

A “MAD” TITRATION PROTOCOL

An effective, but not widely used, method to demonstrate efficacy of an oral orthotic used to treat OSA is a follow-up, **titration polysomnogram**. Just as CPAP devices are titrated to find the best pressure setting for the patient, oral appliances can be tested in different positions to find the most efficacious setting or position of the mandible.

In an effort to improve communication between sleep medicine physicians, sleep medicine dentists and sleep technicians administering the titration studies, the following protocol for the titration of oral sleep devices is suggested.

The oral device used to manage OSA is referred to as a mandibular advancement device (MAD), a mandibular advancement splint (MAS), an oral appliance, etc. A few commonly used MAD devices are illustrated, including demonstrations of the various titration or adjustment techniques each may require.

Preliminary Preparation

Review the type of mandibular advancement splint (MAS) being used by the patient for the study. Refer to the reference sheet for proper adjustment technique. **Each titration, or forward adjustment of the device, should be approximately 1mm per event.** Locate any titration keys, wrenches, shims, elastics, etc. needed to perform the adjustment properly.

The referring dentist should send the patient for a titration PSG only when the patient is comfortable, compliant with MAS therapy, and shows subjective signs of improvement in symptoms.

The dentist should also communicate, to the sleep center staff, any concerns or instructions regarding the patient’s mandibular range-of-motion or ability to move the lower jaw, and may provide some additional guidance.

Establish Titration Objective

Of course, the goal of every titration should be to optimize the efficacy of the therapy being utilized. The sleep technician shall make every effort to eliminate sleep disordered breathing. **When interpreting the PSG results to determine efficacy of the oral appliance therapy and writing the summary report, the physician of record should be encouraged to follow AASM guidelines employing the definitions of an “optimum”, “good”, or “adequate” titration outcome.**

An “optimum” titration reduces RDI to < 5 for > 15 min including supine REM.

A “good” titration reduces RDI to ≤ 10 or by $> 50\%$ if baseline RDI is < 15 .

An “adequate” titration decreases RDI $> 75\%$ from baseline, especially in severe OSA cases.

The following suggestions should meet, or exceed, any previously published guidelines and the physician managing the case will ultimately decide whether to accept the results.

If a patient requires supplemental oxygen during the daytime due to a medical condition, most likely **they should be tested using the oral appliance and oxygen concurrently**. Be aware that the referring dentist or the managing physician may have made specific requests or prescribed orders contrary to the guidelines above, which would take precedence and override these suggestions. Be cognizant of pre-existing health concerns such as COPD, chronic asthma, etc.

Monitoring Guidelines and the Decision to Titrate

Monitor the patient during sleep until it is obvious that sleep-breathing obstructions exceed titration objectives. **If OSA is adequately controlled** and the data meets or exceeds pre-established titration objectives, **NO TITRATION OR ADJUSTMENT IS NEEDED**. Simply monitor the patient and observe for possible deterioration of the patient’s condition in REM sleep.

Try not to wake a patient in the midst of a REM phase cycle to perform an adjustment of the MAD.

If the patient's OSA is not adequately controlled as defined above, remove the MAS and adjust it 1mm in a forward, or protrusive, direction. Allow the patient to return to sleep and continue monitoring. You may repeat this process as needed, at 60-90 minute intervals, for a **maximum of 3 adjustments to the MAS.**

If loud snoring is observed for > 3-5 minutes, you may adjust one additional cycle, but, not to exceed a maximum of three adjustments total for the night.

Monitoring of Oxygen Levels

No provision has been made to allow a technician to administer oxygen during an oral appliance titration. A physician may wish to modify the procedure as needed for a specific patient or create a policy differing from this universal protocol based on the needs of any given facility.

If SpO₂ levels drop below 88% for > 5 minutes, the technician should note this finding in the summary report for the physician's review.

If OSA is Well Managed

Simply stop adjusting the oral device if the symptoms seem to be effectively controlled per the guidelines previously mentioned.

If OSA is Not Well Controlled

The patient will be given several options to consider, by either the referring dentist or the physician, if the obstructive component of the apnea is not successfully managed and/or the patient remains hypoxemic. These could include any of the following therapies.

If several titration positions of the MAS were attempted and the AHI reported at each position was trending toward improvement with additional protrusive movement, and if the patient can tolerate more movement of the mandible forward, **the dentist may elect to do additional positioning of the device.** This would likely require additional testing with another titration PSG or HST as determined by the physician or the dentist.

If additional movement of the mandible forward does **not** seem to be indicated, and if the patient's complaint with CPAP was excessive pressure, then **combination therapy can be attempted** using both the MAS and CPAP. This usually allows the pressure of the PAP machine to be significantly lowered and should be evaluated with an additional PSG to titrate pressure.

If the presence of the straps on the mask was a chief complaint, **hybrid oral appliances can be created** allowing the dental component to support a mask or nasal pillows and thus, eliminate the headgear. These modifications can be relatively simple if anticipated in advance by the dentist.

If the titration gives little indication that the oral appliance is effective, nasal patency, or nasal breathing obstructions are often contributing factors. The dentist or the physician may make a referral for a patient to be evaluated by an Ear, Nose and Throat physician for possible treatment which could include nasal sprays, allergy treatment or surgery.

Positional therapy may help a limited number of individuals.

The patient may always be encouraged to re-attempt PAP therapy.

At the End of the Session

MOVE THE MAD BACK TO THE POSITION IT WAS IN AT THE BEGINNING OF THE STUDY, BUT NOT FURTHER! NOTE THE TOTAL NUMBER OF TURNS YOU DID. DO NOT JUST RETURN THE SCREW TO THE FULLY RETRUDED POSITION. The test results will be reviewed and the dentist will choose the most appropriate position of the device.

Send the referring dentist a copy of the summary report including the physician's assessment, and any significant observations regarding REM related SBD, snoring, etc. **The summary report should be written in a manner that provides data from EACH TITRATION POSITION including AHI, REM sleep time, oxygen saturation data, etc.** Remember that the dentist will need this data to help determine which, if any, of the mandibular positions is most effective and whether additional movement and titration attempts with the device are indicated.

The managing physician will be responsible for all decisions regarding the need for supplemental oxygen therapy, CSA management, etc. and ultimately, whether the OSA has been adequately controlled or not, consistent with AASM definitions of an "optimal, good, or adequate" titration.

It should be remembered that often times, when comparing efficacy of CPAP vs OAT, the patient may be as well managed with slightly higher AHI numbers combined with significantly improved compliance achieved with the MAS, compared to having less compliance with PAP therapies.

Effective implementation of an oral appliance titration protocol such as this may result in significantly higher success rates for OAT cases.