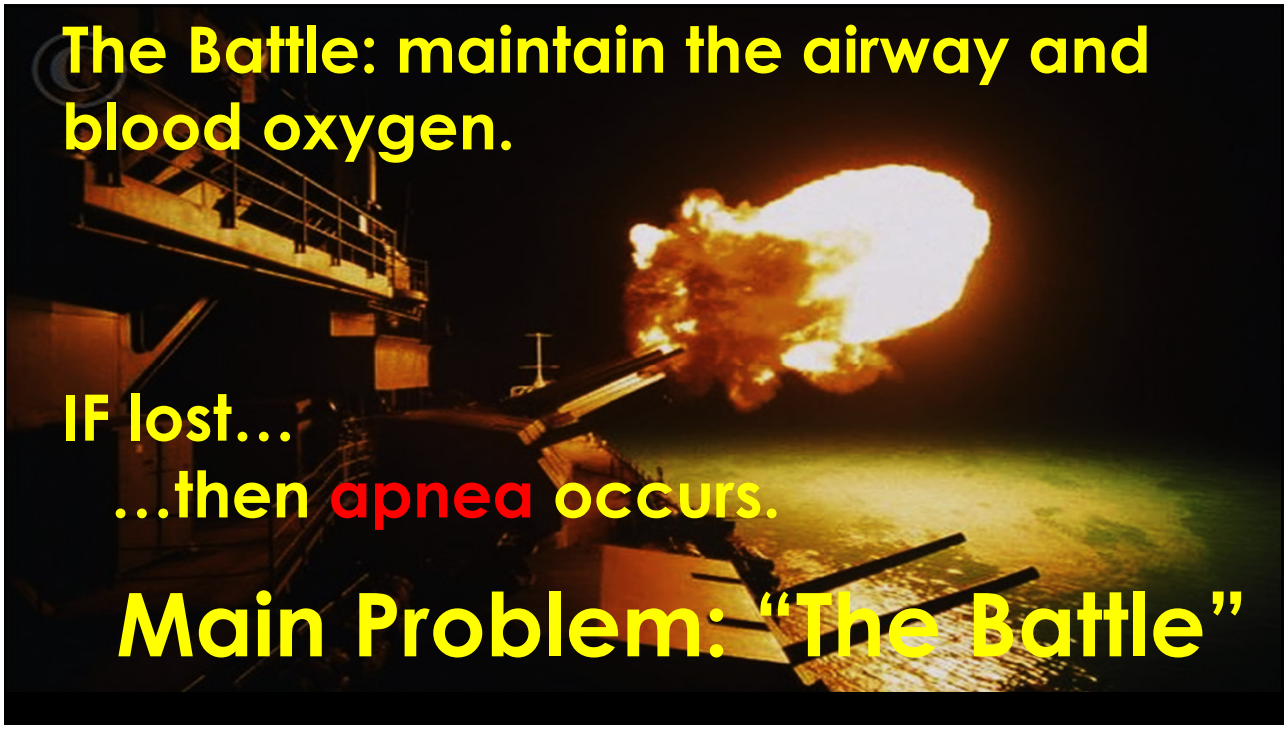
24


COMPENSATORY MECHANISM
Airway collapse
Drop in esophageal pressure
Activation of the sympathetic nervous system
Increase effort to breath
Activation of the clenching muscles and tongue to thrust anterior
Airway opens

