Original article

Comparative study between two techniques using a glycerin in the conservation of central nervous system

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Abstract

Standard formalin embalming is the most important of all work with cadavers in anatomy laboratories, as it keeps the tissue strict, insoluble and protected against deterioration. The most commonly used substance for preservation of cadavers and tissues is formaldehyde, a preservative because it is inexpensive, easy penetration and fast action on the parts. Another substance used is glycerin with rapid action and dehydrating fixative, used also for the preservation of anatomical specimens. This study aimed to compare two techniques that use glycerin in conserving parts of the central nervous system of animals. We evaluated the properties and fixing of conservative solutions applied. The two techniques chosen for this work were: the Giacomini and *Torres* method. In the *Torres* method, the tissue was more flexible and easy to visualize the structures. In the *Giacomini* method, the tissues were dark colored, rigid, with little flexibility. This technique requires a shorter time of immersion, compared to *Torres*. We conclude that the most appropriate method for application in laboratories of anatomy and applicability in practical lessons is technique was *Torres*.

Keywords: glycerin, formaldehyde, *Giacomini* method, *Torres* method.

1 Introduction

Many techniques are used for anatomical preservation of corpses. These techniques have been reported since the Egyptian era, such as mummification, a form of conservation based on dehydration preceded by a treatment with chemical substances which have no exact knowledge (RODRIGUES, 2005).

To be preserved for study and dissection, the anatomical specimens to be perfused and fixed with preservative solution. The fixation is the most important of all the work because it keeps the fixed-tissue, insoluble and protected against deterioration (RODRIGUES, 2005). In an anatomy lab, the fungal contamination the tissue specimens can cause, in students and professional staff of allergy due to the large exposure of airborne fungal spores (CORRÊA, 2003).

The substance most commonly used nowadays, for preservation of cadavers and anatomical specimens is Formaldehyde, as a preservative of low cost, easy penetration and fast action parts fixative. Formaldehyde (CH2O) is an important chemical for the global economy, widely used in construction, wood processing, furniture, textiles, carpeting, and in the chemical industry. It has been classified as a human carcinogen that causes nasopharyngeal cancer and probably leukemia (INTERNATIONAL..., 2006). But their use can have serious health problems. Its inhalation can cause irritation to eyes, nose, tunica mucosa and respiratory tract (e.g. lesions including hyperplasia and metaplasia of the olfactory mucosa) (RODRIGUES, 2005), since it is a substance of low density and very volatile.

In addition to these techniques, there are other substances used for the preservation of corpses, among them the glycerin. Glycerin is a propan-1,2,3-triol, a type of alcohol that can also be called 1,2,3-trihydroxypropane (International Union of Pure and Applied Chemistry - IUPAC). It is a colorless, odorless, viscous liquid that is widely used in pharmaceutical formulations. Glycerol has three hydrophilic hydroxyl groups that are responsible for its solubility in water and its hygroscopic nature. Glycerol is sweet-tasting and of low toxicity. A viscous liquid obtained by hydrolysis of olive oil with the capacity to dehydrate (RODRIGUES, 2005) and this is one of its main features (PIGOSSI, 1964) which are attributed to its antiseptic action (CHIRIFE, SCARMATO and HERSZAGE, 1982). Glycerin has quick action and dehydrating fixative (ALVARENGA, 1992), being largely used for the preservation of anatomical specimens.

The main feature of the glycerin is the ability to cellular dehydration which is attributed to its antiseptic action, acting against fungi and gram-negative and gram-positive, except for the sporulated forms (ALVARENGA, 1992). It is noteworthy that dehydration obtained with the glycerin does not change the ion concentration cell, which maintains cellular integrity, thereby reducing the antigenicity of tissues preserved (PIGOSSI, 1964).

This study aimed to compare two techniques that use glycerin as a way of keeping parts of the central nervous system of bovine and goats. We evaluated the properties of fixing and conservative solutions applied. The two

techniques chosen for this work were: the Giacomini apud Rodrigues (2005) and *Torres* method (2004).

2 Material and method

This work was performed at the Laboratory of the Academic Centre of Victoria, Federal University of Pernambuco - Brazil. Were chosen methods of conservation with the use of parts of glycerin, *Torres* method and *Giacomini* method. Parts of the nervous system of the techniques used for comparison were from the Federal Office for Education of Vitória de Santo Antão-PE. The tissue were first dissected, fixed in formaldehyde at a concentration of 10%, and later kept in a solution formaldehyde 5% over a year.

In reproducing the *Giacomini* method used the adult goat cerebral hemispheres (n = 2), preserved in 10% formalin. To play this method the specimens were immersed in a solution containing 95% alcohol for five days. After this period, the tissues were placed in a fresh solution of 95% alcohol for five days. Then, the tissues were placed in glycerin. When we observe that the parts had reached the bottom of the container which contained glycerin, they were removed and placed in plastic trays to drain the excess glycerin and kept in the environment.

