

Durability of Cling Film Plastic Wrap usage on Dead Body towards Human Decomposition Changes

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Research Article

Volume 4 Issue 4

Received Date: November 08, 2019

Published Date: November 26, 2019

DOI: 10.23880/ijfsc-16000174

Abstract

This study explores the practicability and usability of the cling film plastic wrap on the dead body with decomposition changes, whereby the feasibility of wrapping the remains to ensure the containment of the decomposition fluid within the cling film plastic wrap. 3 unknown and unclaimed dead bodies were used, where a fresh and decomposed body were cling-wrapped, and another fresh body was placed in a cadaver body bag. All the subjects were placed in the body freezers at 4°C and observed day-to-day. The effect of decomposition changes to the cling film plastic wrap was noted down according to 3 different categories; no leakage; slight leakage; and substantial leakage. The freezers were malfunctioned at the end of Day 5 where the temperature in the freezers were escalated to 20°C, thus accelerated the decomposition process and indeed facilitated the study. The authors have noted that the process of wrapping was slightly messier with the decomposition body fluid oozing out of the body. There was no body fluid leakage seen from both the subjects during the whole 14 days of observation. This study has shown that the elastic property of the cling film plastic wrap can withstand and able to accommodate the expansion of the dead bodies from decomposition changes. Wrapping and preservation of human remains using the cling film plastic wrap could be the best operational practices for first responders rather than leaving the body exposed on the disaster site, when the supplies of the cadaver body bags are inadequate. Thinking out of the box, the conventional way of using cadaver body bags to the cling film plastic wrap forms a new perspective in managing the dead and facilitating the human identification needs. The paradigm shift of adopting the cling film plastic wrap as means of protecting the dignity of the dead person, could be the way forward in humanitarian forensic action.

Keywords: Durability; Cling Film Plastic Wrap; First Responders; Large Scale Disaster; Cadaver Body Bag; Humanitarian Forensic Action

Introduction

Cling film plastic wrap has been tested extensively for its optimal performance, efficiency, cost saving and product damage reduction in packaging industry. There are numerous companies performing tests like versatile testing, puncture resistance, load compression and film tension to achieve optimal stretch wrap application on cling film plastic wrap for industrial purposes. As proven in previous study led by the same authors, cling film plastic wrap can be used as an alternative for dead body packaging, preservation and transportation in large scale disasters [1]. Essentially, this study did not look into the ability of the cling film plastic wrap to withstand the decomposition changes of a dead body. Thus, it would be of great advantage to the first responders as well as disaster managers to be able to know the durability of the cling film plastic wrap on dead bodies, both in fresh and decomposed stages. This study will point out the practicability and usability of the cling film plastic wrap on the dead body during disaster given that the previous study was only able to introduce the idea of using cling film plastic wrap in comparison with cadaver body bags.

Methodology

Material

The authors have used the similar cling film plastic wrap as the previous study [1]. It is a transparent pallet roll of 50 cm height x 250 m long with the weight of 3.0 kg, purchased in a local hardware shop at the price of RM 30.00 per pallet (Figure 1).



Figure 1: The cling film plastic wrap used in this research.

In order to measure the temperature of the freezer where the subjects will be placed into, a stainless steel, Cooper Atkins Freezer thermometer was used (Figure 2). It can measure a range of -29°C to 27°C (-20°F to 80°F). The thermometer was glued to each of the freezer inner compartment.



Figure 2: Freezer thermometer.

Field Site

The field experiments were conducted in the Department of Forensic Medicine, Hospital Kuala Lumpur (HKL). The authors conducting the experiment will wear basic personal protective equipment, such as gloves, disposable apron and face mask.

Subjects

This is a simple experimental study to use the cling film plastic wrap on dead bodies and to observe the decomposition changes from 15 June 2019 – 30 June 2019. The authors have used 3 dead bodies categorized as unknown and unclaimed by the Department of Forensic Medicine, HKL, where the bodies are awaiting to be subjected to cremation according to the Standard Operating Procedure (SOP) of the department [2]. The selection of the subjects was done through the inclusion and exclusion criteria, where only adult, non-Muslim dead body will be used. Dead body with known identity or of Muslim religion will not be selected. There was no child or infant used in the study. Out of the 3 non-Muslim, unknown and unclaimed adult dead bodies, 2 were fresh bodies and 1 was a decomposed body. The selected bodies will then be addressed as subjects (Figures 3 & 4).



Figure 3: A fresh body.



Figure 4: A decomposed body.