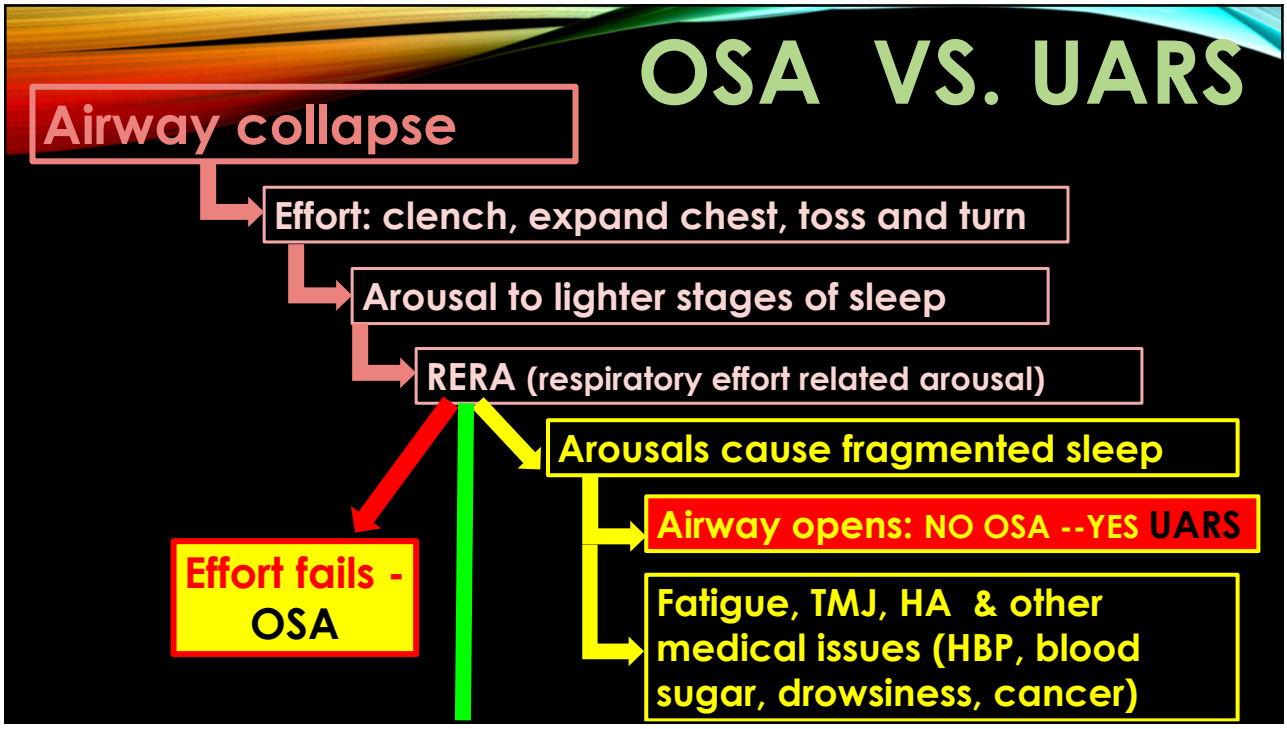
25


Problem:
Effort
(not the apnea)

26


The Battle: maintain the airway and blood oxygen.
IF lost…
…then apnea occurs.
Main Problem: "The Battle"

27


OSA VS. UARS
Airway collapse
Effort: clench, expand chest, toss and turn
Arousal to lighter stages of sleep
RERA (respiratory effort related arousal)
Arousals cause fragmented sleep
Airway opens: NO OSA --YES UARS
Effort fails - OSA
Fatigue, TMJ, HA & other medical issues (HBP, blood sugar, drowsiness, cancer)

28

"Battle" causes sleep fragmentation

- Fatigue and/or drowsiness
- Metabolic syndrome
- Weight gain
- Daytime hyperactivity (to compensate for fatigue)
- Nocturia
- Insomnia
- Anxiety and/or depression
- More

29

Airway collapse causes Negative Esophageal Pressures

- Cardiovascular stress
  - HBP
  - Epithelial dysfunction
- Increased clenching
- TM joint issues
- Facial changes
- Dental issues
- Headaches

