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Is It Time to Redefine Lidocaine Administration Guidelines in Mohs Surgery?

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Current FDA guidelines for lidocaine use in Mohs micrographic surgery (MMS) do not account for the lengthy duration of MMS, which is on average 2-4 hours, nor for the need for lidocaine supplementation during multiple stages of cutaneous resection and reconstruction. When surgeries require excision of large or multiple skin cancers, extensive review of pathology specimens, and/or complex reconstruction, it becomes quite easy for a Mohs surgeon to exceed the FDA-recommended lidocaine dosage.[1]

The FDA-recommended maximum dosage of lidocaine hydrochloride and epinephrine injection is 7 mg/kg with the maximum total dose not to exceed 500 mg per procedure.[2] While these recommendations reduce the risk of reaching toxic lidocaine levels, which start at 5 ug/ml,[3] they don't account for lidocaine metabolism and clearance that occurs while patients are waiting between MMS stages. As one study with a sample of 80 MMS reported, patients may have waiting times that total 1.5 to 3.6 hours,[1] which allow for metabolism of much of the administered lidocaine and may necessitate re-dosing for anesthesia in subsequent stages of surgery.

Lidocaine serum half-life is reported to be 2 hours when injected locally in patients with normal liver function.[3,4] Based on this known half-life, surgeons should be able to safely re-dose after 1.6-2 hours. In fact, FDA administration guidelines for epidural lidocaine allow for re-dosage every 90 minutes if the initial dose does not exceed the safety threshold due to the known half-life of epidural lidocaine of 1.5-2 hours.[2,3] As subcutaneous lidocaine has a near identical half-life to epidural lidocaine, one could extrapolate that the FDA's re-dosing recommendation for epidural lidocaine should also apply to MMS lidocaine subcutaneous use.

This re-dosing may result in total lidocaine dosages that exceed the currently recommended maximum dose of 500 mg. Previous studies, however, have proven the safety of higher lidocaine dosages used in cutaneous surgeries. Ramon et al. concluded that the use of dilute lidocaine (0.33%) and epinephrine (1:600,000) at a dose 3.1 times higher than the recommended dose of 7 mg/kg resulted in a peak plasma lidocaine level 72% below the safety threshold during facelift procedures.[5] In another study, Alam et al. demonstrated that the use of nearly the maximum recommended dose of lidocaine during MMS resulted in a maximum plasma concentration of 0.3 ug/ml, which is 10% of the plasma level associated with the mildest signs of lidocaine toxicity.[3] During this study 1.0% lidocaine with 1:200,000 epinephrine was injected 3 times during multi-stage MMS, and serial plasma lidocaine levels were measured over a surgery span of up to 7.8 hours.[3] The lidocaine levels at all time points remained significantly below the safety threshold.

Based on lidocaine pharmacokinetics and the above research, there is significant evidence supporting the need to revise FDA-guidelines for MMS lidocaine administration in order to best care for patients. By revising these guidelines, we will allow for patients to have increased comfort during procedures and for physicians to perform MMS without unnecessary time and pain management constraints. We suggest revisions to the current guidelines to account for the unique needs of MMS. While the maximum dosage of lidocaine hydrochloride and epinephrine injection should remain at 7 mg/kg with the maximum total dose of 500 mg at the point of initial injection, re-dosing at or below this maximum level every 1.6-2 hours in patients without liver disease should be included in future guidelines.

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