



ORIGINAL RESEARCH PAPER

Orthodontics

ORTHODONTIC APPLIANCE FOR TREATING SLEEP APNEA

KEY WORDS: Sleep apnoea, orthodontic appliances, mandibular advancement devices, tongue retaining devices, obstructive sleep apnoea.

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ABSTRACT

Sleep apnoea is a common sleep disorder characterized by pauses in breathing or shallow breathing during sleep, affecting millions of people worldwide. Orthodontic appliances have emerged as a potential treatment option for sleep apnoea, offering a non-invasive and non-surgical approach to managing the condition. This study aims to investigate the efficacy of orthodontic appliances in treating sleep apnoea, with a focus on mandibular advancement devices (MADs) and tongue retaining devices (TRDs).

INTRODUCTION:-

Orthodontic appliances for treating sleep apnoea are typically designed to reposition the lower jaw (mandible) and tongue to improve airflow during sleep. These devices are often used to treat mild to moderate obstructive sleep apnoea (OSA) and are an alternative to CPAP (Continuous Positive Airway Pressure) therapy. The treatment of OSA is based on the child's age, severity of symptoms, clinical findings, presence of comorbidities, and polysomnography (PSG) findings.



Appliance Used For Treating Apnoea :-

1. Mandibular Advancement Devices (MADs):

Function: These appliances gently advance the lower jaw forward, which helps open the airway by preventing the collapse of the soft tissues at the back of the throat during sleep.

How It Works: The device consists of a plastic or acrylic tray that fits over the upper and lower teeth. The lower tray is adjusted to move the jaw forward.

Effectiveness: MADs are particularly effective for people with mild to moderate OSA. They are generally well-tolerated and can reduce snoring and improve sleep apnea symptoms.

1. Tongue Retaining Devices (TRDs):

Function: These devices hold the tongue in a forward position to prevent it from collapsing backward and blocking the airway.

How It Works: The appliance fits around the tongue and holds it in place, preventing obstruction during sleep.

Effectiveness: TRDs are usually recommended for people who primarily experience tongue-based obstruction.

2. Herbst Appliance:

Function: Often used in orthodontics for jaw alignment, the Herbst appliance can be modified to treat sleep apnea by advancing the lower jaw, similar to a MAD.

Effectiveness: It is most useful for individuals who need more substantial jaw advancement or have a more significant degree of airway obstruction.

3. CPAP-Alternative Devices:

Some modern devices combine features of CPAP therapy with mandibular advancement, providing an alternative to full CPAP masks.

Considerations:

Consultation with a specialist is essential for determining the suitability of an orthodontic appliance, as treatment should be tailored to the severity and underlying causes of the sleep apnoea.

Customization of the appliance is necessary for comfort and effectiveness.

Regular follow-up with both a dentist and a sleep specialist is crucial to monitor effectiveness and adjust the appliance as needed.

For individuals who prefer not to use CPAP machines, orthodontic appliances can offer a viable treatment option, but they are not always appropriate for everyone, particularly for those with severe OSA or other complex health issues.

Types of Oral Appliances for Obstructive Sleep Apnea



Advantages:

Non-invasive:

Unlike CPAP therapy, which requires a machine and mask, orthodontic appliances are non-invasive and don't involve surgery or significant lifestyle changes.

1) Improved Comfort:

For many patients, orthodontic appliances are more comfortable to wear than CPAP masks. They are small, customizable, and fit in the mouth, which may be preferable for people who feel claustrophobic with CPAP devices.

2) Portable and Convenient:

Orthodontic appliances are compact, making them easy to travel with. They do not require electricity, unlike CPAP machines, which need to be plugged in.

3) Reduced Snoring:

These appliances are effective at reducing or eliminating snoring by maintaining an open airway. This benefit can also improve the quality of sleep for bed partners.

4) Improved Compliance:

Many people find it easier to adhere to the use of an orthodontic appliance compared to the consistent use of CPAP, leading to better treatment outcomes for those who struggle with CPAP compliance.

5) Reversible And Adjustable:

MADs can often be adjusted over time to achieve the optimal position for jaw advancement, and if necessary, they can be discontinued or altered if they are not effective or cause discomfort.

6) Low Maintenance:

The appliances require minimal upkeep compared to CPAP machines, which need regular cleaning, filter replacement, and maintenance.

Disadvantages:

1) Limited Effectiveness for Severe Cases:

Orthodontic appliances are generally less effective for people with severe obstructive sleep apnoea. In such cases, a CPAP machine or surgery might be more appropriate.