30

Problem: Airway Obstruction at Base of Tongue

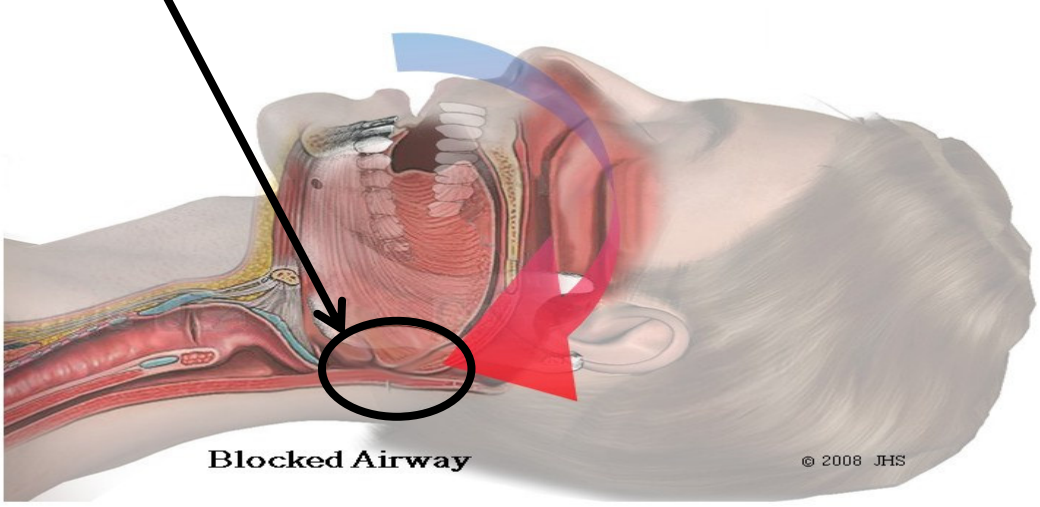


Image courtesy of Jerald H. Simmons MD

31

Solution:Brux to activate the tongue to bring forward

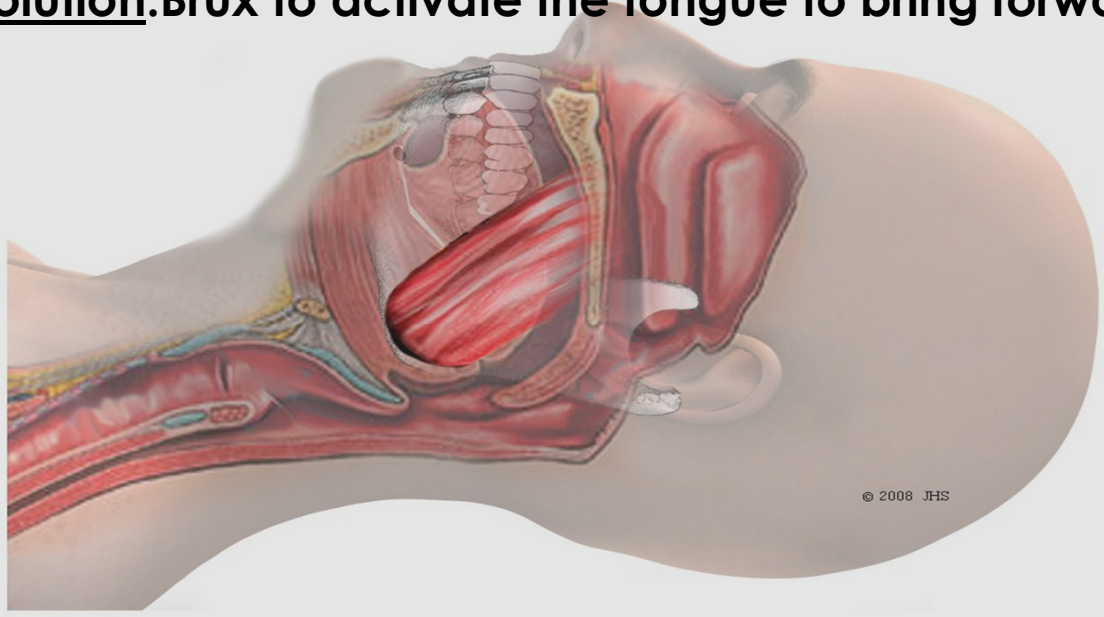
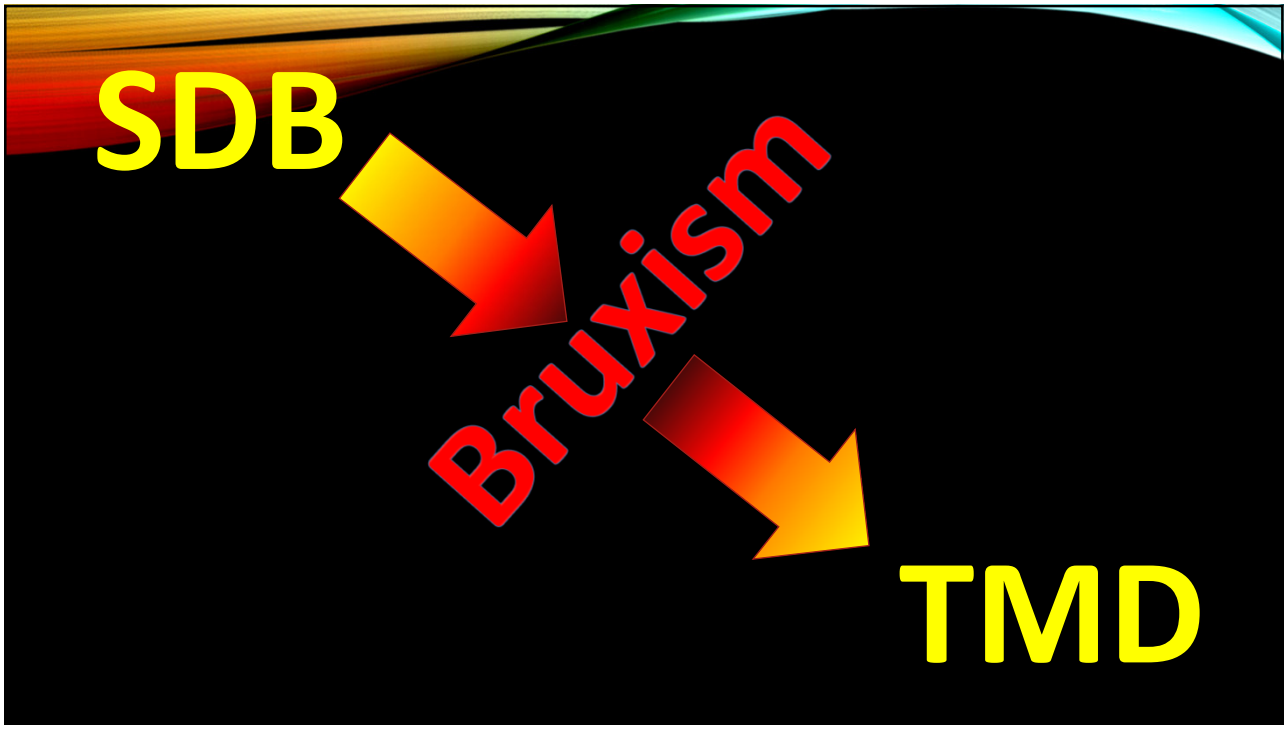


Image courtesy of Jerald H. Simmons MD

32



33

BRUXISM

Definition:

Sleep bruxism (G47.63) is a stereotyped movement disorder characterized by grinding or clenching of the teeth during sleep.

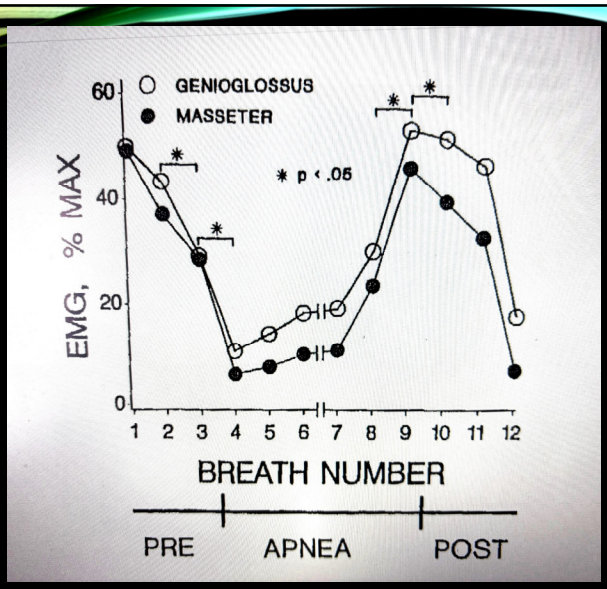
The International Classification of Sleep Disorders, third edition. pg. 182

34

Is the Masseter a Respiratory Muscle?

