Re: Cognition and brain structure following early childhood surgery with anesthesia

- Joshua J Davis, Medical Student

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To the editor:

It is with great interest that I read the study recently published online by Backeljauw et al.(1) on cognition and brain structure outcomes associated with general anesthesia exposure in children. The authors present a novel investigation into the effect of general anesthetics on young children. They use a case control design to examine 53 children aged 5-18 years old who had general anesthesia exposure prior to the age of 4. They compared these children to 53 matched control subjects, and found a consistent, though variably statistically significant, 3-6 point lower score on the neuropsychological assessments in the group exposed to general anesthesia. They proceeded to use MRI to identify which areas of the brain contributed to these differences. The case control design of this study prohibits causal attribution; however, several confounding variable appear to be missing from the results in the report. This missing data leave the association of the role of anesthesia in these children's cognitive developement in question, and lowers the epidemiologic value of the associations they found.

The primary confounding variable that should be reported is the type and number of surgeries to which the children in the control group were exposed before the age of 4. One would assume that the exposed group simply had more procedures, in addition to more anesthesia exposure. Surgery itself and the related complications could have played a major role in the cognitive development of these children. Additionally, while we can identify many of the overt complications of most surgical procedures, sub-clinical complications may manifest and never be identified. These unidentified, minor changes could also have played a role in the cognitive development of these children.

As an example, the authors note in the discussion that tympanostomy tubes were the most common surgery in the exposed group. The authors proceed to cite two studies on otitis media: one, showing the disease process does not lower academic performance long term,(2) and another showing that early tympanostomy does not confer any benefit over later tympanostomy.(3) None of the cited studies compared children who had tympanostomy to those who did not. It is conceivable, therefore, that some aspect of the tympanostomy procedure itself plays a role in cognitive development that could contribute to the small but consistent changes noted in Backeljauw et al.'s study.(1)

Another major aspect of surgery that would have been beneficial to report in this study is concomitant medications, namely, antibiotics. While intraoperative analgesic administration are reported, prophylactic antibiotics are used before and after many surgeries. The long term effects of antibiotics, especially in children, are still under investigation and it would be enlightening to see what, if any, role they may have played in this group of children.

I would encourage the authors of this study to consider analyzing their data for these potential confounding variables (surgery exposure and concomitant antibiotics) to either strengthen the association of their conclusions, or identify variables that may be examined in future studies.

Sincerely,

Joshua Davis

References

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2.) Roberts JE, Burchinal MR, Zeisel SA. Otitis media in early childhood in relation to children's school-age language and academic skills. Pediatrics. 2002;110(4):696-706.

3.) Paradise JL, Feldman HM, Campbell TF, et al. Tympanostomy tubes and developmental outcomes at 9 to 11 years of age. N Engl J Med. 2007;356(3):248-261.

Conflict of Interest:

None declared