Instability of Steam-autoclaved Bupivacaine with Epinephrine

BERNARD C. DELEO, M.D.,* WILLIAM HAMELBERG, M.D.,† GENE L. STAUFFER, R.PH.,‡ SHERRY KRAUSE, R.PH., M.S.§

The performance of regional anesthesia is facilitated if the necessary drug ampules can be sterilized as part of the block tray. This assures the anesthesiologist that the drugs are sterile. Following this principle, we steam autoclave our drugs, including those containing epinephrine, at 15 pounds pressure, 250°F for 20 minutes. As reported by de Jong, we have noticed no clinical decrease in the potency of local anesthetic or epinephrine.

Since the package insert instructions for the recently-released bupivacaine (Marcaine) were similar to those for lidocaine, namely, "Solutions of Marcaine that do not contain epinephrine may be re-autoclaved," we continued our practice of steam sterilization of the ampules prior to usage. While this proved to be satisfactory for bupivacaine without epinephrine, ampules of bupivacaine, 0.5 per cent, with 1:200,000 epinephrine, when autoclaved, turned a light yellow color and emitted a foul-smelling odor similar to rotten eggs or burnt rubber. The manufacturer was unable to explain the reason for the color or odor.

Unlike lidocaine ampules or single-dose vials which contain sodium metabisulfite as an antioxidant preservative, bupivacaine with epinephrine contains sodium bisulfite, thioglycolic acid, and ascorbic acid as antioxidants, in addition to sodium lactate as a buffer and calcium disodium edetate as a stabilizer.

Pharmacologic examination of the autoclaved bupivacaine with epinephrine using nonaqueous titration with 0.1 N perchloric acid in glacial acetic acid demonstrated no change in the potency of bupivacaine. The pH was likewise unchanged. Although our chemist could not identify the source of the foul odor, she postulated that it was the result of the breakdown of thioglycolic acid and the accompanying formation of hydrogen sulfide and acrolein.

Because of the common practice of reautoclaving local anesthetics with steam heat, we feel that this instability of bupivacaine with epinephrine should be noted. The manufacturer utilizes an ultrafiltration method to sterilize the drug products and adds the sterile solution to a sterile ampule prior to sealing. The manufacturer has not offered a specific recommendation for reautoclaving or re-sterilizing the ampules of bupivacaine with epinephrine. Our findings suggest that bupivacaine with epinephrine should not be reautoclaved.

REFERENCES


2. de Jong III: Multiple autoclaving of commercial local anesthetic solutions containing dilute epinephrine. Anesthesiology 24:582-583, 1963

* Assistant Professor, Department of Anesthesiology.
† Professor and Chairman, Department of Anesthesiology.
‡ Staff Pharmacist, Department of Pharmacy.
§ Pharmaceutical Chemist, Department of Pharmacy.

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