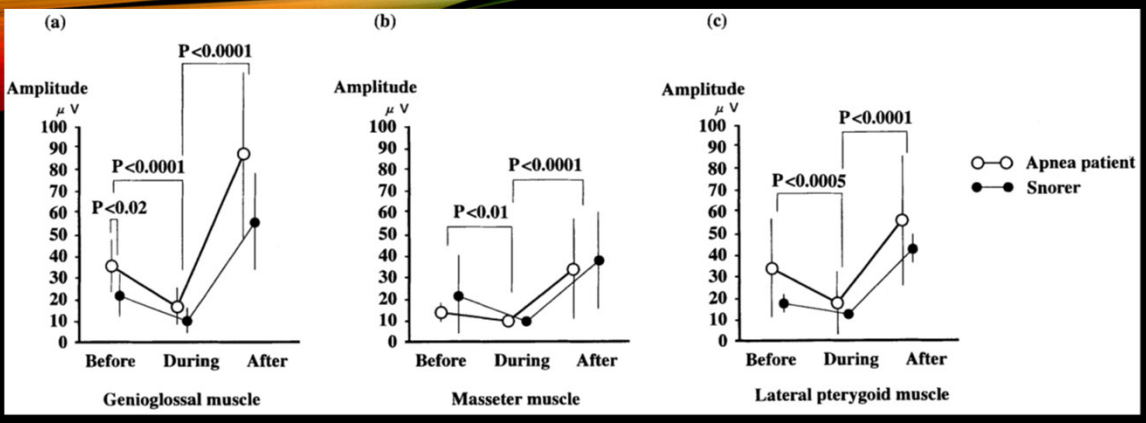
35

10 Patients with OSA



Suratt and Hollowell, Inspiration activation of the Masseter; Progress in Clinical & Biological Research: **1990**, Vol 345, pg 109-116; Call no. WL 108 161 1989s

