Anesthesia Selection Impacts Outcomes In Patients With Sleep Apnea Undergoing Joint Replacement

Using regional anesthesia instead of general anesthesia in patients with sleep apnea undergoing total joint replacement decreases major complications by 17%, according to a study published online, ahead of print, in the journal *Regional Anesthesia and Pain Medicine*. The Hospital for Special Surgery study is the first to provide evidence that an intervention during surgery can improve outcomes in patients with sleep apnea who often fare worse than patients without this condition. Currently, up to 25% of patients presenting for surgery in the United States have sleep apnea.

"This study, for the first time, shows that the use of regional anesthesia improves outcomes in patients with sleep apnea undergoing total joint arthroplasty. Although requiring further investigation, there is no reason to think that these results could not be extrapolated to other types of surgery," said Stavros Memtsoudis, M.D., Ph.D., director of Critical Care Services at Hospital for Special Surgery, New York City, who led the study.

Specifically, the researchers studied neuraxial anesthesia, one type of regional anesthesia. Neuraxial anesthesia involves injecting medication into fatty tissue that surrounds the nerve roots in the spine (known as an epidural) or into the cerebrospinal fluid that surrounds the spinal cord.

Sleep apnea is a disorder in which an individual's breathing is interrupted during sleep, sometimes as many as 30 times or more during an hour. The condition interferes with sleep quality and has been associated with high blood pressure, and diabetes as well as heart attack and stroke. The most common type of sleep apnea is obstructive sleep apnea in which the airway collapses during sleep. This condition is more common in overweight individuals and is becoming increasingly prevalent in the United States, rising in tandem with the growing obesity epidemic.

Many years ago clinicians began noticing that patients with sleep apnea were at an increased risk of developing complications after operations. "Normally, patients with sleep apnea stop breathing when they are sleeping. As patients receive medications potentially affecting wakefulness surrounding surgery, this may be of concern. However, breathing abnormalities may not be the only reasons for increased risk of complications—many sleep apnea patients suffer from cardiovascular problems as well that may worsen surrounding surgery," Dr. Memtsoudis explained.

The American Society of Anesthesiology (ASA) became increasingly concerned about this patient population. In 2006, the ASA released guidelines recommending the use of regional anesthesia, when possible, in patients with sleep apnea undergoing surgery to reduce the use of systemic opioids. Many clinicians

questioned this recommendation, however, because it was not supported by scientific evidence. "Clinicians were looking for guidance on what they could do to alleviate the problem, but there was really no good data, but the guidelines were mostly based on anecdotal reports and the opinion of a few experts," said Dr. Memtsoudis. "This lack of evidence, however, created a real dilemma in many ways."

To investigate whether neuraxial anesthesia actually reduced complications, researchers at Hospital for Special Surgery conducted a retrospective review of all hip and knee replacements performed in patients with sleep apnea between 2006 and 2010 in the United States using Premier Perspective. This administrative database contains discharge information from approximately 400 acute care hospitals located throughout the United States. The researchers identified 30,024 patients with sleep apnea undergoing these procedures whose medical records included information on the type of anesthesia used during the surgery. Approximately 11% of cases were performed under neuraxial, 15% under combined neuraxial/general, and 74% under general anesthesia alone.

Currently, the majority of joint replacements in the United States are performed under general anesthesia, but HSS uses neuraxial anesthesia for 95% of orthopedic surgeries.

The researchers discovered that patients had a 17% lower risk of major complications if neuraxial anesthesia was used rather than general anesthesia. Patients who received combined neuraxial/general anesthesia had a 10% lower risk of major complications compared with patients who received general anesthesia. When neuraxial methods were used, patients had lower rates of pulmonary, gastrointestinal, and infectious complications, and, in particular, acute renal failure. Use of the neuraxial approach (whether used alone or in combination with general) also reduced the use of transfusions, mechanical ventilation, and critical care services. The median length of hospitalization was 2.8 days in the general anesthesia group and 2.6 days in the neuraxial and neuraxial/general combined groups.

"We wanted to know if regional anesthesia really makes a difference in this patient population and it seems to be doing that," said Dr. Memtsoudis. "Neuraxial anesthesia was associated with lower risk of complications and a decrease in the length of stay in the hospital."

The researchers say the results may apply to patients with sleep apnea undergoing surgeries such as prostatectomies and hysterectomies, and this is an area currently being investigated.

The price tags associated with neuraxial and general anesthesia are similar, and evidence is growing that neuraxial anesthesia has benefits in various populations. The majority of surgeries in the United States, however, are performed under general anesthesia for a number of reasons. "There are institutional limitations and preferences. Anesthesiologists have to consider many factors when performing neuraxial anesthesia, and it has to be used in an environment where the nurses and

the hospitals can deal with rare but potential complications. Recovery and anticoagulation protocols have to be considered. Sometimes the medications that are being prescribed afterward to prevent blood clots have to be carefully chosen especially when using epidurals for pain control." When epidural methods are used, clinicians cannot give patients easy-to-use, high potency blood thinners, but must instead use alternatives, which in some require frequent monitoring of blood parameters via a test called International Normalized Ratio. "This approach is more labor intensive and the required increase in resources may not be available everywhere," said Dr. Memtsoudis.

"Before this study, the recommendation to use neuraxial anesthesia in sleep apnea patients was based on no scientific foundation," said Dr. Memtsoudis. The new study provides much needed support for the recommendation.

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