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WATERLESS EMBALMING - AN INVESTIGATION

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Part 1

ABSTRACT: Waterless embalming is defined and presented in historical context and perspective. Techniques and dilutions for both conventional and waterless embalming are discussed. A lab analysis of conventional and waterless final dilutions was conducted and the results interpreted. Results of numerous embalmings using conventional versus waterless technique are rated and compared. Advantages and disadvantages of both techniques are analyzed. Conventional technique appears adequate except in extreme cases. Waterless technique appears well suited for difficult and extreme cases, but unnecessary in normal situations. The use of modern formulated fluids appears to minimize the necessity for waterless technique in most situations. A final summary is given.

INTRODUCTION: Waterless embalming is a concept that has been around in the embalming industry for many years and still attracts much interest at seminars and other professional meetings of embalmers. Whether to inject straight embalming chemicals or dilutions thereof is a question that is as old as the profession itself.

Waterless embalming is, of course, a misnomer. True waterless embalming is theoretically possible but unfeasible in embalming procedures due to numerous reasons. When embalmers refer to "waterless" embalming they are actually referring to "no water added" or dilution-free embalming. For simplicity and clarity, in this article, we will refer to no water added embalming or dilution-free embalming as waterless embalming.

Ever since embalming chemicals have been manufactured there has been a debate over whether the chemicals should be diluted with water or used in concentrated form. Most original chemicals were, in fact, supplied in ready-to-use form. Only later, when technological advances in formulation and shipping costs were factored in, did concentrates of various embalming chemicals become available. Thus arose the arguments surrounding concentration and dilution and, if so, how much dilution.

For all practical purposes, modern embalming cannot be truly waterless (anhydrous). Modern scientifically formulated fluids have a certain unavoidable water content that is present in final form. The water found in modern embalming chemicals is required as a basic solvent for formaldehyde and several other chemicals present. This water is in no way detrimental and, in fact, serves a useful purpose as the basic diluent and carrier of the primary chemicals used in the formulation of the particular embalming fluid.

In this investigation, we attempt to answer some of the ongoing questions and arguments concerning embalming and dilution of fluids. Is waterless embalming intrinsically better than dilution embalming-and, if so, to what degree? Are there observable differences in the embalmed body according to what technique (waterless or conventional) was used? What are the comparisons in chemical concentrations, actual water present and fluid reactivity in waterless versus conventional (standard dilution) embalming?

TABLE 1

TYPICAL "WATERLESS EMBALMING"

32 oz. WATER TREATMENT

32 oz. CO-INJECTION

32 oz. HUMECTANT OR HUMECTANT/
CO-INJECTION MIX

16 oz. ARTERIAL FLUID (INDEX 20-25 TYPICAL)

TOTAL WATER CONTRIBUTION OF FLUIDS = 54 - 62 oz.

WATER ADDED = 0 oz.

TOTAL APPROXIMATE WATER PRESENT = 60%

FINAL DILUTION STRENGTH = 3 - 4 % HCHO

TESTING AND COMPARISON: Final dilutions of embalming solutions suitable for embalming were prepared and their total water content was determined by lab analysis. The solutions were made according to generally accepted criteria for both conventional and waterless embalming. Using a typical solution, the waterless solution was found to contain 54-62 ounces of water in 108-110 ounces of prepared solution. This is a total water content of injected solution of approximately 60%. The final solution strength in formaldehyde content was 3-4%. In contrast, the typical conventional solution was found to contain 102-109 ounces of water per gallon. This results in a total water content of injected solution of approximately 80-85%. The final concentration of formaldehyde present in the conventional dilution was 1.5-2% (refer to Tables 1 and 2).

TABLE 2

TYPICAL CONVENTIONAL EMBALMING

4 - 8 oz. WATER TREATMENT

16 oz. CO-INJECTION

8 oz. HUMECTANT OR HUMECTANT/CO-INJECTION MIX

10 - 12 oz. ARTERIAL FLUID (INDEX 20-25 TYPICAL)

TOTAL WATER CONTRIBUTION OF FLUIDS = 22 - 24 oz.

WATER ADDED = 80 - 85 oz.

TOTAL APPROXIMATE WATER PRESENT = 80 - 85%

FINAL DILUTION STRENGTH = 1.5 - 2.2 % HCHO

When the solutions are compared on the basis of total water content, it is found that conventional embalming solutions contain approximately 20-25% more water than typical waterless solutions. This results in a difference in water content of injected solution of 25-30 ounces per gallon (refer to Table 3). The total difference in water injected during an embalming procedure is approximately 60-70 ounces. Using the waterless technique results in a drastic increase in fluid usage. In a conventional embalming 7-9 bottles of embalming chemicals is typically used while in the case of waterless type embalming 20-24 bottles of embalming chemicals is typical. The increase in fluid usage is, therefore, 225-300% greater in waterless versus conventional embalming.

In addition, numerous embalmings were conducted over a several month period utilizing both conventional and waterless solutions and techniques. The embalmings were predominately normal cases with 20-30% of the cases being classified as difficult or extreme. Examples of difficult or extreme cases included frozen bodies, delayed embalming, advanced decomposition and severely diseased and edematous bodies. After embalming, the bodies were subjectively rated according to several criteria which included the following: overall preservation, degree of fluid distribution and clearing of the circulatory system, degree of rigidity and cosmetic effect achieved with suitability for viewing.

The fluid dilutions used during the embalming phase of the study were as specified in Tables 1 and 2. The typical quantity of fluid injected during the waterless technique was 2 1/4 to 2 1/2 gallons while in the conventional technique the quantity injected was 2 1/2 to 3 gallons. Pressures and flow rates were variable but typically ranged from 2-40 lb. of pressure with a flow rate of approximately 1 gallon of injected solution per 10-12 minutes. Pressure and flow rates were adjusted accordingly due to the nature of each individual case. Arterial fluids used were formaldehyde based commercially available arterial fluids that contained 20-25% formaldehyde. Injection procedures involved the use of multiple site injection with intermittent drainage at multiple sites where necessary. Cavity treatment was accomplished by thorough aspiration followed by treatment with 2-3 bottles of glutaraldehyde/formaldehyde/phenolic based cavity fluid with reaspiration and reinjection of 1 bottle if necessary. The bodies were then evaluated several hours after embalming.

When the normal cases were subjectively rated, there were no significant differences observed between the conventionally embalmed bodies versus the waterless embalmed bodies. The waterless embalmed bodies did exhibit a greater degree of rigidity than the conventional cases in most situations. When the difficult or extreme cases were rated, the waterless embalmed bodies were generally rated higher on the scale of criteria than the conventionally embalmed bodies. The waterless embalmed bodies usually exhibited better distribution and clearing and appeared better preserved than in conventional technique bodies of a difficult or extreme nature.

DISCUSSION: From an examination of the lab and field results, waterless embalming appears to be an acceptable but generally unnecessary technique in the great majority of embalming situations. Waterless embalming does appear to be a recommended technique when dealing with extreme embalming situations such as serious edema and severe drainage problems, etc. Conventional embalming using industry accepted dilution rates results in successful embalming in the great majority of cases (normal and otherwise) with the exception of extreme type cases such as was mentioned previously.

CONTINUED: Waterless Embalming Part 2
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