



'DRYING OF CADAVERS FOR SURFACE MARKING- AN EXPERIENCE

Anatomy

Dr. Navita Aggarwal*

Professor and Head, Department of Anatomy, Adesh Institute of Medical Sciences and Research, Bathinda, Punjab. *Corresponding Author

Miss Gagandeep Kaur

Demonstrator, Department of Anatomy, Adesh Institute of Medical Sciences and Research, Bathinda, Punjab.

ABSTRACT

Medical education uses formalin embalmed cadavers as study material for students. Apart from dissecting cadavers, they are also used in anatomy departments for teaching and assessing the students on the surface marking skills. Knowledge of surface anatomy forms the basis of clinical practice in medicine. For this purpose the dried cadavers are a prerequisite in every anatomy department. It needs special methods to prepare the cadaver for surface marking. In this study we tried to prepare cadavers for surface marking by two different methods. Materials required were cadavers embalmed with formalin solution for more than six months. These bodies were then exposed to different weather conditions as mentioned in article. They were compared for the changes that each method followed and for the results which have been discussed.

KEYWORDS

surface marking; cadaver; drying; preparing ;

INTRODUCTION

Surface anatomy is a descriptive science. It is the study of the external features of the body and is also known as superficial anatomy or visual anatomy. It deals with the surface landmarks which correspond to deeper structures hidden from view. Surface anatomy can impart anatomical knowledge and offer relevant, positive learning opportunities to enhance the skills and attitudes of future doctors. It is a compulsory part of syllabus of medical universities as it enables medical students to learn clinical skills (Aggarwal, Brough, & Ellis, 2006). So, the preserved bodies both wet and dry are an ideal tool for teaching anatomy and skills for other branches of medical sciences (Alsharif et al., 2017).

Apart many changes suggested, the anatomy curriculum still emphasizes the use of wet cadavers for dissection and surface marking on the dried cadavers. The primary method of learning the surface anatomy is by marking structures on dried bodies as per the instructions in the textbooks (NANjuNdAiAh & ChoWdApuRKA, 2012). The knowledge of surface marking forms the basis of clinical practice in medicine. It helps the student to visualize body organs in a living person (Asad & Nasir, 2015). This knowledge helps the students, later on during the clinical classes in learning various methods of clinically examining the patients by percussion, palpation and auscultation. For the practice of all these methods in clinics, the student should know the location of the underlying organ to be able to rightly percuss, palpate or auscultate the organ. The dried cadavers are used not only for teaching, but also for assessing the students on their surface marking skills. So, the availability of dried cadavers for surface marking is a prerequisite in every anatomy department.

While going through the text, we came across various methods of preparing wet cadavers, from formalin embalmed to soft cadaver embalming. Not much, discussion has been found on how to prepare and preserve dry cadavers for surface marking. The preparation of a dry cadaver may vary from place to place depending upon the climatic conditions of the area. So we have tried to prepare dry cadavers with two different methods in our dissection hall (sub tropical country) for which we are sharing our experience.

AIMS AND OBJECTIVES:

- To prepare formalin embalmed bodies for surface marking by two different methods.
- To observe the process of drying of the cadaver till it is ready for surface marking.
- To compare the results of the two methods used for drying the cadavers for surface marking.

MATERIAL AND METHODS

Material required were cadavers already embalmed with usual formalin solution for more than six months.

Two different methods with two cadavers each were tried to prepare

the cadavers for surface marking. Three physical anthropometric measurements of the cadavers for both the methods, that is circumference of abdomen at the level of anterior superior iliac spines, mid-arm and mid-thigh circumferences were taken before starting the process and at the end of the process.

Method A – In the 1st week of October (beginning of winter of a subtropical country), two cadavers were placed inside the dissection hall (centrally air conditioned) for drying them for surface marking. They were placed near a large glass window from which the sunlight would fall on both the cadavers from 8 am to 5 pm. The bodies were kept uncovered during this period of exposure to sunlight. The heat from the sun through a transparent glass was used for drying of the cadavers. This method did not allow large circulation of air because the bodies were not exposed to the outside atmosphere directly. A large amount of heating effect could be created around the bodies because of heat building up through the glass window and less circulation of air (enclosed for air-conditioning).

Method B – In the 1st week of April (beginning of summer of a subtropical country), two cadavers were placed on different stretchers. They were exposed to sunlight directly under open atmospheric conditions in the burial ground (bounded by four walls but open to sky). Cadavers were daily taken out from morning 8 am to 5 pm for exposure. They were kept uncovered during the period of exposure.

