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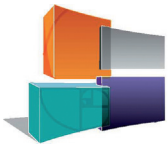

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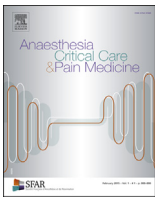

Letter to the Editor

Tumescent local anaesthesia for breast cancer surgery in elderly women: about 6 cases

Tumescent local anaesthesia (TLA) is a regional anesthetic technique allowing to perform minor surgery with minimal blood loss by the infiltration of large volumes of diluted lidocaine and epinephrine. In women with breast cancer, TLA could be used to perform mastectomy without general anaesthesia (GA). We report the first case series of tumescent lidocaine pharmacokinetics in six elderly women undergoing breast cancer surgery. The research was approved by the 5th South Mediterranean Ethics Committee and written informed consent was obtained from each patient.

The pharmacokinetics of lidocaine were assessed in six women (ASA score II ($n = 4$) or III ($n = 2$), median [range] age: 87 years [81–90], BMI: 29 $kg.m^{-2}$ [19–35]) receiving TLA for breast cancer surgery. Before the procedure, the puncture sites were anaesthetised with 20 mL of lidocaine 10 mg/mL (200 mg). TLA solution containing 1 mg/mL of lidocaine and 0.5 μg/mL of adrenaline in Ringer Lactate was infiltrated with two spinal needles (BD Spinal Needle™ 0.7 × 178 mm [22 GA, Franklin lakes, USA]) and a volumetric pump with constant flow rate of 999 mL/h, all around and under the mammary gland, corresponding to a total amount of 10 mL/kg of lidocaine. Total amount of lidocaine was 547 mg [700–1200]. The duration of TLA was 67 minutes [50–70]. Plasma albumin and alpha-1-glycoprotein acid (AAG) concentrations were 39 g/L [35–43] and 0.97 g/L [0.78–1.01], respectively.

Sedative agents were required in five out of the six patients without invasive mechanical ventilation requirement. The cerebral target concentrations of propofol and remifentanil were 0.5 μg/mL [0.1–0.7] and 0.1 μg/mL [0.0–0.4], respectively. Postoperative analgesics included acetaminophen (4 and 6 g for 2 and 3 of the 6 patients), ketoprofen (200 mg for 2 of the 6 patients) and tramadol (100 and 200 mg each, for 1 of the 6 patients) during the first 48 hours. The first day, two patients received nefopam 20 and 40 mg. No morphine was required. Visual Analogue Score (VAS) was 0 for all patients during the 48 hours after the surgery. After this period, the postoperative analgesia included only acetaminophen 1.0 g 3 times per day.

Venous blood samples were collected before the tumescent injection and 1, 2, 4, 6, 12, 24, 36 and 48 hours after the onset of injection. Total and unbound (obtained by the ultrafiltration method [Centrifree™ Millipore™]) lidocaine concentrations were determined using gas chromatography coupled to nitrogen-phosphorus detector using a validated method (limit of quantification of 0.05 μg/mL). The serum concentration-time profiles of total and unbound lidocaine are shown in Fig. 1. The median maximal serum concentration (Cmax) at 1.62 μg/mL [0.99–2.41] was reached at 5.7 hours [4.2–11.9] after administration remaining far from the common toxic concentration (6–7 μg/mL). The maximal serum concentration of unbound lidocaine was 0.18 μg/mL [0.17–0.90]. No clinical evidence of lidocaine systemic toxicity was reported.

Even if TLA for mastectomy required the injection of a large dosage of lidocaine, the present serum concentrations of total and unbound lidocaine are low during the 48 postoperative hours. To our knowledge, no previous study has reported the serum concentration-time profiles of total and unbound lidocaine during TLA during mastectomy in elderly patients.

In regional anaesthesia, a maximal dosage of lidocaine with epinephrine of 7 mg/kg is currently recommended to avoid systemic toxicity. In TLA, the slow infiltration rate of highly diluted tumescent solution into poorly vascularised tissues allows the administration of high doses [1]. Indeed, several studies have reported that doses until 55 mg/kg of tumescent lidocaine are safe to perform liposuction due to the aspiration of significant amount of subcutaneous tumescent lidocaine before it is absorbed into the systemic circulation. Additionally, Klein et al. [1] showed that 28 mg/kg of tumescent lidocaine was easily administered in cosmetic surgery without liposuction. In breast cancer surgery, Sleth et al. [2] previously reported the case of an 84-year-old woman who received 10.7 mg/kg of tumescent lidocaine solution. Unfortunately, lidocaine serum concentrations were reported only over a 2-hour period after the injection.

In our case-series, a dose of 10 mg/kg lidocaine 0.1% was successfully used without signs of systemic toxicity. Cmax were below the neurological toxic threshold (6–7 μg/mL) and were observed around 6 hours after TLA. In peripheral injection, the time to reach maximal serum concentration (Tmax) of lidocaine is affected by the site of injection. After TLA, the tumescent solution slowly diffuses from the deposit to the systemic circulation, which explains the slow increase of serum concentrations and the apparent safety of the technique [1]. The high lipid solubility of lidocaine and the local binding affinity to adipose tissue certainly explained the highly variability of Tmax. The present Cmax of lidocaine were similar to those reported in axillae, breasts or trunk area [3].