Compliance with Ethical Standards

There were only 3 human subjects used in this study, i.e. 2 fresh non-Muslim, unknown and unclaimed adult body and a non-Muslim, unknown and unclaimed adult decomposed body. After a duration of 14 days, the unknown non-Muslim dead body without claimant will be due for cremation in Kuala Lumpur City Hall (DBKL), and thus chosen to be the subject in this research. For study involving human subjects, approvals were obtained from the Medical Research Ethical Committee (MREC), Ministry of Health (MOH), Malaysia, to use the unknown as the subject for the research. Approvals from the MREC MOH were sufficient as ethical clearance for this research. The approval reference number in our national language is KKM/NIHSEC/P19-1165(5) and the reference number in English version is KKM/NIHSEC/P19-1165(6) with the National Medical Research Register registration number NMRR-19-1139-48173(IIR).

In addition, this research has only required to use the subjects for wrapping and conducted in accordance with the department SOP. Having said that, there was no harm inflicted to the dead body whereby no dissection

performed on the subject as well as no tissues or organs were removed. The subject was used solely for wrapping and no additional violence, compulsion or constraint exerted upon the subject. There is no informed consent needed as there is no personal information will be disclosed and subjects will not be identified when the findings of the study are published. The authors declared that they have no conflict of interest.

Wrapping Techniques

There are no hard and fast rules for the wrapping procedure. The authors have suggested to wrap the subject using the bottom-up technique where the cling film plastic wrap is used to wrap the feet of the subject and move up towards the head to cover the whole subject [1]. The total wrapping suggested by the authors are three layers where the first two layers are to cover the subject completely (Figure 5).



Figure 5: A wrapped fresh body.



Figure 6: A wrapped decomposed body.

Then a body tag is placed on the body where the cling film plastic wrap to roll over and complete the third layer of the wrap. This is to make sure there is a body tag numbered for every body found in the disaster scene. However, the wrapping of the decomposed body may need additional layer to secure the structure and contain the body fluid (Figure 6). The time taken to wrap the fresh body and the decomposed body was 10.1 minutes and 13.9 minutes respectively.

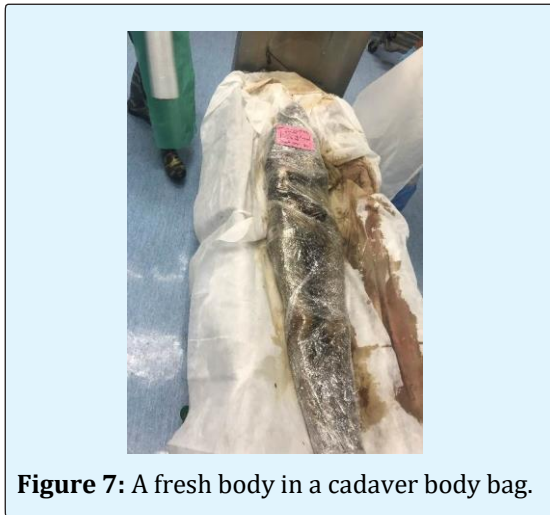


Figure 7: A fresh body in a cadaver body bag.

Comparison Study

From the 2 fresh bodies, one subject will be cling-wrapped and another subject will be placed in a cadaver

body bag. Both the wrapped subject and the subject in the cadaver body bag were placed in the body freezers at 4°C. The subjects located in the freezers will be checked daily at 12 noon while individual freezer temperature will be noted as well. The effect of decomposition changes to the cling film plastic wrap will be noted down according to 3 different categories:

1. no leakage (Body remain dry)
2. slight leakage (Body fluid found right beneath the body)
3. substantial leakage (Body fluid wet the whole body tray)

To concede the applicability of the cling film plastic wrap on a decomposed body, the authors have used 1 decomposed body for this matter. This subject will be wrapped with the cling film plastic wrap and placed in the freezer at 4°C.

Findings

Effect of Decomposition to the Cling Film Plastic Bag and Cadaver Body Bag

The observation only lasted for 14 days as 14 days are the time frame to cremate the subjects according to the department SOP. During the duration of the 14 days, there was no leakage seen from the subject wrapped with cling film plastic wrap and the subject placed in the cadaver body bag (Table 1).

Day	T/°c	Cling Wrapped Subject			Subject in Cadaver Body Bag		
		No Leakage	Slight Leakage	Substantial Leakage	No Leakage	Slight Leakage	Substantial Leakage
1	4	√			√		
2	4	√			√		
3	4	√			√		
4	4	√			√		
5	4	√			√		
6	20	√			√		
7	20	√			√		
8	20	√			√		
9	20	√			√		
10	20	√			√		
11	20	√			√		
12	20	√			√		
13	20	√			√		
14	20	√			√		

Table 1: Results of the effect of decomposition to the cling film plastic bag and cadaver body bag.

At the end of day 5, the freezers were not functioning and the temperature in the freezers were measured as 20°C. This actually means that the decomposition process has actually accelerated. The malfunction of the freezers did not fail this study, instead had actually set a correct direction in order to observe the day-to-day decomposition changes. Figure 8 shows the condition of the subject at Day 14 right before the subject was sent for cremation using a wooden coffin. The subject appeared to be well preserved.



