

Bölüm 23

LOKAL ANESTEZİK SİSTEMİK TOKSİSİTESİ

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GİRİŞ

Lokal anestezipler özellikle küçük alanlara yapılan cerrahi müdahalelerde ve anestezi uygulamalarında sadece anestezi uzmanları tarafından değil, diğer cerrahi branş hekimleri, acil servis doktorları ve diş hekimleri dahil olmak üzere diğer sağlık personeli tarafından da sık olarak kullanılan ilaçlardır. Lokal anestetiklerin potansiyel faydaları arasında opioidlere daha az maruz kalma, azalmış postoperatif bulantı ve kusma, azalmış kalıcı postoperatif ağrı insidansı, azalmış hastanede kalış süresi ve hasta memnuniyeti ve cerrahi iyileşme kalitesinde genel bir iyileşme yer alır (1,2).

Lokal anestezi ilaçları genel olarak güvenli olmakla birlikte, yüksek dozda kullanılması veya yanlış uygulanması halinde toksik olabilir. Lokal anestezi sistemik toksisitesi (LAST) nadir fakat yaşamı tehdit eden kritik bir olaydır. Cerrahi operasyon ve diğer invaziv prosedürler yapılan hastalarda LAST'ı yönetmek ve önlemek için lokal anestezi uygulayıcılarının, mevcut lokal anestetiklerin çeşitliliğinden ve bu potansiyel olarak ölümcül komplikasyonun belirtileri, semptomları ve tedavilerinden haberdar olmalıdır.

LOKAL ANESTEZİKLER

Lokal anestetiklerin yapısı, özellikleri ve etki mekanizması hakkında bilgi sahibi olunması, LAST'ın klinik bulgularının, mekanizmasının, önlenmesinin ve tedavisinin daha iyi anlaşılmasına yardımcı olacaktır. Lokal anestetikler bir aromatik halka, bir ara zincir ve bir terminal amin olarak üç kimyasal bileşenden oluşur (3). İlk bileşen olan aromatik halka, lokal anesteziğin lipid çözünürlüğünü belirler. Lokal anestetikler amino amidler (ör. Lidokain, mepivakain, bupivakain)

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KAYNAKLAR

1. Dickerson DM, Apfelbaum JL. Local anesthetic systemic toxicity. *Aesthet Surg J*. 2014 Sep;34(7):1111-9. doi: 10.1177/1090820X14543102. Epub 2014 Jul 15. PMID: 25028740.
2. Andreae MH, Andreae DA. Local anaesthetics and regional anaesthesia for preventing chronic pain after surgery. *Cochrane Database Syst Rev*. 2012 Oct 17;10:CD007105. doi: 10.1002/14651858.CD007105.pub2. Update in: *Cochrane Database Syst Rev*. 2018 Apr 25;4:CD007105. PMID: 23076930; PMCID: PMC4004344.
3. Becker DE, Reed KL. Local anesthetics: review of pharmacological considerations. *Anesth Prog*. 2012;59(2):90-102.
4. McLeod IK. Local anesthetics: introduction and history. *Medscape*. <http://emedicine.medscape.com/article/873879-overview>. Updated July 23, 2017. Accessed July 25, 2017.
5. Noble KA. Local anesthesia toxicity and lipid rescue. *J Perianesth Nurs*. 2015;30(4):321-335.
6. Hille B. Local anesthetics: Hydrophilic and hydrophobic pathways for the drug-receptor reaction. *J Gen Physiol*. 1977;69:497-515.
7. Butterworth JF IV. Models and mechanisms of local anesthetic cardiac toxicity: A review. *Reg Anesth Pain Med*. 2010;35:167-176.
8. Royse CF, Royse AG. The myocardial and vascular effects of bupivacaine, levobupivacaine, and ropivacaine using pressure volume loops. *Anesth Analg*. 2005;101:679-687, table of contents.
9. Onyüksel H, Sethi V, Weinberg GL, Dudeja PK, Rubinstein I. Bupivacaine, but not lidocaine, disrupts cardiolipin-containing small biomimetic unilamellar liposomes. *Chem Biol Interact*. 2007;169:154-159.
10. Clarkson CW, Hondeghem LM. Mechanism for bupivacaine depression of cardiac conduction: Fast block of sodium channels during the action potential with slow recovery from block during diastole. *Anesthesiology* 1985;62:396-405.
11. Di Gregorio G, Neal JM, Rosenquist RW, Weinberg GLM. Clinical presentation of local anesthetic systemic toxicity: a review of published cases, 1979 to 2009. *Reg Anesth Pain Med*. 2010;35(2):181-7.
12. Knudsen K, Beckman Suurküla M, Blomberg S, Sjövall J, Edvardsson N. Central nervous and cardiovascular effects of i.v. infusions of ropivacaine, bupivacaine and placebo in volunteers. *Br J Anaesth*. 1997;78(5):507-14.
13. Rosenberg PH, Veering BT, Urmey WF. Maximum recommended doses of local anesthetics: a multifactorial concept. *Reg Anesth Pain Med*. 2004;29(6):564-75
14. Cave G, Harrop-Griffiths W, Harvey M, Meek T, Picard J, Short T, Weinberg G. AAGBI safety guideline: management of severe local anaesthetic toxicity. https://www.aagbi.org/sites/default/files/la_toxicity_2010_0.pdf. Accessed 5 July 2015.
15. Neal JM, Bernards CM, Butterworth JF 4th, Di Gregorio G, Drasner K, Hejtmanek MR, Mulroy MF, Rosenquist RW, Weinberg GL. ASRA practice advisory on local anesthetic systemic toxicity. *Reg Anesth Pain Med*. 2010;35:152-61
16. Kapitanayan R. Local anesthetic toxicity: practice essentials. *Medscape*. <http://emedicine.medscape.com/article/1844551-overview>. Updated August 17, 2017. Accessed September 13, 2017.
17. Vasques F, Behr AU, Weinberg G, Ori C, Di Gregorio G. A review of local anesthetic systemic toxicity cases since publication of the American Society of Regional Anesthesia recommendations: To whom it may concern. *Reg Anesth Pain Med*. 2015;40:698-705.
18. Petrar S, Montemurro T. Total local anesthetic administered is integral to the syndrome of local anesthetic systemic toxicity. *Anesthesiology* 2014;121:1130-1131.
19. Wong GK, Joo DT, McDonnell C. Lipid resuscitation in a carnitine deficient child following intravascular migration of an epidural catheter. *Anaesthesia* 2010;65:192-195.
20. Bern S, Weinberg G. Local anesthetic toxicity and lipid resuscitation in pregnancy. *Curr Opin Anaesthesiol*. 2011;24(3):262-7.
21. Christie LE, Picard J, Weinberg GL. Local anaesthetic systemic toxicity. *Contin Educ Anaesth Crit Care Pain*. 2015;15(3):136-142.

