

Treatment Complications: Notes from the Fall 2009 Advanced Course in Oral Appliance Therapy

Compiled by Sheri Katz, DDS, Jeffrey Pancer, DDS, and Leslie Dort, DDS

Little high-level research has examined the side effects of oral appliance therapy (OAT), so the AADSM began identifying problems and solutions associated with OAT during the Advanced Course in OAT that took place October 10-11, 2009 in New Orleans, La. The 45 attendees described, categorized and documented complications they had experienced in practice. The following notes are a summary of these discussions.

These findings are a “work in progress.” We encourage members to submit clarifications, additions or criticisms by referring to the complication letter and number. This document will undergo revisions as suggestions are submitted and discussed. Please e-mail feedback to Dialogue@aadsm.org.

The following dentists were present:

Kathleen Agolia, DDS	Alice Kaniff, DDS	Pamela Nordland, DMD
David Barr, DDS	Steve Kigawa, DDS	Thomas O'Keefe, DDS
David Core, DMD	Timothy Kitzmiller, DDS	James Pearce, DDS
Kathy Curtis, DDS	Lori Kitzmiller	Matthew Pendergrass, DDS
Stan Dittman, DDS	Steven Lamberg, DDS	Ronald Prehn, DDS
Jeffrey Doan	James Lipton, DDS	Sue Ellen Richardson, DDS
Joseph Gatti, DDS	Lael Long, DDS	Gary Robins, DMD
Edward Goyings, DDS	Terry Lowitz, DDS	Jose Rodriguez-Quesada, DDS
Robert Haney, DDS	Susan Lunson, DDS	David Rosen, DMD
Donald Henagan, DDS	David Matthews, DMD	William Schlansker, DMD
Tony Hewlett, DDS	John McCrillis, DMD	Bruce Speake, DDS
Steven Hoffman, DMD	James Metz, DDS	David Sweeney, DDS
Howard Hoffman, DDS	Paul Miller, DDS	Diane Vo, DDS
James Hogg, DDS	Margaret Mitchell, DDS	

A. Complications Impacting the Oral Structures

1. Morning Temporomandibular Joint (TMJ) Pain

TMJ pain noticed in the morning can occur anytime after the initial fitting of the device. It can occur because of midline discrepancy of the oral appliance, bite changes, stress related-muscle spasms, a change in sleep position, trauma, a change in mental status, or uneven advancement. Solutions include rechecking the midlines of the device against the patient's midlines, checking the device for even advancement on both arms, and checking the occlusion on the device. Therapy of the joints include rest, ice, soft diet, use of anti-inflammatories for a few days, reverse advancements until resolution of pain, stop appliance use until TMJs are comfortable, or switch to

CPAP long- or short-term. If pain is unilateral and a Herbst-type device is being used, decrease the advancement on the symptomatic side by .5-1.0 mm.

2. Tinnitus

Tinnitus can be triggered by appliance use, possibly titrating the device too quickly. Treating this complication involves discontinued use temporarily to allow the tinnitus to subside.

3. Tongue Pain

Tongue pain may occur during adaptation to the appliance. It can be caused by a tongue retaining device (TRD) with too much suction or other devices with components on the lingual/palatal areas that irritate the tongue. Treatment includes changing the shape of the tongue retaining device with heat and smoothing the inside surfaces of the devices. Also consider allergies as a source of pain.

4. Sore Cheeks

Sore cheeks can occur from normal adjustment, para-functional habits, change in medication making the mucosa dry or increasing bruxism, systemic changes such as diabetes, acromegaly, or menopause, the bulkiness of the OA, a defect in the appliance, calculus accumulation, a crack in appliance, wear of the appliance, and restorative changes. Treatment involves examination of the OA and review of patient's medical history. Mitigation of this problem includes modifying the OA as needed, using over-the-counter products for dry mouth, covering irritated parts with wax or acrylic, and increasing water intake.

5. Drooling/Excessive Salivation

Drooling is felt to be a normal physiologic response to OAT. This complication should be discussed as part of the informed consent process. Reassure the patient that drooling is common. The patient may place a hand towel on their pillow at night. In extreme cases, the patient may take diphenhydramine at bedtime to decrease salivation (side-effect of the medication) and get them into a deep sleep quicker. Excessive salivation decreases in deep sleep. This is a short-term solution.

6. Dry Mouth

Dry mouth in the morning may be caused by two identifiable reasons. The patient may still snore and require further titration, or the patient is breathing through his or her mouth. The solution to mouth-breathing would be to investigate the cause of this with the patient. He or she may need a referral to an ENT or allergist to increase nasal competency. Artificial saliva may be prescribed to decrease the problem. A decrease in vertical dimension of the oral appliance may be necessary to allow lip competence and additional elastics may be necessary to keep the mandibular/maxillary components in closer proximity.

7. Material Allergy

A material allergy can become evident anytime during the use of

the OA, but is usually experienced shortly after beginning use of the device. Treatment would include a change of the offending material. An adequate history may identify metal/nickel allergies. Nobel metals or titanium can be used and are part of certain devices. Materials can be tested by an allergist.

