



Local anesthesia toxicity review

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Local anesthetics are used in the United States and throughout the world on a daily basis. These drugs are considered safe and effective for the management of pain control in a wide variety of clinical situations. Local anesthetic morbidity and mortality reports are unusual in modern clinical practice. Unfortunately, local anesthetic toxic reactions and overdoses still befall pediatric patients during contemporary routine care.

The typical case report will describe the tragic sequelae that transpire when too much local anesthetic is given to a pediatric patient. Systemic involvement and early toxicity symptoms will usually include CNS aberrations such as dizziness and disorientation. As higher blood levels are reached, the clinical picture changes profoundly, excitement and seizures are rapidly followed by unconsciousness. With CNS depression comes respiratory depression followed by cardiovascular collapse. The cardiovascular effects of a toxic dosage of local anesthesia include vasodilation and resulting hypotension, myocardial depression and resulting bradycardia and cardiac arrest.

There is a relatively low margin of safety when administering drugs to small children. Close attention must be given to the dosage and the pharmacokinetics of the drug being used. Also, local anesthetic injection site, patient's age, size, and physical condition must be appraised. Depending on the source, recommended maximum safe dosages for local anesthetics may vary. These dosages are guidelines to be considered along with many other clinical factors (Table 1).

Most sources now feel that local anesthetics with a vasoconstrictor offer the largest margin of safety. When the agents most commonly used in practice today are considered, Lidocaine 2% 1:100,000 would usually be chosen as best for use in small patients. When considering volume and dosages, it will have the greatest margin of safety for avoiding systemic toxicity.

The following case emphasizes the point that administering local anesthesia with any sedative requires special attention to calculating local anesthesia dosages.

Case Report

An eight-year-old female who had been a patient since 1992 was seen by another dentist for the placement of sealants on tooth number 3, 14, 19, 30, utilizing nitrous oxide and a local anesthetic, Citanest. The patient was given one carpule of Citanest plain and three carpules of Citanest Forte. The nitrous dosage was titrated to 70/30, oxygen to nitrous oxide. During the placement of the last sealant, the child passed out and convulsed. She could not be awakened, oxygen was administered, and a physician was called. The patient was transported to a hospital and the physician stated there was a problem metabolizing the nitrous oxide and she was run down from a strep throat. A suspicion of meningitis was raised so the patient was transferred to a larger hospital. The parents lost a child previously which heightened their concern and a CT scan was demanded which turned out to be normal. The patient returned to school a few days later and was fine.

An attorney for the child became involved and I was asked to evaluate the case because of the allegation of an overdose of nitrous oxide. My review indicated that the use of nitrous oxide was not an issue. The patient received a total dosage of 288 mg of Prilocaine. The patient at a body weight of 39 pounds (17.7 kg), should not have received a dosage of Prilocaine over 100.8 mg, to 141.6 mg. This was obviously a case of a toxic dosage of local anesthetic. This is a typical case of other sedative agents clouding the issue. This case clearly points out how important dosages are, especially with children.⁵

References

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Table 1. Maximum Dosage Guidelines for Local Anesthesia

Lidocaine 2% 1:100,000 epinephrine	4mg/kg of body weight
Lidocaine 2%	4mg/kg
Mepivacaine 2% 1:20,000 neobynephrine	4mg/kg
Mepivacaine 3%	4mg-8mg/kg
Prilocaine (Citanest) 4% 1:200,000	6mg/kg
Prilocaine 4%	6mg/kg
Etidocaine (Duranest) 1.5% 1:200,000 epinephrine	5mg/kg
Bupivacaine (Marcaine) .05% 1:200,000 epinephrine	1.2mg/kg

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