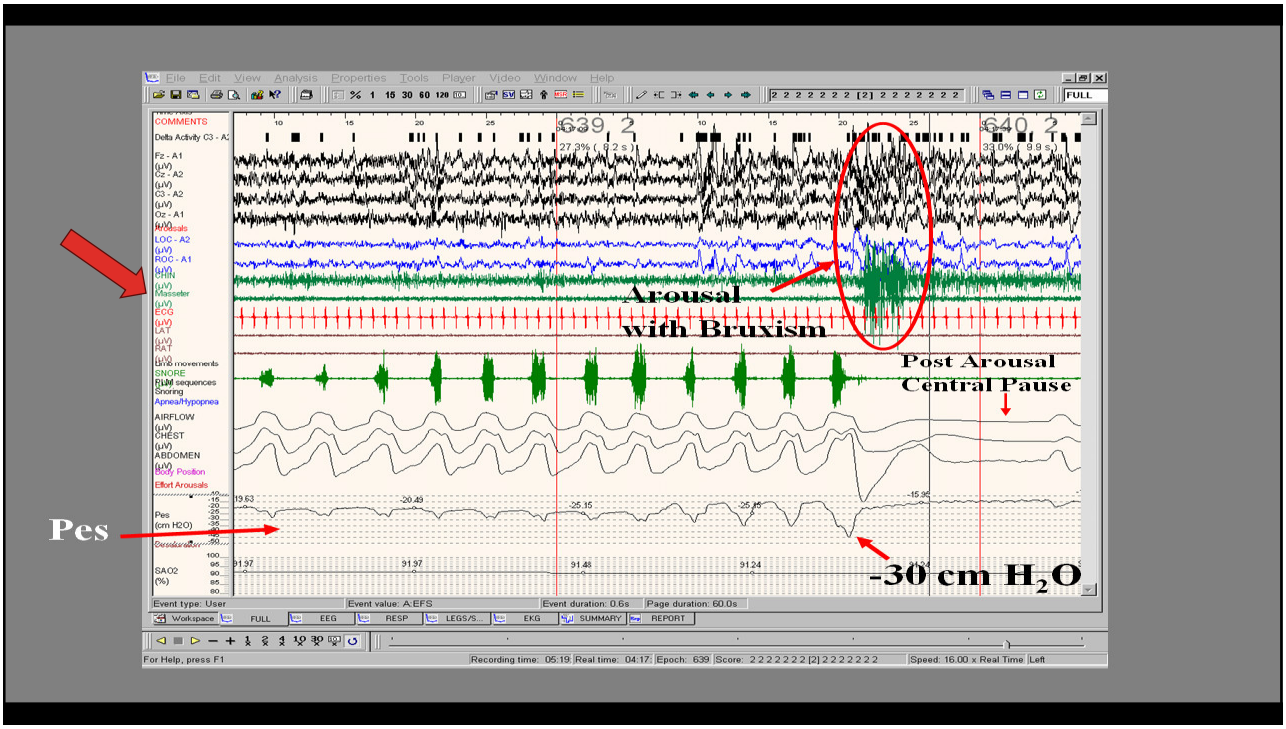
36



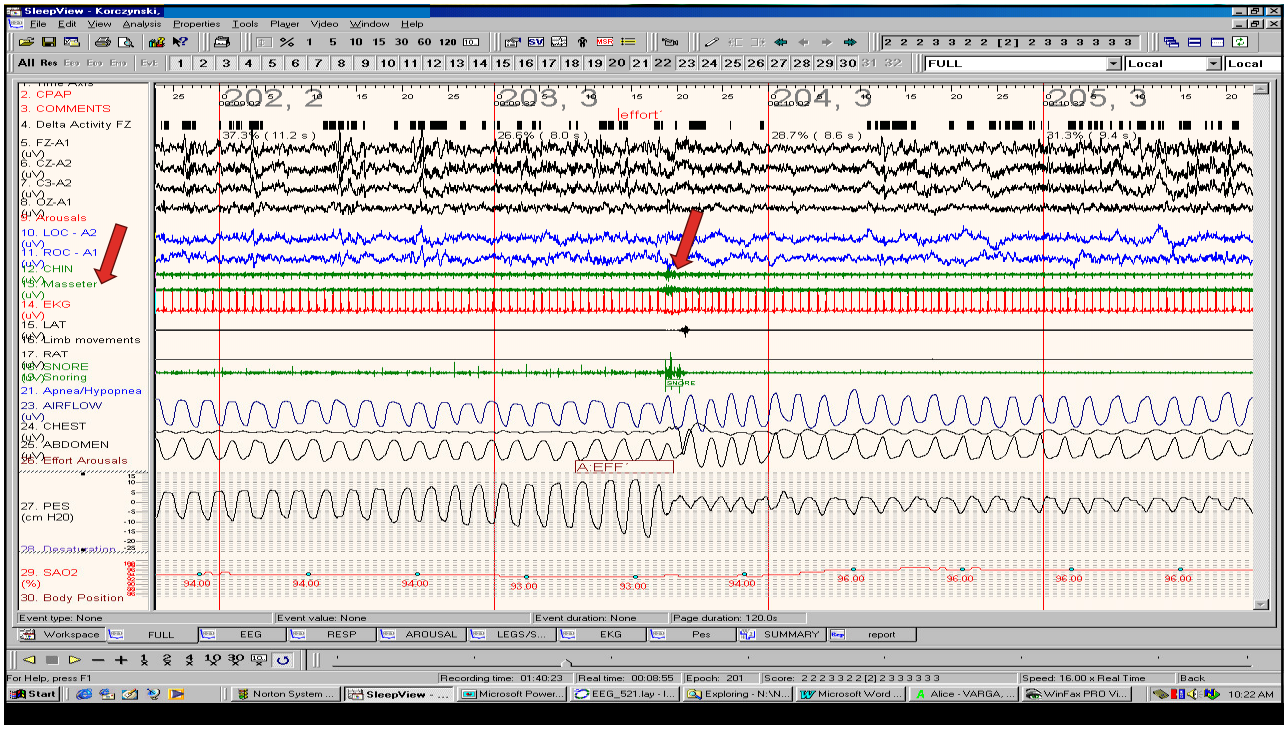
14 OSA patients and 7 snoring patients

JOURNAL OF ORAL REHABILITATION 1998 25; 603–609; A POLYSOMNOGRAPHIC STUDY ON MASTICATORY AND TONGUE MUSCLE ACTIVITY DURING OBSTRUCTIVE AND CENTRAL SLEEP APNEA; K . YOSHIDA

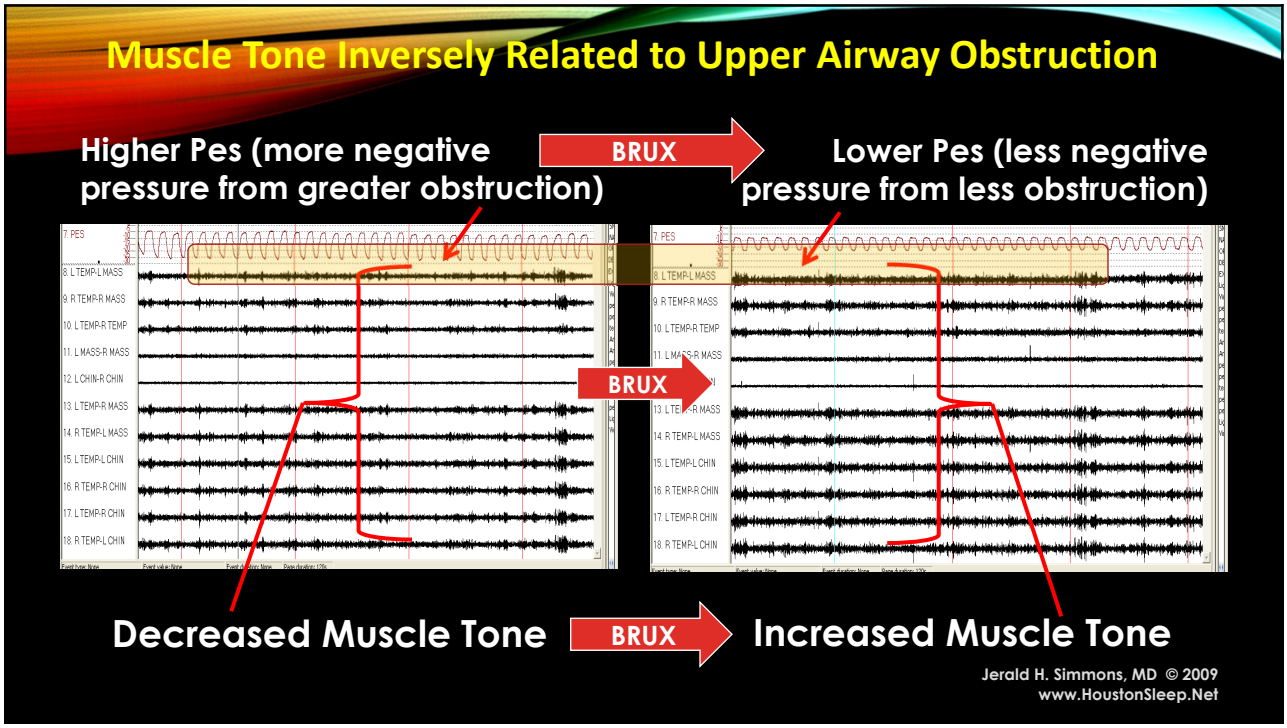
37



38


SleepView - Korczynski,
2. CPAP
3. COMMENTS
4. Delta Activity FZ
5. FZ-A1
6. CZ-A2
7. C3-A2
8. OZ-A1
9. Arousals
10. LOC - A2
11. ROC - A1
12. CHIN
13. Masseter
14. EKG
15. LAT
16. Limb movements
17. RAT
18. SNORE
19. Snoring
21. Apnea/Hypopnea
23. AIRFLOW
24. CHEST
25. ABDOMEN
26. Effort Arousals
27. PES (cm H20)
28. Desaturation
29. SAO2 (%)
30. Body Position
202, 2
203, 3
204, 3
205, 3
effort
A:EFF
SNORE
94.00
93.00
96.00