22. Gitman M, Fettiplace MR, Weinberg GL, Neal JM, Barrington MJ. Local anesthetic systemic toxicity: a narrative literature review and clinical update on prevention, diagnosis, and management. *Plast Reconstr Surg.* 2019;144(3):783–95
23. Heinonen JA, Litonius E, Pitkänen M, Rosenberg PH. Incidence of severe local anaesthetic toxicity and adoption of lipid rescue in Finnish anaesthesia departments in 2011–2013. *Acta Anaesthesiol Scand.* 2015;59(8):1032–7.
24. Rubin DS, Matsumoto M, Weinberg G, Roth S. Local anesthetic systemic toxicity in total joint arthroplasty: incidence and risk factors in the United States from the National Inpatient Sample 1998–2013. *Reg Anesth Pain Med.* 2018;43(2):131–7
25. Japanese Society of Anesthesiologists: Guideline for the use of lipid emulsion. (Japanese). [cited 1 Feb 2017]. Available from: http://www.anesth.or.jp/guide/pdf/publication47_20160325.pdf
26. Mather LE, Copeland SE, Ladd LA. Acute toxicity of local anesthetics: Underlying pharmacokinetic and pharmacodynamic concepts. *Reg Anesth Pain Med.* 2005;30:553–566.
26. Sites BD, Taenzer AHM, Herrick MD, Gilloon C, Antonakakis J, Richins J, et al. Incidence of local anesthetic systemic toxicity and postoperative neurologic symptoms associated with 12,668 ultrasound-guided nerve blocks: an analysis from a prospective clinical registry. *Reg Anesth Pain Med.* 2012;37(5):478–82.
28. Orebaugh SL, Kentor ML, Williams BA. Adverse outcomes associated with nerve stimulator-guided and ultrasound-guided peripheral nerve blocks by supervised trainees: update of a single-site database. *Reg Anesth Pain Med.* 2012;37(6):577–82.
29. Neal JM, Barrington MJ, Fettiplace MR, Gitman M, Memtsoudis SG, Mörwald EE, et al. The Third American Society of Regional Anesthesia and Pain Medicine Practice Advisory on Local Anesthetic Systemic Toxicity: executive summary 2017. *Reg Anesth Pain Med.* 2018;43(2):113–23
30. Neal JM, Mulroy MF, Weinberg GL. American Society of Regional Anesthesia and Pain Medicine checklist for managing local anesthetic systemic toxicity: 2012 version. *Reg Anesth Pain Med.* 2012;37(1):16–18.
31. Dewaele S, Santos AC. Toxicity of local anesthetics. New York School of Regional Anesthesia (NYSORA). <http://www.nysora.com/toxicity-of-local-anesthetics>. Accessed July 25, 2017.
32. Association of Anaesthetists of Great Britain and Ireland. Management of severe local anesthetic toxicity 2 (A4 sheet and accompanying notes). Available at: https://www.wfsahq.org/components/com_virtual_library/media/bf1f1de5f1ad459d42924f3614d2c0abManagement-of-Local-Anaesthetic-Toxicity--Update-25-2-2009-.pdf. Accessed September 20, 2016
33. Neal JM, Woodward CM, Harrison TK. The American Society of Regional Anesthesia and Pain Medicine checklist for managing local anesthetic systemic toxicity: 2017 version. *Reg Anesth Pain Med.* 2018;43:150–153.
34. Hayes BD, Gosselin S, Calello DP, Nacca N, Rollins CJ, Abourbih D, et al. Systematic review of clinical adverse events reported after acute intravenous lipid emulsion administration. *Clin Toxicol.* 2016;54(5):365–404.
35. Brull SJ. Lipid emulsion for the treatment of local anesthetic toxicity: patient safety implications. *Anesth Analg.* 2008;106(5):1337–9.