In the *Torres* method were used brainstem adult bovine (n = 2), which were already pre-fixed in formalin solution 10%. This method was used a solution containing 50% glycerin bi distilled to 99% and 50% hydrogen peroxide to 5%. The tissues were placed in this solution for thirty days. After this period, they were removed from the solution remained exposed to the environment for six months. A feature of this method is the recommendation after a period of six months of environmental exposure part, the replacement of the same solution in 50% glycerin and 50% hydrogen peroxide for 7 days for subsequent replacement in the environment.

3 Results

After playing two of these techniques, we found differences in terms of macroscopic sections analyzed. Looking at the tissues based on the *Giacomini* method (Figure 1), the structures were coloration dark, hampering the identification of the white matter of the gray. The tissues had to be rigid, with little flexibility when handled. This technique has shown little resemblance to the tissue in vivo. However, the *Giacomini* method requires for its realization, a shorter time of immersion, compared to *Torres* method.

In our study, according *Torres* method (Figure 2), promotes greater flexibility of the tissue, compared to *Giacomini* method. The structures were set similar to their characteristic in vivo. Compared the two techniques, the most suitable for application in the anatomy lab and conduct of practical classes was the *Torres* method, because the hydrogen peroxide added to the glycerin keeps the number used in this study its basic characteristics, facilitating the identification of structures, help students and teachers in locating and comparing the number set, and the in vivo images of anatomy atlas.

All sections tested with the techniques of *Giacomini* and *Torres*, after the first six months of implementation were in good condition, no odor, showed no fungal contamination or abrasion (Figure 3).

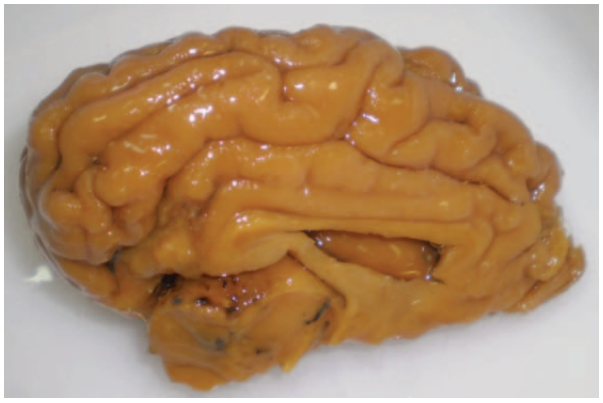

Figure 1. Brain adult goat after application of the *Giacomini* method.

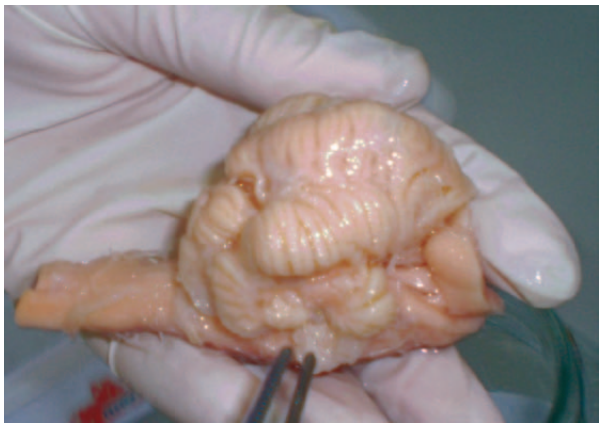

Figure 2. Brainstem adult bovine after application the *Torres* method.

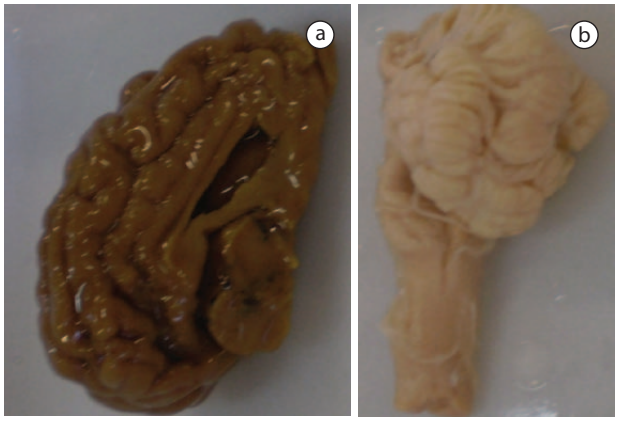

Figure 3. a) Brain goat after application the *Giacomini* method and b) brainstem bovine after application the *Torres* method.

4 Conclusion

We conclude that the glycerin, if used properly, is a good preservative, maintaining appearance, consistency and viewing structures, with no odor, easy handling and exposure of the parts in an anatomy lab. Another perceived benefit to the use of glycerin is the possibility of exposure of the outside part of any solution, which facilitates the

work, reduces health hazards for those working daily with anatomical specimens. Both techniques were considered viable, easy to purchase, handling and performance.

We suggest carrying out further comparative studies of techniques for fixation and preservation of parts of central nervous system by examining other methods of conservation and allocation of new scales of assessment.

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Received June 11, 2011
Accepted December 6, 2011