39


Muscle Tone Inversely Related to Upper Airway Obstruction
Higher Pes (more negative pressure from greater obstruction)
BRUX
Lower Pes (less negative pressure from less obstruction)
BRUX
Decreased Muscle Tone
BRUX
Increased Muscle Tone
Jerald H. Simmons, MD © 2009
www.HoustonSleep.Net

40

Why people brux and clench at night…

…to protect the collapsing airway!!!

41

Do muscle relaxant splints make OSA worse?

"Conclusion: This open study suggested that the use of an occlusal splint is associated with a risk of aggravation of respiratory disturbances. It may therefore be relevant for clinicians to question patients about snoring and sleep apnea when recommending an occlusal splint."

Yves Gagnon, DMD, MSc/Pierre Mayer, MD/Florence Morisson, DMD, PhD/Pierre H. Rompré, MSc/Gilles J. Lavigne, DMD, MSc, PhD; *Aggravation of Respiratory Disturbances by the Use of an Occlusal Splint in Apneic Patients: A Pilot Study*; **Int J Prosthodont 2004;17:447–453.**

42

Do muscle relaxant splints make OSA worse?

"Conclusion: The use of an occlusal stabilization splint IS associated with a risk of aggravation of OSA..."

Nikolopoulou, Ahlberg, Visscher, Hamburger, Naeije, Lobbezoo; *Effects of Occlusal Stabilization Splints on Obstructive Sleep Apnea: A Randomized Controlled Trial*; J OROFAC PAIN 2013; 27;199-205.

43

Clenching is secondary to the activation of the sympathetic nervous system

Day time clenching

- **anxiety** (stress – psychogenic (F45.8))
- **pain** (neuropathic, muscular, inflammatory, etc)
- **headaches** (migraine, muscle tension, sinus)
- **fatigue** (unresolved sleep drive)

44

Chandra - Study 25 subjects:

Conclusion: RERA's are associated with marked increase in cardiac sympathetic modulation, especially in females. Patients with a high RERA index, even in the setting of low or normal AHI, may be exposed to elevated sympathetic tone during sleep."

Chandra, Sica, Wang, Lakticova, Greenberg; *Respiratory effort-related arousals contribute to sympathetic modulation of heart rate variability*; Sleep Breath (2013) 17:1193-1200.