The bodies in both the methods were frequently turned upside down. They were cleaned with a dry cloth daily and were observed for any changes.

OBSERVATIONS

Method A: For first three weeks apparently no changes were seen in the bodies. By the end of the fourth week, the skin appeared shrivelled as if it was drying. After about two months, the skin which was further drying and looking more and more shrivelled with passing time, started having a thin shiny layer all over. Thereafter, this oily layer was wiped clean almost daily. From the end of third month the cadavers appeared darker as compared to their initial stage. At the end of fourth month, the skin was shiny and did not appear very dry because of oily layer over the skin. There was no drying or peeling of epidermis of cadavers till February, when the cadavers were ready for surface marking. So, by this method in a total of 5 months time, the cadavers were prepared for surface marking as the almost all the bony landmarks which are used for surface marking were palpable and prominently visible.

The measurements were taken at the same level as that of the beginning when then process was complete. Approximately 5 cm decrease of the abdominal circumference as compared to the first reading was noted. The thigh circumference decreased by 2.2 cm and the arm circumference reduced by approximately 1 cm.

Method B

For the first two weeks no change were found. By the end of the second week, the skin started appearing as if it was drying. Till about 6 weeks, the skin was drying more and more with passing time and looked shrivelled. Nearing the end of May that is after about two months of drying, few oily and greasy droplets were found under the thigh and arm region of the cadavers almost daily. These droplets were wiped clean as and when required. By the end of June when the cadaver was appearing ready for surface marking, as all the bony landmarks for surface marking were palpable, the skin was very dry. By the mid of July, the cadavers were first used for surface marking. So, by this method in a total of three and a half months time the cadavers were well prepared for surface marking.

The measurements were now again taken at the same level as that of the beginning of the process. Approximately 5.2 cm decrease of the abdominal circumference as compared to the first reading on this cadaver was noted. The thigh circumference decreased by 2.5 cm, and the arm circumference reduced by approximately 1.3 cm.

The end point by both the methods was same, but the differences noted in the drying process by both the methods have been compared below.

Table 1: Differences in the Drying Process by Two Methods

FACTORS	METHOD A	METHOD B
Time	Five months	Three and a half months
skin discoloration	More darkening	Less darkening of skin
Physical appearance at the end of the process	Fresh look and less dry as the skin had a shiny layer.	Dry and shrivelled skin without any oily/ shiny layer.
Skin	Smooth and soft	Dry and rough
Landmarks	prominent and palpable	Prominent and palpable

The bodies prepared by both the methods are being routinely used for surface marking and are placed in the dissection hall covered when not in use. They are wiped clean with a dry cloth once every week.



FIGURE 1: Measurements Being Taken After Completion of the Process

DISCUSSION:

Most of the available material is focussed on preventing the cadavers from drying for dissection, but not much work on how to dry the cadaver for surface marking has been put forward. The dried cadavers are important in medical education as surface anatomy is the basis of physical examination in medicine (Ganguly & Chan, 2008).

These days though living anatomy is gaining importance over cadaveric surface marking, but in the study of surface anatomy on living, the living subjects need to consent to exposing parts of their bodies to many students, especially in cultures, in which body exposure carries significant meaning (Ganguly & Chan, 2008). A study demonstrated that learning from a text and using knowledge learnt to outline the surface anatomy and surface marking of major abdominal organs by drawing improved significantly the student's performance and interest (Azer, 2011).

Many studies highlight the importance of teaching and assessing students for surface marking skills, but not much discussion on how to prepare the cadavers for surface marking has been put forth. After being in dilemma for sometime on how to prepare bodies for surface marking we thought of drying the cadavers by two methods which have been discussed above. We have been successful in preparing very

good surface marking bodies by both the methods. The only difference being some features of the skin, which was drier in method B as compared to method A, and the time needed by both the methods.

Both methods are effective for drying of cadavers for educational purpose. At the end of both the methods, the landmarks are easily seen and palpable. These cadavers have been used by students for almost a year now. Method A, although took more time than method B, but the condition and physical appearance of cadavers by both the methods was good.

CONCLUSION:

From our observations it can be concluded that if quick drying of embalmed cadavers is required then, drying them in open air conditions in hot summer sun is preferable.

It is well known that embalmed bodies have the advantage of carrying minimal risk of infection and are suitable for prolonged use (Eisma & Wilkinson, 2014). By the above discussed drying methods, the formalin embalmed cadavers can be easily dried for surface marking, and the students can learn freely by touching the cadavers (Jain, Gangrade, & Vijay, 2012).

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