COMMENTARY

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Does Surgery for Obstructive Sleep Apnea Provide Value?

Commentary on Tan et al. A cost-effectiveness analysis of surgery for middle-aged men with severe obstructive sleep apnea intolerant of CPAP. J Clin Sleep Med 2015;11:525–535.

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Despite decades of clinical experience, the proper role of surgical treatment for obstructive sleep apnea (OSA) remains controversial. The need for multiple effective treatment modalities is clear: Continuous positive airway pressure (CPAP) is not accepted or tolerated by a significant proportion of diagnosed patients. However, recent reviews of the clinical evidence indicate that the success rate of surgical treatment, excluding maxillo-mandibular advancement and tracheostomy, remains suboptimal.[1,2] In a recent practice parameter from 2010, the American Academy of Sleep Medicine (AASM) stated, "There is a pressing need for comparative outcomes research regarding UPPP and other treatment modalities, as the benefits compared with harms of UPPP are unclear at this time."[3]

In this context, Tan et al. present the results of a cost effectiveness analysis (CEA) of palatopharyngoplasty reconstructive surgery (PPRS) and multilevel surgery (MLS) for CPAP intolerant patients in a hypothetical cohort of 50-year-old men with severe OSA (i.e., AHI > 30/hour).[4] This analysis does not address the uncertainty regarding the clinical long-term effectiveness of surgery for OSA. Rather, it seeks to answer a related, but different question: Does surgery for OSA in a select high-risk population, if indeed effective, provide good value from a societal perspective, given the costs and benefits? Value, in addition to clinical efficacy, is being recognized as a key criterion for treatment decisions in our increasingly cost-conscious health care environment. For example, even if PPRS and MLS were definitively demonstrated to provide a certain level of clinical benefit, its use should be discouraged if the costs of treatment relative to benefits are too expensive.

The intriguing analysis by Tan et al. suggests that PPRS in a selective population may indeed provide good value. Using published estimates of the long-term effectiveness of surgery for OSA, they calculated an incremental cost effectiveness ratio (ICER) of $10,421 per Quality Adjusted Life Year (QALY) for PPRS compared to untreated OSA. Of course, CPAP therapy provides a superior value, at $3,901/QALY compared to untreated OSA. But an ICER of $10,421/QALY for PPRS is still cost-effective, given that $100,000/QALY is a commonly accepted threshold for good value. In fact, the authors note that PPRS is as cost-effective as many other commonly utilized procedures, such as primary angioplasty for reperfusion after myocardial infarction.

CEA, like any analytic framework, has inherent limitations. The most commonly cited objection to CEA is that one's conclusions may vary tremendously based on key model parameters. This analysis used both one-way variation of key parameters as well as probabilistic sensitivity analysis, where the uncertainty around all key parameters are considered simultaneously. This does not reduce uncertainty, and it should be noted that the cited ICER of $10,421/QALY is calculated from the base case, but the authors provide a transparent analysis that shows the effect of varying key parameters such as the cure rate and CPAP adherence by as much as 50%. A more subtle limitation of CEA is that it makes inherent structural assumptions that may oversimplify the clinical situation. Hence, it is noteworthy that they conservatively assume that surgical cure is temporary, and build into their model a decay rate for surgical benefit, based on long-term studies. Another example of overcoming structural model assumptions is to vary the time horizon, as a lifetime horizon often maximizes clinical benefit but is overly optimistic. Here, they found that a five-year time horizon, for example, increases the ICER for PPRS to $71,808/QALY.

Given that there is uncertainty regarding the degree of effectiveness of surgery for OSA, one might ask if performing a CEA at this time is premature. However, a well-performed CEA that acknowledges this uncertainty contributes to the topic in at least two key ways. First, it highlights the impact of the uncertainty surrounding key clinical parameters, such as the cure rate, operative risk, or CPAP adherence. The authors use a technique called Value of Information analysis, where Bayesian methods are used to estimate the potential benefits of reducing the uncertainty surrounding these clinical parameters. They calculate that eliminating uncertainty around MLS short term cure rates, for example, has an expected value of $449 per patient; when multiplied by all potential and future MLS patients, this becomes a large value with societal importance. Second, it helps position surgical interventions for OSA in a new health care environment. The reimbursement environment is rapidly moving towards a value-based paradigm. In February 2015, the Department of Health and Human Services announced that over the next four years, half of all fee-for-service Medicare payments will be shifted to value-based payment arrangements.[5] This CEA supports the value of allowing access to surgery for OSA in this context.

To fully realize the clinical potential of surgical therapy, much work remains. Clinical judgment regarding surgical candidacy across otolaryngologists is highly variable, and the field continues to devote research efforts to better prognosticate surgical success including tools such as drug-induced sedated endoscopy (DISE).[6] If these efforts are successful in identifying which patients are likely to benefit from surgery, cost effectiveness, sleep physician endorsement and patient acceptance of surgery among optimal candidates will improve. Sleep physician endorsement and patient acceptance may also benefit from better outcomes data. The scientific literature for surgical treatments largely consists of small, single-center retrospective reports. Multicenter, prospective studies with long-term horizons are desperately needed to provide robust and generalizable data regarding sleep surgery outcomes. The availability of such data would both improve future CEA analyses and provide sleep physicians greater confidence regarding the appropriate role of surgery among the diverse options for OSA treatment.

CITATION

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REFERENCES

1. Lin HC, Friedman M, Chang HW, Gurpinar B. The efficacy of multilevel surgery of the upper airway in adults with obstructive sleep apnea/hypopnea syndrome. Laryngoscope 2008;118:902–8.
2. Caples SM, Rowley JA, Prinsell JR, et al. Surgical modifications of the upper airway for obstructive sleep apnea in adults: a systematic review and meta-analysis. Sleep 2010;33:1396–407.
3. Aurora RN, Casey KR, Kristo D, et al. Practice parameters for the surgical modifications of the upper airway for obstructive sleep apnea in adults. Sleep 2010;33:1408–13.
4. Tan KB, Toh ST, Guilleminault C, Holty JC. A Cost-effectiveness analysis of surgery for middle-aged men with severe obstructive sleep apnea intolerant of CPAP. J Clin Sleep Med 2015;11:525–35.
5. Burwell SM. Setting value-based payment goals--HHS efforts to improve U.S. health care. N Engl J Med 2015;372:897–9.
6. Vroegop AV, Vanderveken OM, Boudewyns AN, et al. Drug-induced sleep endoscopy in sleep-disordered breathing: report on 1,249 cases. Laryngoscope 2014;124:797–802.

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DISCLOSURE STATEMENT

The authors have indicated no financial conflicts of interest.