One More Study Showing No Benefit Associated With Laminar Flow in the Operating Room

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Wang and colleagues have provided a clear and convincing analysis of their experience performing total joint arthroplasties in 2 different operating theaters in their institution (Rothman Orthopaedic Institute), one with laminar airflow (LAF) ventilation and the other with conventional turbulent ventilation, and examined the incidence of periprosthetic joint infection among patients who underwent surgery in these settings. A strength of their study is that all operations were performed by the same 5 high-volume, fellowship-trained arthroplasty surgeons and under the same perioperative protocols for infection prevention and operating room protocols and with follow-up for at least 1 year. Both standard multivariable analysis examining all risk factors in 6972 patients and propensity score matching that examined 4468 matched patients failed to show any benefit associated with LAF. In fact, each analysis showed a nonsignificantly higher rate of periprosthetic joint infection in the LAF group, and in the propensity score matching comparison the odds ratio was 1.24 (95% CI, 0.55-2.82).

The theory of LAF is that it increases air quality and decreases bacterial contamination in the air. Concerns about air quality in operating rooms have been with us for a very long time but compelling data on the importance have been variable over the years. Although none of us would advocate deliberately increasing air contamination, its association with infection risk has not been well studied. One early study on this topic examined 327 clean surgical cases performed with ongoing air sampling during each operation. A mean of 4.4 bacteria per cubic foot of air and 187 colonies per square foot on settle plates were detected. Twenty-two incisions later developed infection, and there was no significant difference between air bacterial counts during surgical cases in patients who did or did not develop infection. In only 1 of the 22 infections did bacteria from the infection match bacteria in the air, and in that case the bacteria were also found in the patient's nose. Data on LAF have been mixed over the years, as documented in the references for the study by Wang et al, including references showing an increased risk of infection with the use of LAF, and its use has been recommended against by recent guidelines from both the World Health Organization and the Centers for Disease Control and Prevention. Laminar airflow definitely increases cost of construction and maintenance and cannot be demonstrated to benefit the patient.

There are many less-expensive and demonstrably beneficial measures that can be taken to reduce infection risk in all surgical cases, including total joint arthroplasty. These measures include prophylactic systemic antibiotics with attention to timing, dose, and redose for long cases; appropriate skin preparation; maintaining the patient's normothermia; perioperative glucose control for patients both with and without diabetes; proper hair removal or nonremoval; discipline, communication, and teamwork in the operating room; increased levels of inspired oxygen; and preoperative screening and decolonizing for Staphylococcus aureus.

This study by Wang et al is a strong addition to our knowledge and information on this topic. Although it is retrospective, the numbers are large and the outcomes are good. The same surgeons operated in both environments and the basic characteristics of the 2 patient groups were very similar. Even when there were statistically significant differences in some measures between the 2 groups, the actual differences were not clinically significant and did not consistently favor one group vs the other. In addition, the propensity scoring achieved excellent comparability and demonstrated the same outcome. Another strength is complete 1-year follow-up on all patients. Some of the prior
studies on LAF have been criticized for incomplete long-term follow-up. Based on this report and the extensive research including randomized prospective trials done previously and referenced in the study by Wang et al, we can confidently proceed with new operating rooms without LAF and turn our attention to the extensive other measures known to reduce perioperative infection risk.

ARTICLE INFORMATION
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REFERENCES