

Review of: "Investigating surgical smoke in otolaryngology operating rooms"

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More Evidence that Surgical Smoke is a Significant Health Hazard

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The recent study by Li et al. in this month's Scientific Reports provides additional data that exposure to surgical smoke (SS) represents a clear and present danger to health care personnel and possibly to patients as well.¹ In a single institution, prospective observational investigation, Li and colleagues documented likely hazardous levels of particulate matter (PM) and formaldehyde associated with 30 cases of otolaryngology (ENT) surgeries. Performed in the absence of smoke evacuation devices (SEDs), these results are consistent with other recent reports that ENT procedures are associated with significant SS-related hazards.^{2,3}

The study considered PM concentrations with varying proximity to the operating room table related to particles of three diameters: 0.3 μ m, 0.5 μ m, and 5.0 μ m. There was a wide dispersion of concentrations within each class with large interquartile ranges and standard deviations reported, indicating that some cases generated extremely high levels of these products. Not surprisingly, however, all PM classes spiked during the surgery and were maximum near the diathermy device. Interestingly, operating room (OR) atmospheric formaldehyde concentrations were already elevated prior to the start of surgery, a finding

that the authors attribute to residues from previous operations with the understanding that HEPA filters in the ventilation system can remove PM but not volatile organic compounds. Furthermore, the investigation did not measure ultrafine PM with maximum diameters $< 0.1 \mu\text{m}$ that – in addition to penetrating alveoli – can enter the systemic circulation and result in oxidative stress.⁴

Pediatric ENT SS exposure may be a particularly egregious problem. For example, over 500,000 tonsillectomies with or without adenoidectomies are performed in the U.S. annually.² Despite the fact that SEDs have been shown to be the most effective method to reduce occupational exposure to the hazards of SS in general⁴, and in ENT surgery specifically², SEDs are still profoundly underutilized. While most recent survey-generated data from the National Institute of Occupational Safety and Health (NIOSH) suggests that 15% of U.S. surgeries employ SEDs during electrocautery use, pediatric surgery numbers may be significantly less.⁴ Multiple countries and several U.S. states now mandate the use of such evacuation devices, a course that has been compelled by the failure of voluntary measures.⁴

There is increasing evidence supporting the physical, chemical, and biological hazards of chronic SS exposure for operating personnel in all surgical specialties. Acute exposure to surgical plume or recurrent exposure in the pediatric ENT population may be particularly problematic.⁵ The current study documents the tip of the iceberg with data relating to PM and formaldehyde concentrations in one surgical specialty but in so doing, it adds measurable support to the urgency for increased use of effective SS evacuation systems across the board.

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