"Tumescent" Liposuction Alert: Deaths From Lidocaine Cardiotoxicity

[Letters To The Editor]

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To the Editor:

In our just-completed survey of complications following cosmetic surgery, preliminary analysis identified a number of deaths in which lidocaine (Xylocaine) overdosage—the result of multi-liter injection of "tumescent anesthesia" solution (500-1000 mg lidocaine + 1 mg epinephrine per liter)—may have played an heretofore unrecognized contributory and perhaps even causative role. Multi-liter subcutaneous fluid infiltration may predispose to pulmonary edema and help explain the puzzling postmortem weight gain commonly seen after extensive liposuction surgery.

Widely administered for both local anesthesia and the emergency treatment of ventricular arrhythmias, lidocaine has attained a sterling safety record during its half-century of use. Conversely, ultra-high-dose lidocaine infiltration for local anesthesia in suction-assisted lipoplasty (i.e., "tumescent liposuction") is a recent development as yet unsanctioned by the U.S. Food and Drug Administration (FDA). The hazards of exceeding the manufacturer's recommended upper dose limit of 7 mg/kg of lidocaine remain largely unappreciated in the monumental shift to outpatient office procedures.

It may well be that a false sense of safety has been fostered by a number of clinical reports stating that 35 mg/kg lidocaine (five times the recommended upper dose limit) appears to be tolerated without mishap. The advent of large-volume (>5 L) liposuction has further pushed the lidocaine dosing envelope upward so that infiltration of 50 mg/kg lidocaine is no longer uncommon, and much more than that already enormous dose is not at all infrequent.

There are no defined anatomic or microscopic markers for morbidity caused by local anesthetic (other than cocaine); these drugs, including lidocaine, depress cardiac conduction and impair contractile force. Toxicology (i.e., blood and tissue lidocaine levels) remains the diagnostic mainstay in this circumstance. Fortunately, lidocaine assay is both inexpensive and pervasive, albeit not routinely performed in deaths within 24 hours of outpatient cosmetic surgery.

With a lidocaine half-life of 100 minutes, extrapolation of the postmortem finding to estimate the lidocaine blood level at the time of the leading incident is quite feasible. A postmortem assay revealing >6 µg/ml of lidocaine begins to approach the known cardiotherapeutic upper boundary in humans and, extrapolated backward in time, suggests exposure of the heart to a severalfold higher blood concentration prior to the mortal event. A high lidocaine presence in bile and urine serves as a marker to differentiate intraoperative lidocaine infiltration from lidocaine administered intravenously during terminal attempts at cardiovascular resuscitation.

Lacking data on large-dose lidocaine disposition kinetics, there are no firm guidelines linking human cardiotoxicity to postmortem assay findings, other than to raise the index of suspicion sufficiently to incorporate lidocaine assay in the toxicology screen for unexplained postliposuction death.

We welcome further inquiry, as well as case contributions to our ongoing survey.

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