TREATMENT EMERGENT CENTRAL SLEEP APNEA IN PATIENTS WITH PRIMARY OSA TREATED WITH POSITIVE AIRWAY PRESSURE VS MANDIBULAR ADVANCEMENT DEVICE.

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NULL HYPOTHESIS

There is statistically no significant difference in the development of treatment emergent central Sleep Apnea in patients treated with Positive airway pressure vs Mandibular advancement device for primary obstructive Sleep Apnea.

“Treatment emergent central sleep apnea is defined as greater than 5 apnea or hypopnea events per hour in a sleep study done while patient is on treatment for OSA”
INTRODUCTION:

• OSA is characterized by recurrent collapse of the pharyngeal airway during sleep, resulting in substantially reduced or complete cessation of air flow despite ongoing breathing effort.

• OSA is a common condition in adults with prevalence rate of 5-10%[1,2]

• OSA leads to intermittent disturbances in gas exchange, and fragmented sleep.

• Common symptoms include snoring, day time sleepiness, witnessed apneas, fatigue, morning headache and nocturia.
Continuous Positive Airway Pressure (CPAP) therapy is the standard of treatment for OSA.

CPAP therapy for OSA is complicated by occurrence of treatment emergent central sleep apnea.

In a large prospective study, the prevalence during the first night of CPAP titration was 12%. [1,2,3]

However most of these patients had mixed and central apneas during their diagnostic sleep study.
• Mandibular advancement device (MAD) is an alternative treatment modality for OSA in patients intolerant to or unwilling to use CPAP.

• There have been few case reports of patients developing complex sleep apnea after MAD therapy.[3,4,5]

• However these patients had risk factors for development of central sleep apnea.

• There had been no studies to determine the incidence of treatment emergent central sleep apnea in patients with OSA that have been treated with MAD.
Central Sleep Apnea:
Repeated episodes of apnea during sleep resulting from temporary loss of ventilator effort for at least 10 seconds.

Obstructive sleep Apnea
Repeated Episodes of decreased airflow during sleep due to upper airway obstruction and subsequent ventilator attempts against occluded airway.
METHODS:

- A retrospective chart review analysis was conducted on patients that were ever placed on MAD therapy in a community sample of patients with OSA.
- Demographics and comorbidity status was collected on all patients.
- The severity of sleep apnea, sleep fragmentation and degree of hypoxemia was extracted from diagnostic and follow up sleep studies.
- Data was abstracted regarding occurrence of central sleep apnea after being placed on MAD.
• A matched community sample of patients with OSA and PAP therapy was evaluated and compared for the occurrence of treatment emergent central sleep apnea.

• Statistical comparison was done between two groups using Fisher exact test with expected primary outcome was:

  “To determine if there is any difference in the incidence of treatment emergent central sleep apnea in OSA patients treated with MAD compared to those treated with PAP therapy.”
Secondary Outcomes:

1. To determine whether the severity of sleep apnea predicts the development of treatment emergent central sleep apnea.
2. To determine if severity of hypoxemia during sleep study independently predicts occurrence of treatment emergent central events in OSA.
3. To determine if the patients’ BMI predicts the development of treatment emergent central sleep apnea.
INCLUSION CRITERIA:

• Sleep study demonstrating Obstructive Sleep Apnea.
• Patients treated with MAD or CPAP therapy.
• MAD patients with sleep study repeated while using MAD.

Exclusion Criteria:

Patients with central sleep apnea (central apnea index>5/hr) in the diagnostic study.
References


Results:

Comparison between two groups using MAD vs PAP as a treatment modality for the treatment emergent Central Sleep Apnea showed:

There was a statistically significant difference in two groups using Fisher exact test.

P value = 0.0378

Odds Ratio = 2.1211

95% CI 1.0432-4.3129
COMPARISON BETWEEN TWO GROUPS STRATIFIED FOR SEVERITY OF HYPOXIA ON DIAGNOSTIC STUDY:

Oxygen saturation $>75\%$
on diagnostic study

- There was no statistical difference.
- P value=0.473.
Oxygen saturation <75% on diagnostic study

- Statistically significant difference in development of central apnea.
- P value 0.0203
COMPARISON BETWEEN TWO GROUPS STRATIFIED FOR SEVERITY OF SLEEP APNEA ON DIAGNOSTIC STUDY.

Severity of Sleep Apnea:

Determined on the Basis of AHI:

Mild: AHI $5 \geq 15$
Moderate : AHI $15 \geq 30$
Severe: $>30$

AHI: Number of hypoxic apneic events/ hr
Comparison between two groups with mild OSA on diagnostic study:

AHI 5-15

- Statistically significant.
- P value = 0.0001
Comparison between two groups with Moderately severe Sleep Apnea on Diagnostic study:

AHI 15-30

- Statistically significant
- P value = 0.0001
Comparison between two groups with Severe Sleep Apnea on Diagnostic study:

AHI>30 on diagnostic study

• Statistically non significant
• P value=1.000
DIFFERENCE IN TWO GROUPS STRATIFIED FOR BMI

BMI 20-30:
No statistically significant difference.
P value=0.7678

BMI 30-40:
Statistically significant difference.
P value=0.022
BMI >40

Statistically significant difference.

P value=0.0203
DIFFERENCE BETWEEN TWO GROUPS WITH PATIENTS HAVING CHF OR OPIATES DEPENDENCE:

There was no incidence of Treatment emergent Central Sleep Apnea in patients with CHF or Opiate Dependence treated with PAP vs MAD in the study Population.
CONCLUSIONS:

• Statistically significant increased incidence of Treatment Emergent Central Sleep Apnea in patients treated with MAD as compared to PAP for primarily OSA.

• Statistically Significant difference in two groups stratified for severity of hypoxia in patients with oxy-hemoglobin saturation less than 75% on diagnostic study.

• Statistically significant difference in two groups stratified for severity of OSA on diagnostic study in mild to moderate OSA groups.

• Statistically significant difference in two groups stratified for BMI in BMI group 30-40 and >40.

• There is no incidence of Central sleep apnea in two groups with CHF and opiate Dependence.
Rationale Behind Increased incidence of Treatment emergent sleep apnea in MAD group:

Likely PAP-Independent factors:

- Sleep Fragmentation
- Propensity for periodic breathing
SHORTCOMINGS

• Not a multi centric study.
• Confounding factors like CAD, ESRD and A-fib were not included in this study.
• Follow up sleep study in PAP group included was a titration study and not the study on effective pressure.