Unbound lidocaine, which is the active (and potentially toxic) fraction of lidocaine, remained low (0.18 [0.17–0.90] μg/mL). Lidocaine is 65% bound to serum proteins preferentially to AAG. AAG serum concentrations determined before surgery were in the range of normal value in all women. Unfortunately, no measure was planned thereafter. However, it is well known that AAG steadily increases during the first days after surgery, which could explain the low unbound serum concentration [4].

Postoperative pain was assessed until 48 hours after surgery using VAS. No woman presented a VAS > 0. In a previous randomised, double-blinded trial assessing the analgesic efficacy of TLA with lidocaine for suction-assisted lipectomy in patients under GA, Danila et al. [5] observed that lidocaine significantly reduces pain until 18 hours after surgery. In our cases, TLA was performed without GA but 5/6 women required sedation by

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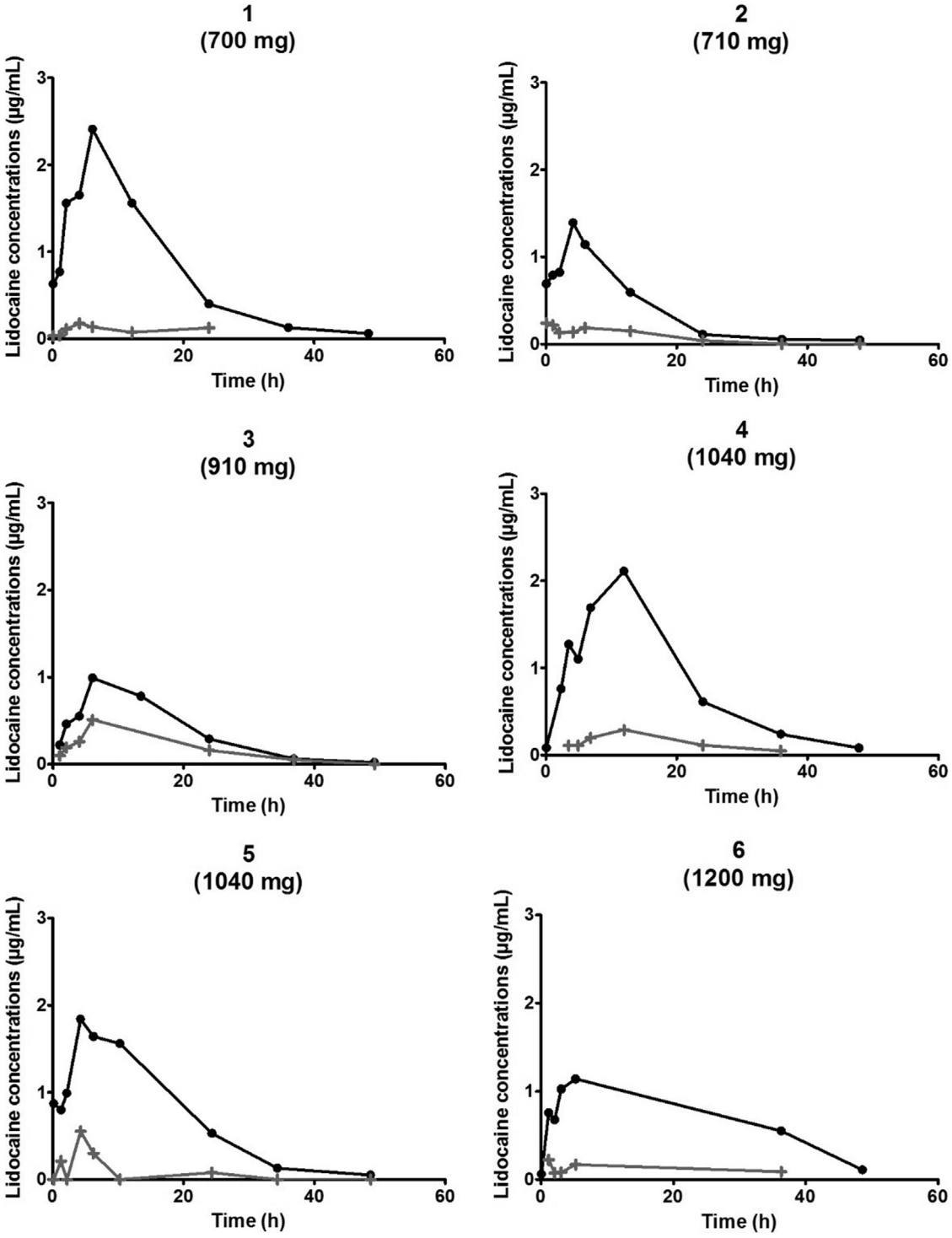

Fig. 1. Time-concentration profile of total and unbound lidocaine. Black lines depict total lidocaine concentrations while grey lines depict unbound lidocaine serum concentrations.

propofol and remifentanil. Postoperative pain was managed using tramadol, acetaminophen and/or non-steroidal anti-inflammatory drugs.

In conclusion, TLA appears as a safe and effective regional anaesthetic technique to perform mastectomy in elderly women with comorbidities. A larger study is required to confirm these findings.

Disclosure of interest

The authors declare that they have no competing interest.

Acknowledgement

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