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Mayo researchers find link between anesthesia exposure and learning disabilities in children

ROCHESTER, Minn. -- Mayo Clinic researchers have found that children who require multiple surgeries under anesthesia during their first three years of life are at higher risk of developing learning disabilities later. Several studies have suggested that anesthetic drugs may cause abnormalities in the brains of young animals. This is the first study in humans to suggest that exposure of children to anesthesia may have similar consequences. The finding is reported in the current issue of the journal *Anesthesiology*.

Using data from the long-term [Rochester Epidemiology Project](#), researchers studied the medical records of 5,357 children from Olmsted County who were born between 1976 and 1982.

The research team, led by Robert Wilder, M.D., Ph.D., a Mayo Clinic anesthesiologist, found that although one exposure to anesthesia was not harmful, more than one almost doubled the risk that a child would be identified as having a learning disability before age 19. The risk also increased with longer durations of anesthesia.

"It's very important for parents and families to understand that although we see a clear difference in the frequency of learning disabilities in children exposed to anesthesia, we don't know whether these differences are actually caused by anesthesia," says Randall Flick, M.D., a Mayo Clinic anesthesiologist and co-author of the study.

"The problem is that anyone who underwent an anesthetic also had surgery," says Dr. Wilder. "It's unclear whether it's the anesthetic, the physiological stress of surgery or perhaps the medical problems that made surgery necessary that are responsible for the learning disabilities."

Young children's brains are more vulnerable to a variety of problems because they are undergoing dynamic growth. The brain is rapidly forming connections between cells and trimming excess cells and connections, says Dr. Wilder.

The general anesthesia chemicals in use during the study period were primarily halothane and nitrous oxide (laughing gas). Although halothane is no longer used in the U.S., it has been replaced by newer agents that have similar effects on the brain. Nitrous oxide is widely used throughout the U.S. and the world.

Debate exists about the developmental correlation between the animal (rodent) and human studies. Some think that the related exposure period would be perinatal in humans (the last month of pregnancy and first six months after birth), so the researchers repeated their analysis, examining anesthetic exposure before age 2, and found similar results.

"Parents and physicians need to balance this information along with the normal decisions that we all go through when we decide to have surgery for one of our children," says Dr. Flick. "Although alternatives to the use of these medications exist, they are limited. Certainly, performing surgery without appropriate use of anesthesia is unacceptable."

The children in the study were tested as a natural part of the educational process in the Rochester school system. They did not perform as well in reading, writing or math as their IQ tests indicated.

Other studies have linked anesthesia exposure in young children to behavioral problems. Dr. Flick says the Food and Drug Administration (FDA) is aware of the possible problems with anesthesia. "They've been very proactive in trying to gather information as quickly and thoughtfully as possible," Dr. Flick says, "but much more research is needed before we could conclude that anesthesia itself causes problems." He also encourages families with questions to go to the Web sites of the American Society of Anesthesiology and the Society for Pediatric Anesthesia.

The research team is working to obtain funding to extend the database for 10 more years (1982-1992), a period that would include the use of more modern anesthetics. They are also working with the FDA to complete a study that matches children who had an anesthetic with children who have a similar medical problem but did not receive an anesthetic.

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Additional co-authors include Juraj Sprung, M.D., Ph.D.; Slavica Katusic, M.D.; William Barbaresi, M.D.; Christopher Mickelson, M.D.; Darrell Schroeder; Amy Weaver; and David Warner, M.D.; all from Mayo Clinic's campus in Rochester. Another co-author is Stephen Gleich, M.D., of the Primary Children's Medical Center, Salt Lake City.

About Mayo Clinic

Mayo Clinic is the first and largest integrated, not-for-profit group practice in the world. Doctors from every medical specialty work together to care for patients, joined by common systems and a philosophy of "the needs of the patient come first." More than 3,300 physicians, scientists and researchers and 46,000 allied health staff work at Mayo Clinic, which has sites in Rochester, Minn., Jacksonville, Fla., and Scottsdale/Phoenix, Ariz. Collectively, the three locations treat more than half a million people each year.

VIDEO ALERT: Additional audio and video resources, including excerpts from an interview with Drs. Wilder and Flick describing the research, are available on the [Mayo Clinic News Blog](#).
