

AN IMPROVED METHOD OF EMBALMING SUITED TO SUBSEQUENT PLASTINATION REQUIREMENTS

Peter Cook and Brenda Dawson
School of Medicine
University of Auckland
Auckland, New Zealand

INTRODUCTION

Plastination of tissues from cadavers embalmed using the standard anatomical embalming solutions has posed problems. The glycerine and phenol components of most embalming fluids are essential for long term tissue preservation but are not ideal for the fixation of tissues to be used for plastination. Because of this, new and improved embalming solutions have been developed specifically for use on cadavers to be used for plastination. Ideally, these solutions must fix the tissues properly and retain natural color within the tissues, while at the same time avoiding the use of long chain alcohols, phenols and glycerines which are detrimental to the infiltration of resins into the tissues during plastination.

In order to assess their fixation ability in respect to plastination some established fixative solutions were used on cadaveric material. It was found that Wentworths and Jores solutions were suitable for preparing individual organs of embalmed cadavers or fixing tissues of unembalmed cadavers obtained at autopsies. A large number of commercially prepared embalming chemicals (Dodge Chemical Company, Cambridge, Massachusetts, USA) were found to be suitable for maintaining color and retaining softness of tissues in embalmed specimens which were to be used for standard prosection techniques.

In order to solve the problem of proper fixation of cadavers for plastination we decided to improve on the performance of past embalming solutions by formulating our own solution and using it for embalming.

METHOD

The cadaver of a thin, 88 year old male, who died of bronchopneumonia, was embalmed through the right common carotid and right femoral arteries. The right jugular vein was used as a drainage point during injection. The total injection consisted of 18 litres of embalming fluid containing chemicals (Dodge Plasdoform based) combined in the proportions shown in Table 1.

Table 1

| | |
|---------------------|---------|
| Metaflow | 700ml |
| Metasyn Accelerated | 700ml |
| Rectifiant | 500ml |
| Mold-x | 500ml |
| Non-Deionised Water | 1600 ml |

Perfusion was done using a Porti-Boy embalming pump at a pressure of 10 psi. Following embalming the cadaver was stored at 4°C for 4 months prior to dissection.

DISCUSSION

When the cadaver was dissected for plastination it was noted that there was no degeneration of the skin, fat, muscle, joints or organs. Tissues remained extremely soft with no swelling. Coloring of individual tissues were more realistic than that achieved using other embalming formulas.

Because the tissues within the cadaver remained very moist, there was minimal "firming" effect on either the fatty layers of the body or on the blood within the capillaries and major vessels. The advantage of this was that it allowed for the injection of red and blue latex, into the arterial and venous systems, even though the body had been embalmed some 4 months previous.

Another advantage of using this embalming technique is that muscle bundles and nerve plexuses could be prosected intact instead of piecemeal with no difficulty.

The relatively pleasant aroma of the fluids used for this embalming fluid, in contrast to the pungency of formalin and phenol of other formulas, is another pleasant advantage to using this solution. This is a particularly welcomed advantage to the prosector or student who had previously spent hours hovering over a strong smelly specimen while dissecting.

This solution, though found to be very suitable for the preservation of specimens to be used for plastination and prosection, was not entirely recommended for use on specimens to be used for student dissection.

To date some six cadavers have been prepared using this method. Most recently, cadavers which had been embalmed using the above formula, were used for dissection at a plastic and reconstructive surgery workshop. This workshop is held annually at our facility for groups of international surgeons. It was found that because the cadavers were prepared in this way manipulation of tissues was much easier and that complex surgical techniques, which could not have been performed on cadavers embalmed using other preservation methods, were carried out with ease. Also the tissues of the cadaver more closely resembled that of living tissue.

CONCLUSIONS

The embalming formula outlined in this paper has provided us with a fixative which can be used on specimens for prosections and plastination. It has helped to facilitate the production of high quality specimens for the teaching in our graduate and undergraduate programs.

As well, this technique has allowed us to produce specimens which can be used in the teaching of specialized methods within our curriculum (i.e. reconstructive surgery courses) at the School of Medicine. This has led to international acclaim for the Department of Anatomy and its courses.

REFERENCES

- Dodge Chemical Co. A manual for using metasyn for general and jaundice arterial embalming. Cambridge, Massachusetts. USA.
- Legault, J.M. June 1979. Color preservation of gross specimens for teaching and medical illustration. Arch Pathol Lab Med. Vol. 103.