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An Evaluation of Antibacterial Efficacy of Modified Larssen Solution

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Abstract

The modified Larssen solution has not been studied with all details since the introduction of Antibacterial efficacy of modified Larssen solution. In spite of favorable results on soft embalming, the lacks in the literature about its disinfection effect and attitude in different storage conditions were evaluated in this study.

Introduction

Since beginning of the modern anatomy with Paré's studies, many methods and solutions for embalming had been described before the discovery of formaldehyde in 1869 [1]. Then, it thought to fill the gap of fixative and antiseptic solution for cadaver preservation. However, it came up to be a perfect antiseptic solution, but not for cadavers to be studied in anatomy science. Formaldehyde is highly toxic and irritant for different types of mucosa and also causes tissue discoloration and hardening [2]. Eventually, different techniques and solutions for embalming came up. Better techniques in which plastic surgery is mostly involved need "soft cadaver" for practices. Modified Larssen Solution (MLS) is one of them. However, it is not only one of the cheapest way to satisfy the expectations but also a way of effective fixation and disinfection and is being used in our anatomy department since 2011. Although a study from our anatomy department has been published recently, there are not too many studies of MLS in the literature according to our knowledge. Even though the MLS cadavers are on use especially in postgraduate courses, we try to get more data and improve the method, particularly the storage topic, with various studies [3].

In this study, we tried to show how appropriate this solution is as an antiseptic at different storage conditions. In our daily practice with these specimens, we smell light malodor, but observed no physical signs of tissue distortion or putrefaction, when the plastic boxes of MLS-heads (MLSh) opened. We concluded to take cultures from the fluid resting in the plastic boxes and head surfaces and see if there are any bacteria.

Materials and Methods

Differently from the literature description of MLS method, we kept four MLS perfused head specimens for six months in two different ways to evaluate the efficacy of the solution:

1) In MLS filled and covered plastic box at room temperature (two heads) and

2) At +4°C refrigerator by wrapped MLS soaked gauze within plastic bags (two heads), instead of -20°C deep freezer storage [3-5].

Comparison was made by smear cultures of one 10% formalin embalmed head (F10), one MLS solution of a MLSh and the specimen itself, one oral sample from +4°C preserved MLSh that is covered with MLS soaked gauze, one +4°C preserved MLSh surface sample and from the accumulated solution at the bottom of its bag. Smears were cultivated in Blood agarfor a streak culture and incubated in 37°C for 24 h.

Results

All specimens' cultures were evaluated. Interestingly, as other smear samples were turned out to be non-colonized, the culture from the skin smear sample of moisturized MLSh with MLS was found to be colonized with skin flora bacteria. Besides, Pseudomonas fluorescence was cultured from the liquid which was accumulated in the plastic bag of the same MLSh (Table 1).

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Table 1: Culture results of the samples.

Specimens	Culture	Sample quantity
MLSh	None	2
MLS plastic box solution with malodor	None	2
F10	None	1
+4°C-preserved MLSh	Skin flora	1
+4°C-preserved MLS (accumulated liquid of the above)	*P. fluorescens*	1
+4°C-preserved MLSh, oral smear	None	1

Discussion

Many techniques described for embalming with high efficacy of disinfection [1,2]. However, most of these techniques are shown not to be highly appropriate for plastic surgery learning practices and courses [1].

We used MLShs for multiple site dissections repeatedly during six months term after the embalmment process. Cadavers were dissected on unsterilized surfaces with unsterile instruments and gloves. MLShs in plastic boxes with malodor, showed no signs of putrefaction. Instead, after removing out from the plastic boxes, their smell turned to the chemical smell of the MLS. On the other hand, the liquid which was left in the plastic box had greasy particles on its surface, which are probably originated from the cadaver's subcutaneous tissues. In fact, that is why we focused on smear cultures from the surface of the liquid in the plastic boxes and MLShs. However, only one, the +4°C preserved MLSh, had shown cultures of bacteria. This indicates an easier colonization on the surface as long as MLSh is partially kept out of the solution, in our opinion.

Limiting factor of this study is that we didn't use fungal or viral cultures, as previous studies did [1,2,6]. Yet, this study is a pre-study of MLS and MLS embalmed cadaver contaminations. We will further investigate this issue in the future with different cultures. Moreover, a solution in which P. fluorescence cultured has not been published. This is the first report in our knowledge.

As a cheap and highly efficient method for soft embalming, MLS is shown to have antiseptic properties [1,3]. Additionally, our results show that MLS embalmed specimens can keep even at room temperature in solution filled tanks or at +4°C with moisturizing. In future studies, we will try to make certain of this aspect of MLS.

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