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Application of Transparent Plastic Wrapping Film for Wound Dressing

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Abstract

Objective : **To introduce a new wound dressing application for the treatment of open wounds using transparent plastic food wrapping film.**

Materials and Methods : **The material is polyvinyl chloride plastic film readily available, inexpensive and requires minimal simple skill to prepare for use as dressing materials. The application of the dressing in conjunction with Betadine ointment and sterile gauze makes dressing changes less painful.**

Results : **The infection rate is low with a faster rate of wound healing. Three and a half years of follow up yielded very good wound healing results. The clinical applications of this simple plastic material in various situations are described along with discussion of precautions.**

Conclusion : **D-derm should be considered as an alternative to conventional dressings in order to reduce the cost of treatment of open wounds.**

There are several types of wound dressings available to cover open wounds such as burns and abrasions. Conventional open wound dressings may cause severe pain during dressing changes because the dressing adheres to the new epithelium. When the dressing is removed, new cells are pulled away along with the dressings, thus may delays healing.

Antibacterial creams are incorporated with fine gauze to prevent colonization to become infection of the wounds. The most common agents are silver sulfadiazine (Silvadene®), alpha-amino-p-toluenesulfonamide monoacetate (Sulfamylon®), chloramphenicol (Kemicitine®), and povidone-iodine (Betadine®). Each of these agents has its own advantages and disadvantages. On some occasions, antibacterial solutions such as silver nitrate solution can be used, or with Pseudomonas infection, acetic acid solution can be employed. On the other hand, biological dressings are the best method for preparing the burn wound bed for autograft. Commonly used biological dressings are human cutaneous allograft (cadaver skin), porcine xenograft (pig skin) and human amnion. These are expensive and difficult to prepare. In addition, these materials carry a small risk of hepatitis and HIV infection.

Materials and Methods

Food wrapping film made of polyvinyl chloride plastic without phthalate (a carcinogen) was prepared and sterilized for use as wound dressing in burns and other open wounds at Thai Nakarin Hospital over the past three and a half years (1999 to 2003). This material has been approved for food wrapping by Food and Drug Administrations in the United States and Japan. It is very thin but strong and does not break

down when wet. The material can be easily obtained from the local supermarket. It can be cut to any size as needed.

The film was cut into 6 × 6, 6 × 12, 9 × 12 and 12 × 12 inch^2 pieces. Because it is very thin, it cannot hold the required shape. Therefore, the transparent film is sandwiched between two pieces of smooth tissue paper and held down with staples at each of the four corners (Figure 1). Multiple drainage holes can be punched in the dressing at this stage of preparation if required. It is then folded and placed in a sterilization bag. The bag is sealed and gas sterilized for 5 to 6 hours along with other hospital equipment at no additional cost. After this, the dressing is ready for use. The dressing is cut to the desired size, the corner staples are cut off, and one side of the paper is removed. The sterilized plastic film is placed over the wound, which has been dressed with povidone-iodine ointment, and then the other piece of paper is removed. Finally, the plastic dressing film is covered with gauze dressing.

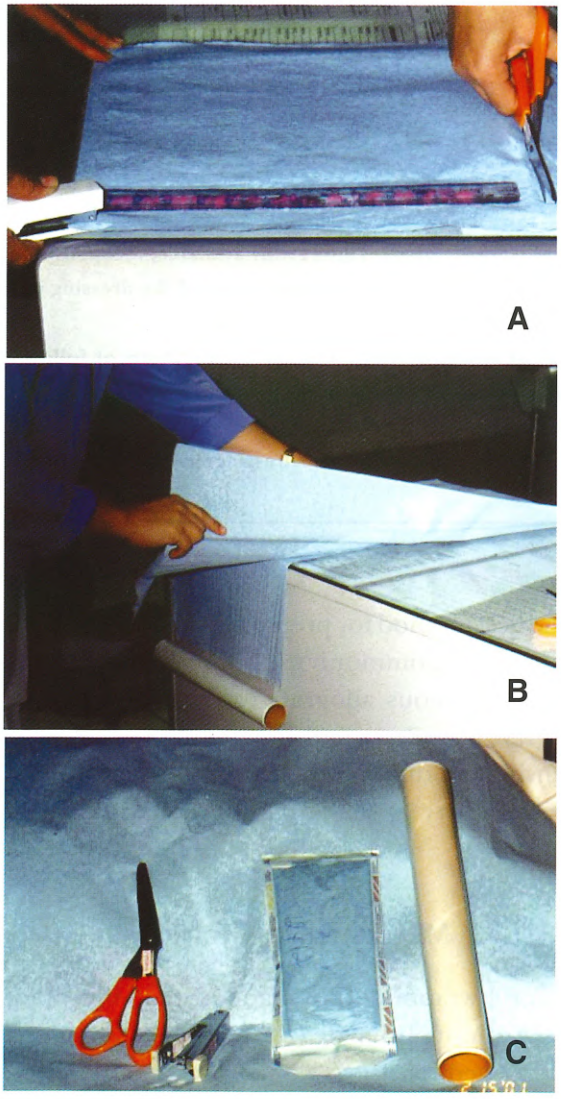

Fig. 1 Photographs showing preparation of simple transparent plastic film dressing.
A. Cutting the paper into appropriate size.
B. Sandwiching the food wrapping film between two pieces of paper then cut them into the desired sizes.
C. Materials needed in making simple transparent plastic film dressing.

