

Study quantifies risk of cardiac arrest in children during spine surgeries

November 17 2015

Although the vast majority of pediatric spine surgeries are safe, a handful of neuromuscular conditions seem to fuel the risk of cardiac arrest during such operations, according to research led by investigators at the Johns Hopkins Children's Center.

A report on the findings, published in the November issue of the journal *Spine*, is believed to be the first to quantify the risk—which is quite small—of this potentially lethal complication among children. The findings, the investigators say, can help surgeons and operating room staff members better plan for such contingencies in high-risk patients.

The study results stem from an analysis of outcomes in some 2,600 spinal surgeries performed at the Johns Hopkins Children's Center and Texas Scottish Rite Hospital for Children in Dallas between 2004 and 2014.

The authors are quick to point out that the absolute risk of [cardiac arrest](#) in children during spine surgery is minuscule. Indeed, of the 2,639 patients in the study, 11 had one—less than 0.5 percent. A single patient died. Ten of the 11 children were successfully resuscitated.

Specifically, the results showed that children with such neuromuscular disorders as cerebral palsy, spina bifida and muscular dystrophy were three times more likely to suffer cardiac arrest during surgeries that straighten the spine. Six of the 11 children who had a cardiac arrest had a neuromuscular disorder.

In eight of the 11 cases, cardiac arrest was triggered by electrolyte imbalances or circulatory problems—not a surprising finding, the researchers say, given that young children have less blood and [lower blood pressure](#), and are thus more vulnerable to circulatory shock. Children also tend to develop electrolyte imbalance more rapidly than adults. Other causes of cardiac arrest included allergic anaphylaxis, irregular heartbeat, and respiratory and airway problems.

"Our findings are reassuring: Spinal surgeries in children are overwhelmingly safe, but even so, some risk remains," says lead investigator Paul Sponseller, M.D., M.B.A., director of pediatric orthopaedics at the Johns Hopkins Children's Center. "Armed with this knowledge, surgeons can plan accordingly by taking a few additional preventive steps to make what is an already safe surgery even safer."

The vast majority of children with scoliosis have mild forms and don't need early corrections or surgery at all. However, children with forms of scoliosis tied to neuromuscular disease tend to have more severe spinal curvatures and often need surgery at a far younger age, when they are more vulnerable to the effects of surgery and anesthesia and are more likely to suffer serious complications.

In a cardiac arrest, the heart stops beating or begins to quiver chaotically, unable to pump out blood to the rest of the body. Always a life-threatening emergency, cardiac arrests that occur inside the hospital have dramatically higher survival rates than those that occur outside the hospital. Cardiac arrests require cardiopulmonary resuscitation or electroshock with a defibrillator to restore normal heart rhythm.

During spinal operations, surgeons position [children](#) on their stomachs, but if a cardiac arrest occurs, a child must be quickly rolled over onto the back for resuscitation.

Sponseller and colleagues say that while many of the factors that lead to cardiac arrest in these cases are not preventable, knowing who's at highest risk can improve preparedness, cut response time and reduce stress among the surgical staff should a complication occur.

"Our findings underscore the notion that any surgery can escalate from routine to super-stressful in a matter of seconds," says Sponseller. "We are hypervigilant during all surgeries, but at the same time, knowing which patients are most likely to decompensate is always a good thing."

More information: Emmanuel N. Menga et al. Intraoperative Cardiopulmonary Arrest in Children Undergoing Spinal Deformity Correction, *Spine* (2015). [DOI: 10.1097/BRS.0000000000001105](https://doi.org/10.1097/BRS.0000000000001105)

Provided by Johns Hopkins University School of Medicine

Citation: Study quantifies risk of cardiac arrest in children during spine surgeries (2015, November 17) retrieved 4 May 2024 from <https://medicalxpress.com/news/2015-11-quantifies-cardiac-children-spine-surgeries.html>

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