Conflict of Interest Disclosures
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I do not have any conflicts of interest to disclose.

CONTROLLING ADVERSE EFFECTS OF MANDIBULAR ADVANCEMENT DEVICE (MAD) THERAPY WHICH CAUSE PATIENTS TO ABANDON THERAPY

PERSONAL COMMENTS & RECOMMENDATIONS FOR BETTER CONTROL ADVERSE EFFECTS FROM MANDIBULAR ADVANCEMENT THERAPY (MAD) TO TREAT OBSTRUCTIVE SLEEP APNEA
THE PROBLEM...

"I can’t wear this all night doc, it hurts and my bite is changing!"

AADSM TO THE RESCUE

CONSENSUS GUIDELINES FOR CONTROLLING ADVERSE EFFECTS OF MAD THERAPY

WHAT DOES THE REPORT CONCLUDE ABOUT MANAGING SIDE EFFECTS OF MAD THERAPY?
ABSTRACT OF AADSM GUIDELINES

SPECIAL ARTICLES

Management of Side Effects of Oral Appliance Therapy for Sleep-Disordered Breathing

Sheats RD, Schell TG, Blanton AO, Braga PM, Demko BG, Dort LC, Farquhar D, Katz SG, Masse JF, Rogers RR, Scherr SC, Schwartz DB, Spencer J.

AADSM CONSENSUS REPORT: NOV. 2017

SOME PERSONAL OBSERVATIONS & OPINIONS

• I do feel that this consensus report is both comprehensive and evidence-based
• I also agree that the members who were chosen to be on this committee are recognized leaders and researchers
• The stated purpose for producing this consensus was very appropriate:

"It is expected that these guidelines will be most beneficial to the novice practitioner in the field of dental sleep medicine and will serve to highlight the breadth of adverse effects of OAT and to provide strategies for managing them."

Personal observations (cont.)

• Although comprehensive, I do not feel that this consensus report serves the “novice” DSM clinician particularly early in treatment
• The committee maintains that:

"the most commonly observed side effect is unwanted tooth movement…"

• …I simply have not found that “tooth movement” is universally the most troublesome symptom confronting the patient or the novice clinician
• Complaint of “tooth movement” indeed becomes a concern after utilizing MADs for extended periods
AADSM CONSENSUS REPORT: NOV. 2017

Personal observations (cont.)

- Acute jaw pain and acute bite changes will often begin to occur often after titration of the MAD and mandible is advanced >50% maximum protrusion or thereabouts
- What I hope to prove / clarify is the etiology of these complications:
  - Activation / formation of painful myofascial pain trigger points in both the muscles of mastication and upper quarter muscles
- It is my belief that a better understanding of the basics of MPD will provide better outcomes for the management of obstructive sleep apnea with MADs

MANAGEMENT CONSIDERATIONS

- Verification and/or Correction of Midline Position: to maintain the appropriate lateral position of the mandible in its forward position
- Verification and/or Correction of Occlusion: to ascertain balanced occlusal forces bilaterally and anteriorly-posteriorly.
- Habitual Occlusion: Habitual occlusion refers to the position of closure between the dental arches in which the patient feels the teeth fit most comfortably with minimal feeling of stress in the muscles and joints.
- Isometric and passive jaw stretching exercises: include instructing patients to move the mandible against resistance both vertically and laterally within their physiologic range of motion and using finger pressure to stretch the lateral pterygoid, temporalis, and masseter muscles.
- Conservative Titration: Conservative titration refers to the minimum amount of advancement of the appliance required to manage sleep-disordered breathing.

TMD & MALOCCLUSION

“...a direct, causal link between (malocclusion) & TMD is no longer justifiable”
Dental Angle Class Asymmetry & Temporomandibular Disorders

Conclusions:

- “...Dental asymmetries as a risk factor for TMD signs and symptoms is minimal...”

- Try to view midline disparity as a comorbidity rather than the cause of adverse effects

“COMMON MANAGEMENT CONSIDERATIONS”

Temperomandibular Joint-Related Side Effects

Transient Morning Jaw Pain

“Watchful waiting, palliative care, isometric contraction and passive jaw exercise, and decreasing the titration rate are considered first-line treatments to manage transient jaw pain.”
**COMMON MANAGEMENT CONSIDERATIONS**

### Temporomandibular Joint-Related Side Effects

**Persistent Temporomandibular Joint Pain**

“Palliative care, isometric contraction and passive jaw stretching exercises, verifying or correcting midline positions, appliance adjustment, decreasing the titration rate, decreasing advancement, and conducting a temporomandibular disorder work-up and management are considered first-line treatments to manage persistent temporomandibular joint pain. Pacing posterior stops or anterior disclusion elements, discounting waking time and temporarily discontinuing use of oral appliance therapy are considered second-line treatments. If these treatment options are insufficient or inappropriate, using a daytime intranasal saline, prescribing a steroidal dose pack, recommending a different oral appliance design, referring to a dental specialist or additional health care provider, and permanently discontinuing oral appliance therapy may also be appropriate.”