2) Potential for Jaw Discomfort or Pain:

Some users experience discomfort, pain, or tension in the jaw, teeth, or gums due to the appliance. This can sometimes lead to temporomandibular joint (TMJ) issues or tooth movement.

3) Need for Customization and Professional Fitting:

These appliances must be custom-made and adjusted by a dental professional. This can be time-consuming and expensive. They also require periodic follow-ups to ensure optimal fit and effectiveness.

4) Teeth Movement or Bite Changes:

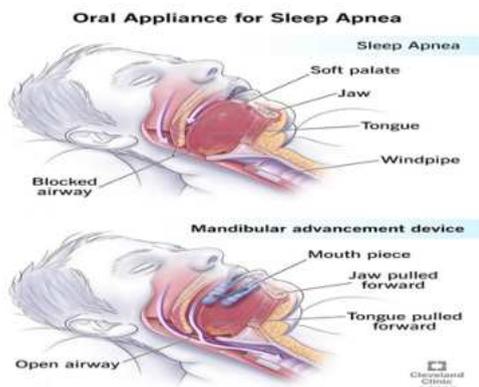
Long-term use of these devices can result in minor changes to the alignment of teeth or the bite. Although this is generally reversible, it may require additional orthodontic work.

5) Risk of Dry Mouth or Excessive Salivation:

Some patients may experience dry mouth or excessive salivation while wearing the device, which can be uncomfortable (8).

6) Not Effective for Central Sleep Apnoea:

Orthodontic appliances are only effective for obstructive sleep apnoea, not for central sleep apnoea, which involves a failure of the brain to send the proper signals to the muscles that control breathing (8).



7) Ongoing Costs:

While the initial cost of an orthodontic appliance may be lower than a CPAP machine, there can be additional costs for fitting, adjustments, and possible repairs over time.

Comparison To Other Treatments:

1. Orthodontic appliances are often compared to continuous positive airway pressure (CPAP) therapy, which is the gold standard treatment for sleep apnoea (3).
2. While CPAP is generally more effective, orthodontic appliances can be a viable alternative for patients who cannot tolerate CPAP.

Limitations and Future Directions

1. Patient Selection:-

1. Not all patients with sleep apnoea are suitable for orthodontic appliance treatment.
2. Further research is needed to identify the characteristics of patients who are most likely to benefit from this treatment.

2. Long-Term Efficacy:-

1. There is limited data on the long-term efficacy of orthodontic appliances for sleep apnoea.
2. Further studies are needed to determine the durability of the treatment effects.

RECENT STUDY RESULTS :-

So, it seems that orthodontic appliances can be a pretty effective treatment for sleep apnoea. Mandibular Advancement Devices (MADs), in particular, have shown significant improvements in reducing Apnoea-Hypopnea Index (AHI) and Oxygen Desaturation Index. These devices work by advancing the lower jaw forward to keep the airway open, and studies have found that they can be just as effective as other treatments, like continuous positive airway pressure (CPAP) therapy (1).

In terms of specific study results, one systematic review found that MADs resulted in significant improvements in AHI and symptoms of sleep apnoea in 92% of subjects. Another study found that interceptive orthodontic treatments, such as rapid maxillary expansion and mandibular advancement, can be effective in reducing AHI and improving oxygen saturation in paediatric patients with sleep apnoea.

Some of the Interceptive orthodontic treatments that have been studied for sleep apnoea are (2) :-

- Rapid Maxillary Expansion appliances
- Mandibular Advancement methods
- Myofunctional appliances (or) Therapy
- Rapid Maxillary Expansion combined with Mandibular Advancement techniques.

These treatments aim to correct craniofacial abnormalities that can contribute to sleep apnoea, such as retrognathia and midface deficiency. While the evidence is still limited, it's promising to see that orthodontic appliances can be a viable treatment option for sleep apnoea.

CONCLUSION:-

In conclusion, orthodontic appliances, particularly mandibular advancement devices (MADs), have proven to be an effective treatment option for mild to moderate obstructive sleep apnoea (OSA). These devices work by repositioning the lower jaw and tongue to help keep the airway open during sleep. While they are not suitable for all patients, particularly those with severe OSA, they can offer significant improvement in symptoms such as snoring and daytime fatigue, with fewer side effects compared to other treatments like CPAP. The success of MADs depends on patient compliance, the severity of sleep apnoea, and proper fitting by an experienced dentist or orthodontist. Regular follow-ups are essential to ensure long-term effectiveness and address any issues. In cases of

severe OSA, orthodontic appliances may be used in conjunction with other treatments, such as CPAP or surgery, for better results.

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