8. Periodontal Bone Loss, Local or Generalized

Periodontal status should be well documented before beginning OAT. If periodontal bone loss or generalized periodontal problems occur during therapy, check for changes in the patient's medical history (i.e. diabetes or pregnancy) or their oral hygiene. Determine if the appliance is rocking, unstable, or impinging on tissues; look for broken teeth and recurrent decay. The treatment would involve modifying the OA to relieve the offending pressure or instability of the device. The patient may require simple home care instructions or a consultation with the patient's dentist or periodontist. If the problem is thought to be medically related, a referral to the patient's physician is advised.

9. Tooth Mobility

Adverse forces occurring during appliance use, or forces caused by functioning without repositioning the mandible in the morning, can cause tooth mobility. The patient will present with some mobility that was not present on the onset of therapy. They may or may not complain of sore teeth. Examine the patient to rule out periodontal pathology.

Evaluate for bruxism, consider internal aspect of the appliance—hard or soft. Adjust if possible. Consider how specifics of appliance design result in different forces on teeth (i.e., is the OA connected at the front or sides and with what degree of freedom of movement). An OA with a different design or light occlusal adjustments may be indicated.

B. Managing Emotional Changes Associated with OAT

10. Vivid Dreams

Patients may begin experiencing vivid dreams. Reassure the patient this change is usually associated with the return of REM sleep.

11. Feelings of Suffocation.

Feelings of suffocation may be experienced immediately or with titration. This may occur with a very anxious patient, a patient with a crowded airway or if too much advancement is affected. Try changing the advancement, changing the vertical, and making sure the patient can breathe through his mouth easily, which may mean reconfiguring the current device or changing to a different oral appliance. Give the patient permission to remove the device when this occurs.

12. Anxiety

Anxiety associated with OAT can occur anytime during therapy. Patients worry about discomfort, claustrophobia, device effectiveness, and effects on the existing dentition. Prevention of anxiety can include providing proper channels of communication between the dentist and the patient. Other suggestions include showing the OA in the dentist's mouth, demonstrating the difficulty of snoring with the appliance in place. If anxiety is caused by the patient being uncertain of the devices efficacy, consider doing an ambulatory study immediately or having

the device titrated in the sleep lab as soon as possible. In the meantime, if the patient can use CPAP, have the patient wear the new mandibular advancement device for just a couple of hours at a time and then use his CPAP until a study can be arranged.

C. Occlusal Complications

14. Occlusal changes

Occlusal changes can occur months or years after treatment begins. Shifts often happen when the appliance creates forces and the patient neglects to return to full occlusion during the day. Determine if there are changes in the TMJ or muscle pain. When checking the TMJ, look to see if there are wear facets on the teeth. Examine the pre-op models, photos and images. Treating this complication entails daytime realignment exercises and possibly orthodontics, as well as the possibility of ending use of the appliance.

15. Open Contacts

Open contacts often occurs after initial adaptation to the appliance. It can occur as a result of flexing of the acrylic, position of clasps, movement of the appliance, or forces generated by the appliance as it is worn. Check to see if there is acrylic coverage of the posterior teeth which could force them apart or if there is food impaction between the teeth. Also check for mobility of the

teeth which could have been caused by excessive pressure and movement of the appliance. This complication may be treated by the wearing of a morning splint. Try modifying the appliance to cover posterior molars which may not have been properly covered. Sometimes open contacts have been caused by offending clasps. Determine if there is movement of the appliance during clenching. If open contacts are present, make sure the patient is aware of the need to keep these areas clean.

D. Complications Associated with the Tongue

16. Difficulty Swallowing

This problem usually occurs when the appliance is first inserted. It is often caused by too much vertical dimension. It may also be that the patient needs time to adjust to the appliance. It could be a result of underlying neuromuscular problems. Look back at the medical history to find indications of past problems with swallowing or OAT. Treatment of this complication includes decreasing of the vertical dimension, reassuring of the patient that it is just a matter of adjustment to the appliance. When inserting the appliance for the first time, ensure that the patient is comfortable with the appliance in their mouth.

17. Changes in Speech

The patient may have difficulty producing certain sounds or develop a lisp, especially early in the therapy and in the mornings. It can result from protrusion of the mandible or stiff or sore cheeks. Examine the patient and make sure he or she does morning exercises and wears splints daily for at least 20 minutes.

18. Gagging

Gagging may occur any time during OAT. It most often occurs as a result of the impingement of the appliance on the tongue or excessive

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saliva. Review the patient's history for history of gagging or excessive saliva production. Check to make sure that the upper and lower appliances are not extended too far back and that they do not infringe on the tongue's space. Determine if gagging occurs immediately on insertion or later in the night. Treatment includes reduction of palatal extension, thinning of the palatal area, or reduction of the lingual area of the lower appliance. The patient can also try rinsing the mouth with cool water before inserting the device. He or she may need to use the device for a short time and increase the amount of use over time to overcome this problem.