**Tenderness in Muscles of Mastication**

“Palliative care, watchful waiting, verifying or correcting midline positions, use of a morning occlusal guide, and isometric contraction and passive jaw stretching exercises are considered first-line treatments to manage tenderness in the muscles of mastication. Decreasing oral appliance advancement, vertical distraction, and further treatment modifying the acrylic, and temporarily discontinuing use of oral appliance therapy are considered second-line treatments. If these treatment options are insufficient or inappropriate, recommending a different oral appliance design, referring to a dental specialist or additional health care provider, and permanently discontinuing oral appliance therapy may also be appropriate. In very rare instances, increasing oral appliance advancement may be indicated.”

**Joint Sounds**

“Watchful waiting is considered first-line treatment to manage joint sounds caused as a result of using an oral appliance. If this treatment option is insufficient or inappropriate, temporary or permanent discontinuation of oral appliance therapy may also be considered.”
TMJ DISC IS DISPLACED

MAD THERAPY BEGINS: MANDIBLE ADVANCED

PRESSURE ON RETRODISCAL TISSUE IS RELIEVED AT LEAST DURING THE NIGHT
THE DISC DISPLACEMENT IS REDUCED CONSEQUENTLY, MORE TMJ NOISE

THIS IS A BENEFIT OF MAD THERAPY, NOT A DETREMENT OR ADVERSE EFFECT

ORGANIZED DSM SEEMS TO MISS THE MARK

By far, the majority of adverse effects associated with MAD Therapy for treatment of OSA is due inadequately treated myofascial trigger points primarily affecting the inferior belly of lateral pterygoid muscle.”

Dan Tache DMD, DABDSM
COMMON SIDE EFFECTS WITH MAD THERAPY:
DON'T BLAME THE APPLIANCE
IT'S NOT ABOUT THE BITE

SO, WHERE DO WE START WHEN WE HEAR...

"I can’t wear this all night doc, it hurts too much and my bite feels off all day long now.

Doc, if you are okay with it, I’ll just take a break from wearing this deal for a while and maybe come back to it in a few months!!

WILL THIS ALWAYS A VIABLE OR REALISTIC OPTION?
ABANDONING TREATMENT IS NOT WITHOUT POTENTIALLY SERIOUS CONSEQUENCES

Diseases Associated with NOT controlling OSA

- Hypertension 35%
- Atrial Fibrillation 49% (% with OSA)
- Pacemakers 59%
- Diabetes 72%
- Congestive Heart Failure 76%
- Obesity 77%
- Drug Resistant Hypertension 83%
- Night Time Heart Attacks 91%

MANY OF OUR PATIENTS HAVE SIGNIFICANT MEDICAL PROBLEMS AND DO NOT UNDERSTAND THAT THESE PROBLEMS ARE COMORBIDITIES OF WHAT WE ARE TRYING TO TREAT FOR THEM!

DISCONTINUE MAD TREATMENT AT POTENTIALLY GREAT RISK!

- OSA increases this risk more than any other single factor— including smoking, obesity etc. (5x increase)
- Nearly 80% of nocturnal strokes directly attributed to OSA

THE NEMESIS OF MANDIBULAR ADVANCEMENT DEVICES EMPLOYED FOR TREATMENT OF OSA:

PAINFUL MYOFASCIAL TRIGGER POINTS IN THE INFERIOR BELLY OF LP (AND OTHER MUSCLES OF THE SAME FUNCTIONAL GROUP)
WHAT IS A TRIGGER POINT?

1. taut, palpable band or banded area in a (skeletal) muscle
2. A very tender nodule (trigger point) in the muscle when palpated
3. Reproducible pain patterns provoked when the trigger point compressed or stretched
4. painful limitation of motion

Essential Inclusion Criteria

TRIGGER POINTS CAN FORM IN ANY SKELETAL MUSCLE

CHRONICALLY SHORTENED MUSCLES WILL DEVELOP MTPS

As Contraction Knots become more numerous, the activity of the trigger point increases proportionately...more swelling and pain.