45

SLEEP

Collapsing airway

↳ SNS activation

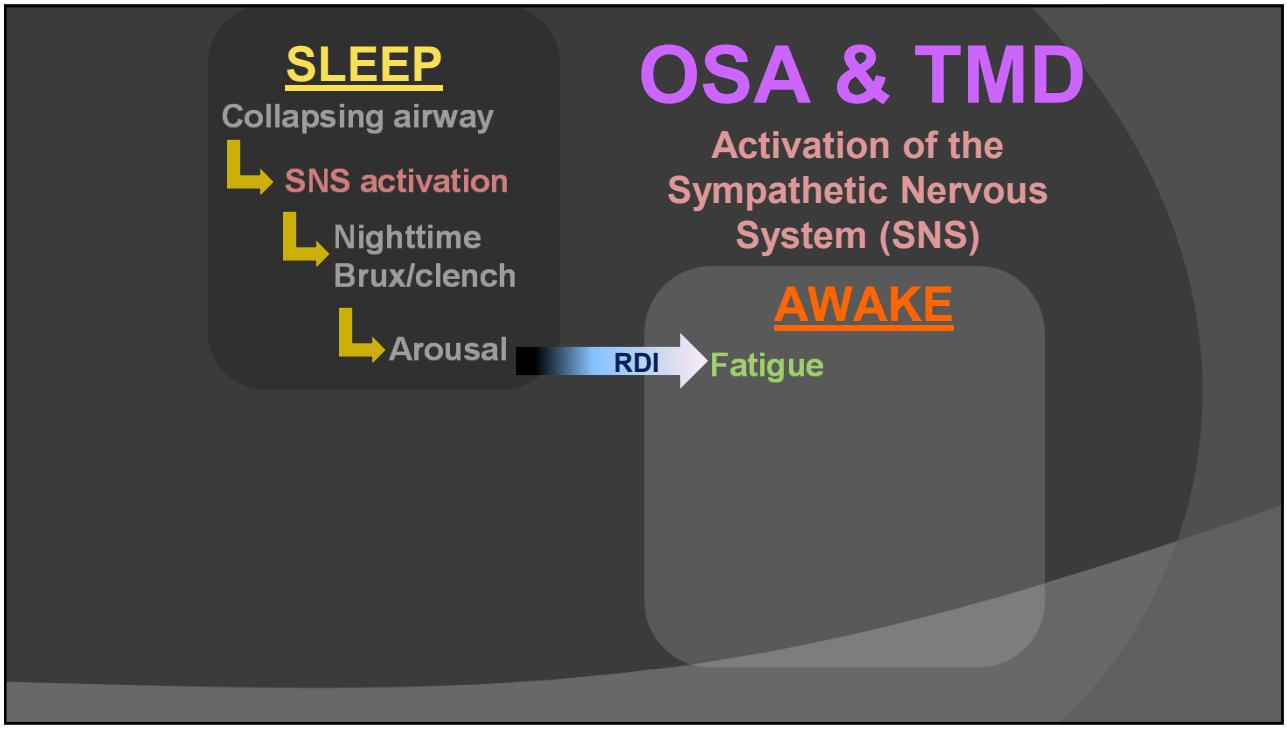
↳ Nighttime Brux/clench

↳ Arousal

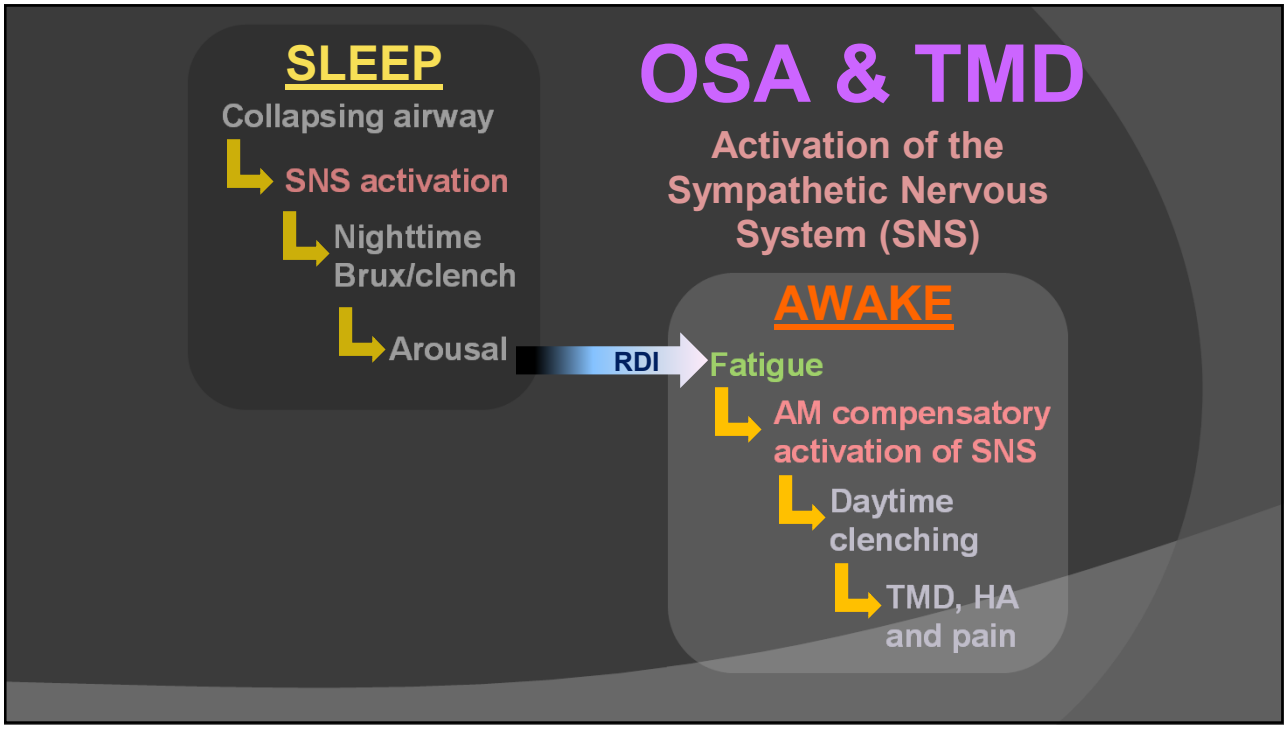
OSA & TMD

Activation of the Sympathetic Nervous System (SNS)