19. Clenching and Grinding

These problems may occur anytime during OAT. It often results from never having worn an OA before. In most cases, it often begins when the appliance is first inserted and just requires time for adjustment. Check to make sure that there is no uneven occlusal contact or too much posterior occlusion. Handle by removing posterior contact altogether distal to the bicuspid or ensure even posterior contacts on both sides.

E. OA Structural and Retention Problems

20. Appliance breakage

Appliance breakage may occur at any time during the treatment of the patient with oral appliance therapy. Usually it occurs as a result of heavy occlusion, rock system, improper fit of the appliance, or difficulty in seating the appliance. When this occurs the patient will often express muscle pain or tenderness of the teeth. Wear facets on the teeth or a limited range of motion may be apparent. When inserting an appliance, ensure that it is not too tight and that the device can be removed easily by the patient before he or she is dismissed. The appliance must have enough retention to stay in the mouth yet still be removed easily by the patient. If the appliance fits properly and the patient has no difficulty removing it, check for the history of muscle pain or increased stress. Look at a possible history of appliance use for parafunctional habits. Proposed treatment for this problem included posterior disclusion or change in appliance design.

21. Appliance Odors

Appliance odors usually result from improper or inadequate cleaning which allows bacterial growth. In double or triple laminate appliances, check for possible delamination of the layers, which could allow bacterial growth due to difficulty in cleaning. Emphasize to the patient the necessity of proper maintenance and daily cleaning of the appliance. Brush or soak the appliance with diluted peroxide five to 15 minutes once per week. Brush the device every day with toothpaste, let sit, rinse after five minutes. Leave the case open during the day. A denture cleaning tablet is recommended for some devices.

22. Loosened Crowns or Restorations

Loosened crown or restorations can occur because of caries under a crown or an appliance that fits too tightly. When the patient is first examined for OAT, check the patient for caries using radiographs as well as a thorough oral inspection (always remember advise/consent). During long-term OAT use, caries may develop, causing crowns, fillings or teeth to break. To prevent this from happening on insertion of new appliances, ensure that existing crowns are properly blocked to produce minimum stress on those areas.

23. Loss of TRD Suction or Retention

The loss of suction or retention during the use of a TRD usually occurs only after long-term use. It most often occurs as a result of stretching of the TRD or possibly just long-term wear and resulting thinning of the TRD material. Check the patient to see a change in the surface of the tip of the tongue. Ask the patient if the tongue feels sore. Try using a blazer torch and boiling water to refit the appliance. Fabrication of a new device may be necessary.

24. Appliance Retention

Retention problems may result because of short teeth, incorrect models or appliance fabrication, long-term appliance wear, improper care of the appliance, or an increase in bruxism. Chronic coughs can also cause these issues. Check the patient to see if they have started bruxing, or if they have been placed on medication that may cause the bruxing. If this is a new appliance, have the appliance remade on new models from new impressions. If this is an older appliance, either relin it, add acrylic, add clasps, or remake the appliance, possibly from different materials. For short, flat teeth consider adding facial contours to the facial surfaces of several teeth, possibly using composite.

F. Post Titration Problems

25. Increase in AHI/RDI at Follow-Up Polysomnogram (PSG)

An increased AHI/RDI may reflect inadequate titration either over or under mandibular protrusion. Ask the patient about the night of their follow-up PSG: were they congested, did they sleep supine when their diagnostic study had them sleeping laterally, etc... Weight gain, allergies, inflammation, undiagnosed lung disease, or an invalid or incorrect baseline test may also be the cause of this occurrence. It may also result from the mechanism of the appliance slipping. Re-check the patient's medical history, note all medical changes and consider changes in the medical or psychosocial situation. Check that the OA mechanics work properly and inquire about the patient's sleep hygiene. Review his or her diet. Make sure the patient's allergies are properly treated. Consider repeating the baseline PSG without the appliance. The patient may require CPAP.

26. Residual Sleepiness

Residual sleepiness may occur after the patient has been titrated to the most effective position following a PSG. Weight gain, changes in alcohol use, inadequate treatment, or an underlying medical condition can cause it. Review the patient's medical history and diagnostic sleep study. Consider other medical and sleep disorders such as restless leg syndrome, narcolepsy, pain, depression, etc... Rigorously check that the appliance functions properly and effectively. Refer the patient back to a sleep physician for possible change to CPAP or combination therapy. Personally call the physician to ensure the patient's problems are addressed.

27. Unmet/ Unrealistic Expectations

Expectations issues may arise as treatment progresses. It is usually the result of an inadequate informed consent process with the patient during the initial interview and subsequent appointments. The initial interview with the patient must provide a complete history as well as a question to the patient of their reason for seeking OAT. Information from the initial patient interview should be continuously brought into successive appointments. It may also be the result of other relationship pressures. Patients may have a change in their life circumstances causing them to reconsider the appropriateness of OAT. Review the current informed consent procedure and increase information with future patients. ”