Q: SO, WHY IS LATERAL PTERYGOID MOST OFFENDED?
A: BECAUSE IT IS MOST AFFECTED BY MANDIBULAR ADVANCEMENT

**LATERAL PTERYGOID (LP)**

**SYMPTOMS**
Referred pain from LP:
- Sinus-like pain
- Pain that feels like an earache
- Pain that feels like a TMJD
- Cannot close back teeth together

**Q: WHICH OTHER MUSCLES ARE AFFECTED?**

**A: WHAT IS REFERRED TO AS THE FUNCTIONAL UNIT OF LATERAL PTERYGOID MUSCLE**
FUNCTIONAL UNIT OF THE LATERAL PTERYGOID MUSCLE

- Pterygoids
  - Medial
- Masseter
  - Superficial
- Anterior Temporalis

THE FUNCTIONAL UNIT OF THE LP: MUSCLES MOST AFFECTED BY ADVANCEMENT OF THE MANDIBLE

CLINICAL APPLICATION: IDENTIFICATION OF ACTIVE TRIGGER POINTS IN LP

- DIRECT TECHNIQUE: PALPATION
- INDIRECT TECHNIQUE: PROVOCATION
EXAMINATION* OF THE LP MUSCLE

1. Direct Palpation
2. Resisted Protrusion

* goal of the examination is to duplicate the symptoms of LP myofascial pain confirming the source of the pain & dysfunction

DIRECT EXAMINATION OF LP: PALPATION

• IT IS VERY DIFFICULT TO ASSESS THE LATERAL PTERYGOID (LP) MUSCLE BY DIRECT PALPATION.
• I PREFER INDIRECT EVALUATION BY "PROVOCATION"
"Now, please do a Jay Lars and push your jaw against my hand for 10 seconds, go...1,2,3..."

"...tell me if this duplicates your pain..."

IF PATIENT COMPLAINS OF JAW PAIN, EARACHE, WITHOUT SINUS-AREA PAIN CONSIDER A TMJD

DISC DISPLACED/ RETRODISCITIS
TECHNIQUES FOR CONTROLLING MYOFASCIAL PAIN AFFECTING THE LP

- AM Aligner
- Morning Positioner
- Bite Tabs
- Retrusive stretching (Jay Leno stretches)
  - Jaw Thrusts
- Latero-trusive Jaw Stretching

THE AM ALIGNER: FABRICATION

www.pattersondental.com/Supplies/ItemDetail/071050186

Irradiated Thermacryl™
AM ALIGNER: ORIGINAL STYLE

ORIGINAL STYLE

AM ALIGNER IN PLACE

AM ALIGNER: MODIFIED

ORIGINAL STYLE: MAXIMUM INTERCUSPATION

NEW MODIFICATION: EASIER TO POSITION JAW CORRECTLY (CO)

MODIFICATION PERMITS MORE RETRUSION

AM ALIGNER: POSITION

AM ALIGNER: MODIFIED

MORE RETRUSION = MORE STRETCH
Instruct the patient to bite hard until the back teeth are hitting evenly.

Using an AM Aligner

Adequate stretch of LP often necessitates more retrusion than CO will permit... border movement is needed.
WHAT IS NEEDED: UNLIMITED RETRUSION

RETRUDE THE JAW TO THE ANATOMIC LIMIT OF THE FOSSA FOR BEST STRETCH

MORNING POSITIONER (MP)
The objective: **Drive** the condyle **back** to stretch the LP.

The AM Aligner **depresses** the jaw more than **retrudes** so, LP is **stretched** very little.

**MORNING POSITIONER™: IS IT EFFECTIVE IN LENGTHENING THE LP?**

**WITH VERTICAL DISTRACTION, IS LP BEING MAXIMALLY STRETCHED?**

Centric Relation
MP: Is it stretching the LP?

The objective: Drive condyle back to stretch the LP

The problem: this device does NOT retrude the jaw much
Jaw is depressed > retruded

JAW RETRUSION

BITE TABS

BITE TAB EXERCISES: BETTER THAN YOU MAY THINK
BITE TABS (HOME GROWN)

BITE TABS: DO IT RIGHT

"... try to squeeze your back teeth together ..."

JAY LENO JAW THRUSTS

ANATOMICAL LIMITATIONS
JAW RETRUSION: DON'T WORRY ABOUT ANY POPPING

PROTRUDE JAW

RETRUDE JAW

BETTER YET, BUT...

• This technique does allow for much improved LP stretching
• While this IS more effective, there are limitations
• So, if myofascial pain persists because the TP persists, then what is one to do?