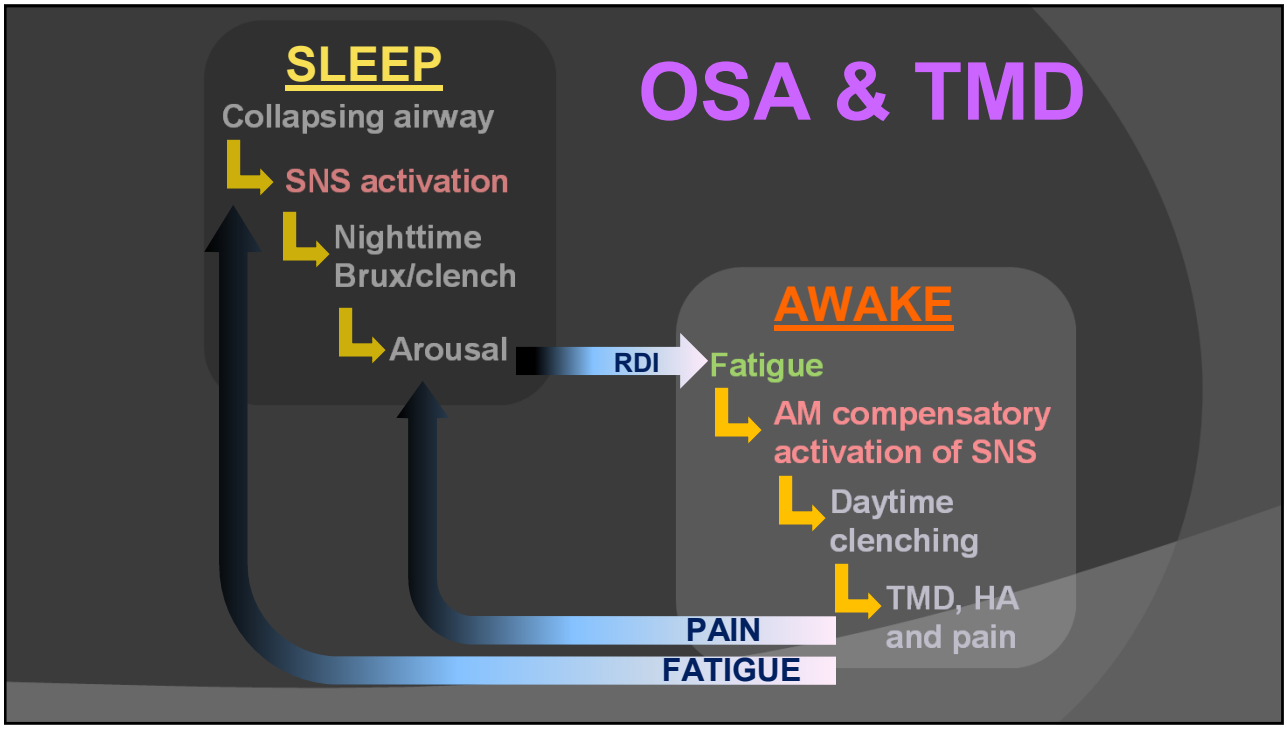
46


SLEEP
Collapsing airway
SNS activation
Nighttime Brux/clench
Arousal
RDI
OSA & TMD
Activation of the Sympathetic Nervous System (SNS)
AWAKE
Fatigue

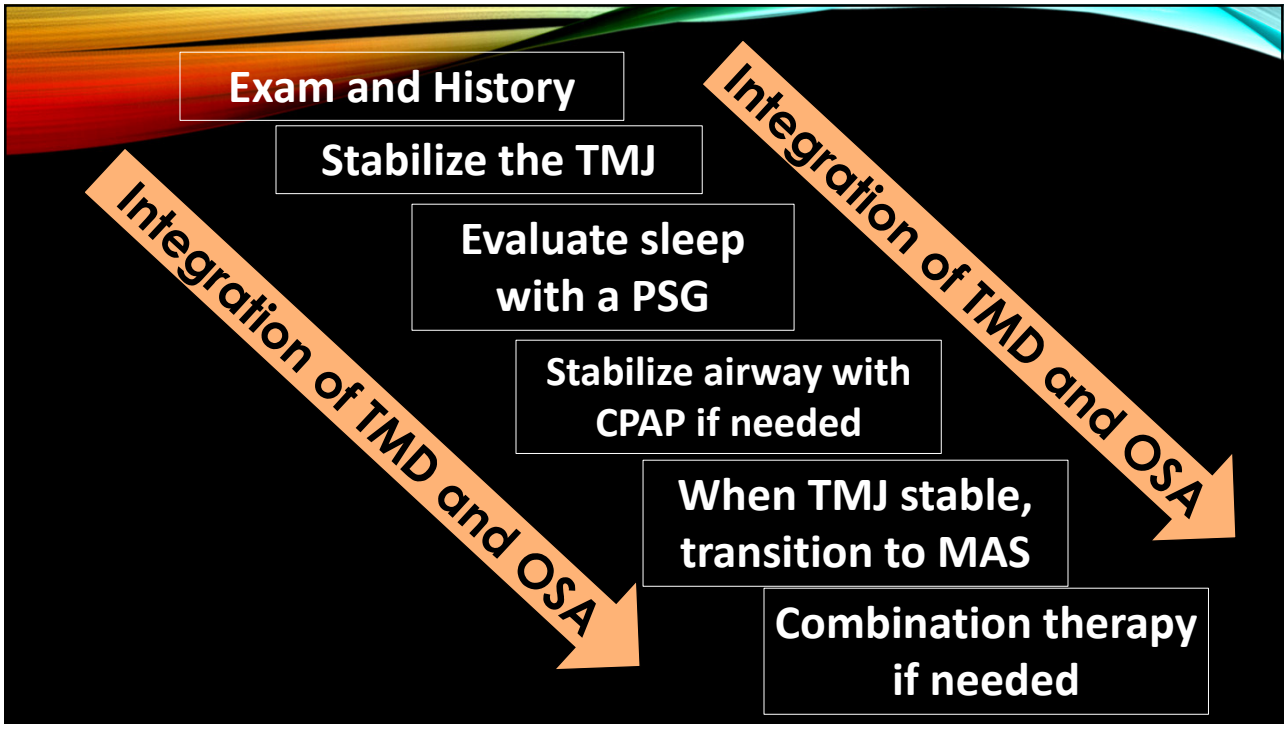
47


SLEEP
Collapsing airway
SNS activation
Nighttime Brux/clench
Arousal
RDI
OSA & TMD
Activation of the Sympathetic Nervous System (SNS)
AWAKE
Fatigue
AM compensatory activation of SNS
Daytime clenching
TMD, HA and pain

48


SLEEP
Collapsing airway
SNS activation
Nighttime Brux/clench
Arousal
OSA & TMD
RDI
AWAKE
Fatigue
AM compensatory activation of SNS
Daytime clenching
TMD, HA and pain
PAIN
FATIGUE

49


Exam and History
Stabilize the TMJ
Evaluate sleep with a PSG
Stabilize airway with CPAP if needed
When TMJ stable, transition to MAS
Combination therapy if needed
Integration of TMD and OSA
Integration of TMD and OSA

50

Remember

No one cares how much you know

until

They know how much you care!

51

52