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Mortality of Veterans with Sleep Apnea: Untreated versus Treated

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Introduction: Untreated obstructive sleep apnea (OSA) appears to increase mortality. The effect of treatment on mortality rate is unclear because most previous reports analyzed small samples and did not adequately control for comorbidity. We sought to determine whether providing a continuous positive airway pressure (CPAP) device or performing uvulopalatopharyngoplasty (UPPP) is associated with a decreased mortality rate relative to providing no treatment for OSA, in a large cohort with control for comorbidity.

Methods: This retrospective inception cohort study included all patients diagnosed with OSA in any Veteran Affairs (VA) inpatient facility 1991 - 2001 or outpatient facility 1997 - 2001. Subjects were identified by ICD9 diagnostic codes in the VA inpatient and outpatient treatment files. Treatment status (None, CPAP, UPPP, or tracheotomy) was determined by ICD9 or CPT procedure codes in these databases. Patients without a code for CPAP, UPPP, or tracheotomy were considered untreated. Patients undergoing tracheotomy were not included in this analysis, because indications for tracheotomy could not be determined. CPAP patients were provided a CPAP device, but usage data were not available. Sleep apnea severity data were not available. The Charlson Comorbidity Index was calculated from ICD-9 diagnostic codes from the year prior to inception into the cohort. Mortality data were extracted from VA Death Files. Survival time was calculated from the date of first diagnosis of OSA to date of death or 9/30/2002. Treatment groups were compared on mortality hazard with Cox regression, adjusting for age, sex, race, comorbidity, and inception year.

Results: The cohort consisted of 149,267 veterans, age $57+/-12$ (mean+/-SD) years, 97% male. By September 2002, 16,967 of 116,678 untreated patients (14.5%), 3256 of 28,612 CPAP patients (11.4%), and 394 of 3977 UPPP patients (9.9%) were dead (untreated v treated, $p<0.001$). From the date of OSA diagnosis, untreated patients survived $3.6+/-2.3$ years, CPAP patients survived $4.6+/-2.5$ years, and UPPP patients survived $5.3+/-2.5$ years (untreated v treated, $p<0.001$). After adjusting for the variables listed, untreated patients had 1.9 (95%CI 1.8-2.0, $p<0.001$) times greater hazard of dying at any time relative to treated patients. UPPP patients had a lesser mortality rate ($p=0.006$), longer survival ($p<0.001$), and lesser hazard of death (adjusted hazard ratio 0.57, 95%CI 0.39-0.81, $p=0.002$) relative to CPAP patients.

Conclusion: Treatment with CPAP or UPPP confers a survival advantage over no treatment, after adjustment for age, sex, race, comorbidity, and year of OSA diagnosis. One cannot draw conclusions about the relative efficacy of CPAP and UPPP because CPAP usage data were not available.