COMBINED LATERAL + RETRUSIVE STRETCHES

LATERO-TRUSIVE STRETCH
RETRUSIVE STRETCHES ARE LIMITED BY THE POSTERIOR LIMIT OF THE GLENOID FOSSA

BANG!

LATERO-TRUSIVE STRETCH: RETRUSION + LATERAL MOVEMENT AS WELL

- One of the most effective stretches
- Not limited by the boundaries of the glenoid fossa

LATEROTRUSIVE STRETCH: SO EFFECTIVE BECAUSE CONDYLE MOVE AWAY FROM GLENOID FOSSA
PREVENTING ADVERSE AFFECTS CONSEQUENT TO MAD

EXPLORING INCREASED VERTICAL DIMENSION FOR IMPROVED AIRWAY STABILITY-AN OFT UNDERUTILIZED OPTION

PREVENTING ADVERSE AFFECTS CONSEQUENT TO MAD

EMPLOYING ACOUSTIC PHARYNGOMETRY TO ENHANCE AIRWAY STABILITY WITH INCREASED VERTICAL

SELECTING SLEEP-DISORDERED BREATHING APPLIANCES: BIOMECHANICAL CONSIDERATIONS

OBSERVATIONS BY DR. PETER GEORGE (DEVELOPER OF THE GEORGE GAUGE)

• “sagittal expansion of the airway” does not always result in an increase in size or stability of the airway

• “there is no direct correlation between the amount of mandibular advancement and the efficacy of an MAD”


EFFECT OF INCREASED VERTICAL ON AIRWAY: THE PALATOGLOSSAL MUSCLE

• Increased vertical:
  ➢ more tension to palatoglossal muscle (broken line)
  ➢ This pull:
    ➢ advances the palate and
    ➢ increases tension,
    ➢ Reduces collapsibility


PHARYNGEAL PATENCY IN RESPONSE TO ADVANCEMENT OF THE MANDIBLE IN OBESE ANESTHETIZED PERSONS

• “In conclusion, forward displacement of the mandible did not improve the patency of velopharynx in obese persons
  ➢ Whereas increased vertical improved oropharyngeal airway patency both in obese and non-obese persons.

EMPLOYING ACOUSTIC PHARYNGOMETRY (AP)

PREVENTING SIDE EFFECTS BY REDUCING THE AMOUNT OF ADVANCEMENT NEEDED

BG: USING AP TO OPTIMIZE THERAPY

Brief PMH
• Dx with CVD following a myocardial infarction
• Difficulty managing his blood pressure
• He was diagnosed with severe obstructive sleep apnea.
  o AHI=71;
  o Lowest Oxygen Saturation=70%.
• BG provided with Auto Bi-PAP

BG: A STUDY OF HYBRID THERAPY

• BG requires very high Bi-PAP pressures to control OSA
  ➢ Pressure range: 16 – 20 CMW
• High Bi-PAP pressure = significant mask leaks
• AHI remains elevated:
  ➢ AHI was still high @ 46.9-56.0/hr.
High mask pressure leading to discomfort and leaks, compelled BG to be changed to a full face mask as shown below.

**ACOUSTIC PHARYNGOMETRY TO ANALYZE THE AIRWAY**

Determining x- and y-axis position for optimal airway response

**Advancement** will stabilize airway...next will check effect of vertical.
Both ADVANCEMENT and/or INCR. VERTICAL (6mm) appear to add very good stability to airway.

TAP 3 MAD CHOSEN

DUAL THERAPY APPROACH WILL BE ATTEMPTED TO REDUCE PRESSURE...REDUCED LEAKAGE...REDUCED AHI
OAT DEVICE CHOSEN: TAP3
- WE WILL TRY ADVANCEMENT FIRST -

TAP3 IS DELIVERED & TITRATED

[Statistical data]

9/8/18
RECALL: INITIAL AP EVAL. REVEALED THAT +6MM VERTICAL SHOULD HELP

ACOUSTIC PHARYNGOMETRY
+AIRWAY METRICS™

Adding +6 mm of vertical to further enhance efficacy of MAD

TAP 3 IS MODIFIED (+ 6MM OF VDO)

I will close this space with acrylic if we are successful
SUCCESSIVE DOWNLOADS FOLLOWING THE MODIFICATION

SUCCESSIVE DOWNLOADS FOLLOWING CHANGE IN VDO

SUCCESS:

Completing our work: add posterior contact
BECOME MORE KNOWLEDGEABLE ABOUT MYOFASCIAL PAIN
GET CREDENTIALED
FOLLOW AASM GUIDELINES