# Local anesthetic systemic toxicity after endovenous laser therapy

Madam,

A 73-year-old man recently presented for endovenous laser therapy (EVLT). His medical history included stable coronary artery disease, hypertension, diabetes mellitus, and mild chronic kidney disease. His medications were lisinopril, metoprolol, glipizide, metformin, pantoprazole, simvastatin, tamsulosin, and loperamide.

The patient received sedation consisting of 100 mcg fentanyl and 380 mg propofol. Twelve mL of a 1:1 mixture of 1% lidocaine and 0.5% bupivacaine was infiltrated subcutaneously in the groin and a tumescent solution was administered. Hemodynamics were stable throughout. Ondansetron was administered given a history of postoperative nausea.

Within 10 minutes of his arrival in recovery, the patient complained he could not hear and his speech became incoherent. Simultaneously, his neck and all four limbs became rigid. Electrocardiogram (ECG) demonstrated sinus tachycardia without other abnormalities. Blood pressure rose to 153/97 mmHg. A serum lidocaine level was sent as it was revealed that 1¼ bags of a tumescent solution had been administered, with each 750 mL bag containing 270 mL 1% lidocaine (plain).

An intravenous bolus of 120 mL (1.5 mg/kg) of 20% lipid emulsion was administered along with 50 mg IV diphenhydramine. Within 1–2 minutes, he became flaccid, vital signs normalized, and the rigidity resolved. However, 5 minutes after initial resolution of symptoms rigidity returned and he was no longer responding to commands. Symptoms again resolved after treatment with 20 mL IV lipid emulsion, 2 mg IV midazolam, and initiation of a lipid emulsion infusion. His further recovery was uneventful. The serum lidocaine level drawn at the time of the acute presentation returned at 5.8 mcg/mL (normal <5 mcg/mL).

The threshold level for lidocaine toxicity is 5 mcg/mL. Central nervous system complaints predominate. However, Di Gregorio *et al*. found that the "classic prodrome" of auditory changes, circumoral numbness, and metallic taste were observed in only 16%; that 41% of presentations were atypical; and that seizure was the most common manifestation, occurring in two-thirds of cases.[1] Bradycardia/asystole was the predominant cardiovascular sign (27%), while tachycardia (16%) and hypertension (9%) occurred less frequently. Rigidity has also been described.[2]

Our patient was not clearly at increased risk of LAST and had undergone the same procedure on the other leg without incident, receiving a nearly identical anesthetic and tumescent dose. Acute dystonic reaction to ondansetron, while considered less likely, was treated empirically. Malignant hyperthermia (MH), serotonin syndrome, and neuroleptic malignant syndrome were ruled out.

Tumescent solution in EVLT provides analgesia, reduces bleeding, and dissipates heat from the laser to minimize injury to surrounding structures. The tumescent solution containing 0.36% lidocaine was well above the typical concentrations used, which range from 0.05% to 0.1%.[3] In addition, it was prepared without epinephrine. Because the tumescent solution for EVLT is injected directly into the perivascular space, potential for rapid systemic absorption is much higher than that during liposuction procedures.[3,4] Our institution now employs 0.1% lidocaine tumescent solution with 1:100,000 epinephrine.

The American Society for Dermatologic Surgery advises a maximum safe dose of 55 mg/kg tumescent lidocaine for liposuction.[5] Klein measured serum lidocaine concentrations after tumescent infiltration with and without liposuction in 14 healthy volunteers.[3] He estimated a maximum safe tumescent lidocaine dosage of 45 mg/kg with and 28 mg/kg without liposuction. Peak lidocaine levels with and without liposuction were 2.9 mcg/mL and 2.38 mcg/mL, respectively, with mean time to peak level approximately 13 hours in both groups.

Hudson *et al*. evaluated plasma lidocaine concentrations during EVLT in 10 healthy volunteers.[4] They used a tumescent solution containing 0.1% lidocaine. Mean total lidocaine dose was 6.38 mg/kg (range, 3.57 to 10.7 mg/kg). Mean peak lidocaine level was 1.36 mcg/mL, with peak level occurring between 60 and 120 minutes after the initial injection. These data suggest that tumescent lidocaine infiltration for EVLT, while quite overall safe, results in faster times to peak level and a proportionally increased peak plasma lidocaine level relative to total dose. This supports the distinction in absorption properties between the two techniques, and that administration for EVLT may have a narrower margin for error than in liposuction.

Anesthesia providers and proceduralists must be aware of the potential for LAST in procedures involving tumescence, particularly EVLT.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

**Thomas R. Hickey, Michael Casimir[1], Natalie F. Holt**

Department of Anesthesiology, Yale University School of Medicine, VA Connecticut Healthcare System, West Haven, CT 06516, [1]Department of Anesthesiology, Yale University School of Medicine, New Haven CT 06520, USA

**Address for correspondence:** Dr. Thomas R. Hickey, Department of Anesthesiology, VA Connecticut Healthcare System, 950 Campbell Ave, West Haven, CT 06511, USA.
E-mail: thomas_hickey@post.harvard.edu

## References

1. Di Gregorio G, Neal JM, Rosenquist RW, Weinberg GL. Clinical presentation of local anesthetic systemic toxicity: A review of published cases, 1979 to 2009. Reg Anesth Pain Med 2010;35:181-7.
2. Chiang YY, Tseng KF, Lih YW, Tsai TC, Liu CT, Leung HK. Lidocaine-induced CNS toxicity-a case report. Acta Anaesthesiol Sin 1996;34:243-6.
3. Klein JA, Jeske DR. Estimated Maximal Safe Dosages of Tumescent Lidocaine. Anesth Analg 2016;122:1350-9.
4. Hudson, AJ, Whittaker DR, Szpisjak DF, Lenart MJ, Bailey MM. Tumescent technique without epinephrine for endovenous laser therapy and serum lidocaine concentration. J Vasc Surg Venous Lymphat Disord 2015;3:48-53.
5. Svedman KJ, Coldiron B, Coleman WP 3rd, Cox SE, Jacob C, Lawrence N, *et al*. ASDS guidelines of care for tumescent liposuction. Dermatol Surg 2006;32:709-16.



**Access this article online**

Quick Response Code:

**Website:** www.joacp.org

**DOI:** 10.4103/joacp.JOACP_113_17

**How to cite this article:** Hickey TR, Casimir M, Holt NF. Local anesthetic systemic toxicity after endovenous laser therapy. J Anaesthesiol Clin Pharmacol 2018;34:401-2.