CHAMPION® Expanding Encyclopedia Of Mortuary Practices

Number 642, 2000

THE EMBALMING CHEMISTRY OF EDEMA
Part 2

By: James H. Bedino, Chemist/Dir. Research
The Champion Company

CONTINUED: The best overall results were obtained (with or without magnesium sulfate) when a mixture of glutaraldehyde and formaldehyde was used. When glutaraldehyde was added at 1/4th the typical amounts of formaldehyde, the total formaldehyde required could be reduced by at least 1/2. This is a significant reduction in formaldehyde exposure and usage with no sacrifice in effectiveness. The glutaraldehyde/formaldehyde/magnesium sulfate mixtures that were used were rated qualitatively equal or better in all cases. The amount of magnesium sulfate that was used in the glutaraldehyde/formaldehyde dilutions was half or less of the amounts that were used in the formaldehyde only dilutions. Glutaraldehyde as the primary preserving aldehyde coupled with the tissue dehydration effect of freed up formaldehyde in the injection solution maximizes the efficacy of this final dilution.

We estimate, in fact, that at least 70% of the tissue moisture reduction that occurs during edema embalming is due to the high amount of formaldehyde used and only 30%, or less, is due to the use of magnesium sulfate at various high concentrations. This explains the apparent disparity between successful use of Epsom salts and failures with Epsom salts -- the results are due to the overall success of the embalming and the effectiveness and concentration of the formaldehyde that was used. Also, using arterial fluids with higher percentages of alcohol have very little effect on the success of edema embalming. After the fluid is mixed for final dilution, the small amount of alcohol difference is nullified by the dilution water.

Waterless embalming contributes little to the overall success of edema embalming, other than advocating the use of high concentrations of formaldehyde, which obviously is effective in the embalming treatment of edema. As stated above, the small amount of dilution water difference cannot be significant when compared to a standard final formaldehyde concentration using normal water dilution.

From observation of injections with very high concentrations of humectants, it appears, that the effect is noticeable but not significant. The use of this humectant rebound procedure is limited by the solubility and viscosity of the humectant in the final dilutions and the difficulty of injecting such a high viscosity fluid effectively. Humectant rebound effect can be noted during the embalming of normal cases if an excessive amount of humectant is used on the case. A definite mild drying effect can be observed. The quantities of humectant that must be used for this effect to occur are quire high and it is unlikely that rebound could occur with anywhere near normal usage. The amount that would be required for severe edema cases is more concentrated than is really capable of being in the final dilution or injectable. Lanolin, due to it's insolubility, does not exert this effect and, at any rate, would be uninjectable at concentrations comparable to other humectants. The humectant rebound effect exists but does not appear to be effective in the treatment of edema as a stand alone technique.

MODERN SOLUTIONS: The focus for successful embalming of edema cases in the modern age of embalming should be on highly effective chemical combinations with overall reduced exposure to chemicals that maximize the desired results.

Chemical mixtures that utilize glutaraldehyde as the primary aldehyde coupled with the use of formaldehyde as a supplemental aldehyde to effect maximum tissue dehydration in conjunction with a acid/base balanced hypertonic mixture of salts and their acid complements would derive the overall best results in edema embalming. By utilizing a complex mixture of salts that are acid/base balanced, the possibility of pH variance is minimized (in fact, the mixture can be buffered to the acidic side to accelerate embalming action), solubility is maximized and fast effective embalming occurs.

Osmotic tension is maximized as these combination salts have much higher solubility in embalming fluids (2-3 times the effective working concentrations of older Epsom salt based additives). This induces the best chance of significant secondary dilution during injection and success in edema embalming. In lieu of dilution water, a modern water soluble humectant (such as aloe-based chemicals) could be used to exert an additional hyperosmotic effect (as long as viscosity is low enough to allow injection). Combination of these chemicals and techniques would offer the best chance for success in modern edema embalming.

In regards to treatment of the cavities of edema cases, utilize a high preservative factor cavity chemical that contains little or no water (e.g. Cavity 48) and consider reaspiration necessary with reinjection of additional cavity chemical if condition of the cavity so dictates.

SUMMARY: Edema is a constant and persistent problem in embalming and will only continue to worsen as more extraordinary medical measures are used to prolong the life of the medical patient. New chemicals coupled with proven techniques are capable of dealing effectively with this embalming problem. Modern high-technology embalming chemicals and additives that are glutaraldehyde driven and based on aldehyde overload with freed up formaldehyde added for dehydration are capable of excellent edema embalming results. In addition, the presence of acid/base balanced salts in high concentration increases the hyperosmolarity of the solution to enhance moisture reduction. These chemicals maximize embalming action while controlling pH and delivering hyperosmotic pressures much higher than previously possible and contributing to overall edema embalming success.

REFERENCES:

Bedino, J. Lab technical reports 1998, 1999, 2000. The Champion Company, Springfield, Ohio

Bedino, J. Field technical reports 1998, 1999, 2000. The Champion Company, Springfield, Ohio

Bedino, J. Waterless Embalming: An Investigation. Champion Expanding Encyclopedia of Mortuary Practices # 619. The Champion Company, Springfield, Ohio.

Mayer, R. Embalming: History, Theory and Practice. Second Edition., 1996. Appleton/Lange, Stamford, Ct.

The Merck Manual. Seventeenth Edition., 1999. Merck Publishing, New Jersey.

Tabers Cyclopedic Medical Dictionary., 18th Edition, 1997., F.A. Davis Co., Penn.

Oser, B.L., Hawk's Physiological Chemistry. 14th Edition, 1965., McGraw-Hill Pub. Co. New York.

Other Resources: Old embalming textbooks and notebooks from the extensive historical archives of the Champion Company, including some of the earliest Champion Encyclopedia Articles of the 1930's.

Introducing . . .

Xeros

Edema Factor

The Future Now: **Formaldehyde Free**

Champion's Answer For Edema Embalming

Glutaraldehyde-Based	⇨	For Potentiated Aldehyde Overload Effect with Maximum Sanitation Action
Complex Mix of Concentrated Salts	⇨	For Maximum Hyper-osmotic Effect During Embalming
Acid/Base Balanced Buffer System	⇨	pH Control For Rapid and Effective Embalming Action
No Epsom Salts	⇨	For Maximum Solubility and Ease of Injection

To Order Call 1-800-328-0115