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Update on the management of local anesthetic systemic toxicity

Actualización del manejo de la toxicidad sistémica por anestésicos locales

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Regional anesthesia has become increasingly important as part of comprehensive pain management and it is an excellent option to avoid airway manipulation during the pandemic. Although local anesthetic systemic toxicity (LAST) is a rare event, the growing use of regional anesthesia calls for an update pertaining several key points contained in the article entitled "Protocol and need for local anesthetic systemic toxicity kit" published in the Colombian Journal of Anesthesiology (1).

Following the publication in 2010 of the first guidelines of the American Society of Regional Anesthesia and Pain Medicine (ASRA) it is satisfying to find that 20% lipids are found in operating theaters, procedure rooms and/or recovery areas, even in some dental services. Other areas where lipid emulsions could be available include emergency services where relatively more common analgesic procedures are performed by emergency physicians in elderly patients with hip fractures, and in plastic surgery procedure rooms where tumescent solutions are used. Caution is required when it comes to the use of local anesthetics for suturing children in these services. Also, a clear knowledge of toxicity management is required, because allowed doses could be easily exceeded in this population.

Adequate LAST prevention should require inclusion, in the regional anesthesia checklist and in the WHO safe surgery checklist, of the dose of local anesthetic to be used, given that LAST may occur following the application of the local anesthetic by the surgeon if the dose is exceeded in a patient with prior regional block (2,3); hence the importance of good communication between the anesthetist and the surgeon. This highlights that systemic toxicity is additive, either from local anesthetic re-dosing or from the administration of a new anesthetic (2). Electronic clinical record systems can offer automatic calculations of maximum safe doses or automatically generated dose reminders (3) that can help the anesthetist. However, it must be borne in mind that the dose to be used must be individualized for each patient and that, ideally, the minimum safe dose should be selected.

In our experience, we have found that not only aspiration used prior to the administration of the local anesthetic is a preventive measure, but also making sure that the percentage of negative aspiration is not increased by staff in training applying too much pressure on the transducer. However, we found that there is no anesthetic dispersion around the nerve and aspiration becomes positive only after the pressure applied on the transducer is released. Consequently, ultrasound guidance is essential to observe adequate anesthetic dispersion with each application.

It is crucial to check the LAST kit regularly in order to deliver any lipids that are close to expiry to other services where turnover is greater, as is the case in intensive care units, and to replace them with new ones. The kit should also include an updated simplified version of the treatment so that people do not have to go searching desperately for dose information in those rare instances in which there is a crisis and memory fails. A reasonable option is to use the American Society of Regional Anesthesia (ASRA) LAST app which shows how to manage this toxicity. Additionally, the cognitive tools already mentioned are useful as reminders to use a lower epinephrine dose in the context of LAST-related cardiac arrest, considering that prior studies have shown a trend among anesthetists to use the standard American Heart Association resuscitation guidelines without taking into account the specific resuscitation considerations in LAST.

Sedation prior to regional blocks has undergone changes during the pandemic. Some sites have discontinued the practice or have reduced the dose based on drug availability. In other instances, the

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aim is to avoid deep sedation, in order to enable symptom reporting in the awake or mildly sedated patient.

The nursing staff plays a key role during administration of the local anesthetic, because they can report blood aspiration or injection resistance, and also to assist with patient monitoring before and after the regional block. Consequently, the nursing staff must be familiar with lipids and their storage, what they are used for and how to administer them in LAST cases. Drills in which the nursing staff participate are critical for adequate human factor management during a crisis.

Regarding the treatment of LAST-related seizures, airway management requires the use of 100% oxygen, avoiding hyperventilation and administration of benzodiazepines (2). Hypoxia, hypercapnia and acidosis must be avoided because they will worsen toxicity (2). In its latest update, ASRA recommends early lipid treatment in all patients considered to have potentially severe LAST in whom airway management has already been instituted (2).

Guidelines for lipid administration were simplified in patients weighing more than 70 kg who can receive a fixed 100 mL bolus of 20% lipids given in 2-3 minutes (for patients weighing less than 70 kg the dose is 1.5 mL/kg), followed by a standard 200-250 mL infusion given in 15-20 minutes (for patients weighing less than 70 kg the dose is 0.25 mL/kg/min) (2). Weight-based recommendations are available for patients weighing less than 70 kg, but it is important to highlight that accurate volume or flow is not critical because lipids can be administered either manually or using a pump (2). However, emphasis is made on never exceeding 1L of lipids in 30 minutes for resuscitation (2). For patients with extreme obesity, the United Kingdom guidelines recommend that, ideally, the lipid dose should be determined on a lean weight basis (4).

If the patient remains unstable after 5 minutes, the bolus can be repeated up to two more times (three boluses at the most, including the initial one) at the same dose of the initial bolus, doubling the baseline infusion to 0.5 mL/kg/min (2). Once hemodynamic stability is achieved, the infusion should be continued for an additional 15 minutes (2). Patients must remain under continuous monitoring 4 to 6 hours after a cardiovascular event, and at least for 2 hours after an event restricted to the central nervous system (2). Importantly, pancreatitis should be ruled by general clinical assessment, and daily amylase or lipase measurements must be obtained for two days (5). It is worth noting that lipemia could interfere with electrolyte or hemoglobin measurements (5).

If the diagnosis of LAST was clear, the event was short-lived with no signs of cardiovascular instability and no additional events after 30 minutes of monitoring, surgery can proceed if the entire surgical team agrees (2).

To conclude, prevention is of the utmost importance in preventing local anesthetic systemic toxicity. Doses must be adjusted according to individual risk factors, and early diagnosis, access to lipids when indicated, and knowledge of the team are all crucial components of patient treatment in this setting.

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