

# Can Lidocaine be Safely Used to Reduce Pain Caused by Intramuscular Penicillin Injections? A Short Literature Review

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To the Editor,

Intramuscular (IM) injection, a common procedure frequently performed by nurses, has been used for more than a century.<sup>1</sup> More than 12 billion IM injections are annually given throughout the world.<sup>2</sup> One of the major disadvantages of IM injection of penicillins, such as benzathine penicillin G, is pain at the injection site.<sup>3</sup> Farhadi et al. reported that the average pain intensity in patients receiving IM injection of benzathine penicillin was described as "severe" with a mean visual analog scale (VAS) score of 7.4/10.<sup>4</sup> Since a painful injection might raise severe fear which can deter patients from seeking medical care, pain originating from IM injection should not be underestimated.<sup>5,6</sup>

Injection pain can be greatly reduced by administering drugs in combination with local anesthetics<sup>7</sup> like lidocaine.<sup>8</sup> Lidocaine is a sodium-channel-blocking drug and an extremely versatile local anesthetic agent which has remained a widely used agent due to its potency, rapid onset and intermediate duration of action.<sup>9</sup>

A few studies have examined the influences of lidocaine as a diluent on pharmacokinetics of IM penicillins or cephalosporins in human and none showed any changes in pharmacokinetic parameters of these antibiotics when mixed with lidocaine.<sup>3,6,7</sup> Furthermore, lidocaine is physically or chemically compatible with penicillin.<sup>10</sup> Amir et al. compared concentration and injection pain of benzathine penicillin G between two diluents, either sterile water or lidocaine hydrochloride 1%. They found that although lidocaine significantly reduced injection pain, it did not change penicillin concentration in body fluids.<sup>3</sup> Patel et al. investigated the effect of lidocaine 1% as a diluent on the pharmacokinetics and tolerance of IM ceftriaxone and showed that lidocaine neither changed parameters nor altered its bioavailability. In addition, pain intensity and frequency at the injection site were reduced considerably by administering lidocaine.<sup>7</sup> Likewise, Schichor et al. showed that lidocaine could reduce pain intensity after IM ceftriaxone injection when compared with sterile water as a diluent.<sup>6</sup> Despite potential toxicity of lidocaine, its usual dose for IM penicillin injections is 10-60 mg (1-3 mL of lidocaine 1% or 2%) which is significantly less than the recommended maximum dose for local anesthetics without epinephrine (4.5 mg/kg).<sup>3</sup> In sum, using lidocaine as a local anesthetic can be relatively safe for pain relief during IM injections of penicillins. Nevertheless, more research is still needed in this regard.

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