Figure 8: Condition of the cling-wrapped subject at Day 14.

Usability of the Cling Film Plastic Wrap on Decomposed Body

The third subject of the decomposed body was proven able to be wrapped with the cling film plastic bag. The authors have noted that the process of wrapping was slightly messier with the decomposition body fluid oozing out of the body. However, the cling film plastic wrap is able to be practically used on decomposed body. Dead body can still be managed in a respectful and dignified way in the event of large scale disaster where first responders may be outbraved with challenging scarce resources. That is to say, it would still be an option to wrap and preserve human remains rather than leaving the body exposed.

Discussion

The cling film plastic wrap is indeed easy to use. The duration of wrapping a complete fresh subject in this study was about 10 minutes which is similar as the previous study using the bottom-up method [1]. There is a slightly longer time taken to wrap the third subject of the decomposed body, i.e.13.9 minutes. The authors reckon the additional effort and time taken in handling

the decomposed body due to its physical condition. In this study, the authors were reluctant to use the cling film plastic wrap on dead animals due to the higher possibility to generate an exact output by simulating the real scenario using real human subject. In addition, a recent study by Forbes, et al. (2018) concluded that the decomposition rates as well as chemical composition and abundance of volatile organic compounds (VOCs) between the odour profiles of pig and human remains was dissimilar [3].

This study has shown that the elastic property of the cling film plastic wrap can withstand and able to accommodate the expansion of the dead bodies from decomposition changes. Similarly, its body fluid resistant property has contributed to the ability to contain the body fluid as a result of the decomposition process. There was no body fluid leakage seen from both the subjects during the whole 14 days of observation. At the end of day 5, the freezers were noted to be malfunctioned and the temperature in the freezers were then escalated to 20°C. However, the study was not compromised and in fact assisted in the acceleration of the decomposition process of the subjects in the freezers. In other words, the rapid decomposition process has depicted the capability of the cling film plastic wrap usage on dead bodies.

Thinking out of the box, the possibility to wrap and preserve human remains and their personal belongings thus can also be a suitable way to manage traceable long-term storage and disposal of the dead in large scale disasters in accordance with the International Committee of the Red Cross (ICRC), where unidentified and unclaimed bodies can be properly preserved and documented for future identification [4]. Instead of using coffin, the remains can be cling-wrapped and place in a proper burial temporary controlled burial site with GPS coordinate in which the particular human remains can be exhumed in future if family members were to come forward for identification [5].

To recapitulate the findings from the current and previous study, the cling film plastic wrap has shown to have a significant innovation impact for dead body management in large scale disasters, particularly within the Golden 48 hours, which is the first 48 hours' post-disaster before the decomposition process commences. The cling film plastic wrap usage on human remains is suitable and easy to be used by first responders to ensure collection and retention of information relevant for identification. Proper handling of dead bodies by first responders is a priority of the humanitarian approach of

human identification needs to manage the dead with dignity and respect. The findings from the study are hoped to be shared with all the first responders' agencies which particularly involved in the Disaster Victim Identification (DVI) scene phase of the search and recovery of human remains.

Conclusion

Fundamentally, the cling film plastic wrap is practical to be applied in large disasters where local capacities are overwhelmed and cadaver body bags supplies may not be sufficient to accommodate an escalating number of deaths. Thus, wrapping and preservation of human remains using the cling film plastic wrap could be the best operational practices for first responders rather than leaving the body exposed on the disaster site. It is time for

a paradigm shift from the conventional way of using cadaver body bags to the cling film plastic wrap in large scale disaster. Similarly, rethinking that the cling film plastic wrap is actually a means of protecting the dignity of the dead person could be the way forward in humanitarian forensic action.

Acknowledgement

We would like to thank the Director General of Health Malaysia for his permission to publish this study. The authors greatly acknowledged the tremendous support from the Director of the Hospital Kuala Lumpur (HKL) for providing a platform to conduct research. Special thanks to all personnel of Department of Forensic Medicine, HKL whom have helped with the experimental research work.

Nomenclature

No.	List	Abbreviation
1.	°C	Degree Celsius
2.	°F	Degree Fahrenheit
3.	cm	centimetre
4.	DVI	Disaster Victim Identification
5.	et al.	and others
6.	GPS	Global Positioning System
7.	HKL	Hospital Kuala Lumpur
8.	ICRC	International Committee of the Red Cross
9.	i.e	that is
10.	kg	kilogram
11.	m	metre
12.	RM	Ringgit Malaysia
13.	SOP	Standard Operating Procedure
14.	VOCs	volatile organic compounds

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