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Preservative vs. Preservative-Free: Local Anesthetic Choice for Epidural Injections FactFinder

Committed to providing helpful information to our members about key patient safety issues, the International Spine Intervention Society's Patient Safety Committee has developed a FactFinder series. FactFinders will explore and debunk myths surrounding patient safety issues. The intent of this FactFinder is to present the evidence surrounding use of preservatives in spinal injections of local anesthetic.

Myth: Only preservative-free anesthetics should be used in spinal injections.

Fact: There are documented adverse events following the injection of preservatives via blind injection. There are currently no reported adverse consequences following the injection of preservatives via properly performed image-guided injections. Since there is a theoretical concern that the epidural and subarachnoid spaces are continuous, the risks and benefits of using medications containing preservatives need to be weighed carefully.

Preservatives are added to pharmaceutical products to prevent or inhibit the growth of microorganisms that may have been introduced during the manufacturing process.[1] Many drugs intended for epidural use (such as steroids, opioids, and 2-chloroprocaine) contain antioxidants or preservatives, or are formulated with vehicles known as excipients. An excipient is an inactive substance used as a diluent or vehicle for delivery of active ingredients. Preservatives are often added to local anesthetics dispensed in multi-dose containers and less commonly added to drugs intended for single use.[2]

Several studies document the negative side effects of injecting preservatives into the intrathecal space or with blind epidural injections.[3-9] Many question whether these side effects would have occurred with a fluoroscopically-guided injection that had confirmed accurate placement in the epidural space. Hetherington and Dooley studied the "potential for patient harm from intrathecal administration of preserved solutions", and concluded that the intrathecal route of administration can "increase the risk of local adverse effects such as arachnoiditis".[8] They further concluded that "it is accepted practice that any spinal injection should not contain any preservatives (such as benzyl alcohol and parabens-containing compounds)", since there was an increased risk of adverse neurological events. They emphasized the importance of using preservative-free products in the intrathecal space.

In a case report, a 24-year-old woman in labor received a blind epidural injection with 0.9% saline and preservative 1.5% benzyl alcohol.[4] She developed weakness in the lower extremities with numbness and prickling sensation and inability to void. She regained her ability to walk and void at nine weeks post-injection, but still had weakness in the lower limbs. At 16 weeks post-injection, she fully recovered but still

experienced leg cramps. A 50-year-old man developed confusion and disorientation after he received epidural morphine preserved with phenol and formaldehyde.[3] Upon scanning of the injection site, epidural tissue damage was seen. His symptoms were reversed after he was given preservative-free morphine. Of note, these injections were performed blind so the final needle tip location was unknown.

Sghirlanzoni and colleagues reported six patients from Italy who were diagnosed by myelography with chronic adhesive arachanoiditis up to three years after receiving non-obstetric epidural anesthesia between 1983 and 1988.[10] In each case, the patient received epidural local anesthetics from multiple dose vials containing the preservatives methyl and propyl paraben. Hodgeson *et al.* suggested that "parabens are safe when administered spinally in the small doses associated with preservative use."[2] As early as 1977, methylparaben was found to have no adverse effects on rabbit spinal cord.[11]

Review of the available literature suggests that local anesthetic solutions containing antimicrobial preservatives (*i.e.,* those supplied in multiple-dose vials) should not be used for epidural or caudal anesthesia. This recommendation is consistent with CDC's position that multi-dose vials are for single use when they are opened in the presence of a patient.[12]

Though this has been challenged, Nelson has maintained that "the epidural space is not wholly separate from the subdural and/ or subarachnoid space" and the spaces are "not only contiguous, but continuous."[13] He concluded that epidural delivery of drugs may not guarantee that the substance will remain isolated in the epidural space alone and cited a 2.5% risk of inadvertent drug injection directly into the subarachnoid space.

A review of the current literature does not yield reports of adverse consequences from preservatives after properly performed image-guided injections. Since there is a theoretical concern that the epidural and subarachnoid spaces are continuous, the risks and benefits of using medications containing preservatives need to be weighed carefully.

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