PREPARATION AND UTILIZATION OF BEQUEATHED BODIES IN AUCKLAND NEW ZEALAND

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The University of Auckland, School of Medicine has recently celebrated its 25th anniversary. Throughout its existence the school has been fortunate to maintain a high quality of facilities for the dissection and examination of human cadavers. It has also been able to maintain an adequate local supply of bequeathed bodies for the body donor program.

Standard Anatomical Embalming Procedure

At the Auckland School of Medicine a bequeathed body is normally received in the Anatomy Department's mortuary within 2 to 24 hours after death. No bequeathed bodies are accepted without communication between the licensed anatomist, the next-of-kin, an official from the medical school, and the donor's doctor.

Regardless of the cause of death, as stated on the Medical Certificate of Death, all bodies are treated as potentially hazardous. After acquisition all bodies are screened for HIV, hepatitis B and hepatitis C viruses. All bequeathed bodies deemed as a risk to staff or students are not accepted for use.

It is standard practice that all cadavers be thoroughly disinfected before use with a high strength virucidal cleanser such as Virkin disinfectant (Antec International, Suffolk, England).

Cadavers are not shaved or de-personalized, as is the case in some other medical schools, thus preserving the individuality of what is virtually the medical students first patient.

• Embalming proceeds with the cutdown and cannulation of either the right common carotid artery or the right femoral artery. Occasional problems are encountered as a result of vascular pathology (i.e. arteriosclerosis) and may necessitate perfusion through other vessels such as the left carotid, left femoral axillary or iliac arteries.

Arterial injection is done using a Portiboy PE10 perfusion pump at a pressure of 10-15 psi. During injection, the jugular or femoral at the sight of injection is isolated and clamped off.

The cadaver is pre-injected with 3-8L of Plasdo-form based embalming fluid (Dodge Chemical Co., Cambridge, Massachusetts, USA) consisting of metaflow and rectifiant. This is advantageous in arterial conditioning. During pre-injection venous pressure is maintained for approximately 30 minutes of arterial perfusion to allow the chemical properties of the metaflow additive to act in dissolving blood clots and expanding the capillaries of the cadaver. After 30 minutes the enlarged jugular or femoral vein is opened carefully to allow drainage of the arterial system resulting in the elimination of any dissolved clotted blood as well as reduction of postmortem discoloring (liver mortis) of the cadaver.

Following pre-injection, the cadaver is embalmed using 18-25 litres of embalming solution containing the following:

37% Formalin	2.5 L
Phenol Glycerine	1.0 L
Methylated Spirits Mold-x	6.0 L
Iceterine	12.0 L
	475ml
	20.0 ml

During the initial stages of perfusion the extremities and the head and neck regions are massaged with warm soapy water and the superficial venous vessels are "milked out" to assist in the complete and even distribution of the embalming fluid into the smaller capillary systems of the cadaver. Following the arterial perfusion, supplementary local injections of embalming fluid with a large bore hypodermic needle, are administered to the hands, fingers, feet, toes and male genitalia if required. The body is thoroughly examined to ascertain the adequacy of the perfusion and the skin openings are sutured before sealing in a airtight plastic bag and storing at 4°C until required for anatomical dissection. Cadavers are used for dissection, clinical teaching, etc. approximately 12 months later.

DISCUSSION

While this method is excellent for the embalming of cadavers to be used for student dissection it has not proven entirely satisfactory for tissues which will be used for plastination using the S-10 technique (von Hagens, 1985).

Occasional problems of mold growth on some cadavers, exacerbated by high humidity, necessitated considerable experimentation with waterless embalming treatments. These studies have demonstrated that reduction or total elimination of water is an important and effective means of eliminating fungal growth on cadaver tissue (Mitchell et al, 1993).

Originally, the methylated spirit component of our embalming mixture was 6 litres with the remaining 6 litres consisting of boiled water. Initially, we increased the phenol component of the fluid to assist in mold control, however, this practice was abandoned due to the health risks involved in using this chemical. We also found that increasing the volume of glycerine helped to counteract the hardening effects caused from using high volumes of methylated spirits.

The non-water based embalming fluid formulated above is now routinely used, in this department, for embalming cadavers for student dissection.

The relatively warm, humid climate of Auckland predisposes the cadaver tissues to mold growth. To counteract this we have air conditioned our dissection laboratory and maintain it at a constant temperature of 14°C. This measure has proven to be:

1) Effective in controlling mold growth on cadaveric material

2) A significant factor in reducing the formaldehyde fumes given off by cadavers during dissection.

This air conditioning system works on the laminar air flow principle with 12 complete changes of refrigerated air per hour. Air is expelled from the laboratory through vents situated below the cadaver table levels.

SUMMARY

The methods we have outlined above for embalming and storing bodies in our medical school have proven satisfactory for the past 25 years. Cadavers prepared using these methods have been used on a regular basis by students, staff, clinicians and other health professionals. These techniques are constantly being improved upon by our embalming and prepatory staff.

Our facility is now able to prepare an infection-free, adequately preserved, and cosmetically acceptable, specimen for examination. In addition, the dissection laboratory is maintained as environmentally safe and odor free as possible. This encourages students to use our facility to its fullest extent, thus providing them with a valuable learning resource for the study of human anatomy.

REFERENCES

Cook, P., Dawson, B. 1995. Plastination Methods employed in New Zealand. J Soc. Plast. 9:2, 1995.

O'Sulivan, E., Mitchell, B.S., April, 1993. An improved composition for embalming fluid to preserve cadavers for anatomy teaching in the UK. J. Anat. Vol 182 Pt 2:295-297.

von Hagens, G. 1985. Heidelberg Plastination Folder. Universitat Heidelberg, Heidelberg, Germany.

ANNOUNCEMENT

We are preparing a complete listing of what has been published on plastination since its introduction 20 years ago and wish to present the result of this work at the next International Conference on Plastination in Brisbane, Australia in 1996.

Presently, we have more than 100 references of papers published in 27 different journals, but certainly have missed some.

We would like to include in this work a list of the abstracts, papers or posters about plastination that have been presented at different conferences.

We ask for everyone's assistance. Please send a list of your references, publications (copies if possible) and abstracts to:

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