Results

From 1999 to 2003 the simple transparent plastic film dressing was used in the clinical situations of 124 patients as shown in Table 1. In addition, it had also been used in facilitating packing of a liver wound bed for hemostasis and to wrap an ultrasound probe for intraoperative ultrasonographic examination.

Clinical Applications

1. Donor site for skin graft After a partial thickness skin graft was taken, the donor site was covered with a thin layer of povidone-iodine ointment. The staples and one side of the paper were removed and the thin transparent plastic film was placed directly onto the wound. The second layer of paper was then lifted off, and the entire wound area was covered with sterile gauze. The dressing was left untouched for 5 to 7 days.

2. Second degree burn wound The thin transparent plastic film dressing was used in both major and minor burns. This simple dressing could be applied in the operating room, emergency room, O.P.D. or even in the patient's room. The wounds were first cleaned with normal saline and povidone-iodine solution. The necrotic part of skin was removed, the blisters were punctured. Povidone-iodine ointment was applied to the burn wound areas and then covered with the transparent plastic film and a sterile gauze wrap (Figure 2).

The patient might feel a burning sensation during the application of the povidone-iodine ointment, but this usually lasted for less than 5 minutes. There was no wound infection found with this dressing technique. The wound healed within 7 to 10 days. There had been no conversion from partial thickness to full thickness wound.

Table 1 Application of plastic film dressings of various clinical sound conditions in 124 patients.

Patient category	Age	No. of patients	Results	Remarks
Donor site	28-60	5	Well-Healed	No complication
2nd degree burn	1-62	49	Well-Healed	6 patients were lost to follow up
Toenail removal	4-74	26	Well-Healed	No complication
Abrasion	5-84	26	Well-Healed	No complication
Abscess cavity	18-45	18	Healed	

Fig. 2 Photographs showing application of transparent plastic film dressing in burn wounds.
A. Minor burn wound of trunk.
B. Minor burn wound of thigh.
C. Major burn wounds of lower extremities, Day 1.
D. Major burn wound of arm, Day 1.
E. Major burn wounds of lower extremities, Day 6.
F. Major burn wound of hand and forearm, Day 6.

3. Abrasion wound Most abrasion wounds encountered were caused by motorcycle accidents. The wounds were dirty with contaminants from the street, such as gravel, sand, broken glass, asphalt or grease. Foreign bodies that were difficult to remove in the initial treatment may remain in the tissues. The first day of treatment with povidone-iodine ointment and transparent plastic film dressing allowed the particles to loosen up due to the moisture that develops in the wound (Figure 3). At the next dressing change, the wound might look dirty and needed to be cleaned with saline soaked gauze; then the dirt and other loosen foreign bodies were easily wiped out. The wound did not get infected and healed within 10 to 14 days, depending on the depth of the wound. Occasionally, skin grafts were required in full thickness wounds.

4. Nail bed After partial or total removal of the nail, the raw surface of the nail matrix was exposed. The conventional petrolatum gauze dressing causes adherence of the gauze to the wound. The process of removing the old dressing was painful and occasionally caused the wound to bleed. By applying povidone-iodine ointment and thin transparent plastic film dressing prior to wrapping with gauze made subsequent removal of the dressing easy and painless (Figure 4).

5. Abscess cavity Normally after incision and drainage (I&D), the abscess cavity is packed with gauze to stop the bleeding and to keep the cavity open to drainage. With application of transparent plastic film dressing, the abscess cavity was lined with perforated plastic film dressing and then packed with gauze (Figure 5). The gauze would not adhere to the tissue and could be easily removed on the next day.

Fig. 3 Photograph showing transparent plastic film dressing application in abrasion wounds of hand and forearm.

Fig. 4 Photographs showing transparent plastic film dressing application in wound after nail removal.
A. Ingrown toenail after partial nail and matrix removal.
B. Nail bed covered with povidone-iodine ointment and transparent plastic film dressing.

This transparent plastic film so prepared had also been used to facilitate packing of a liver wound bed for hemostasis and to wrap an ultrasound probe for intraoperative ultrasonographic examination that allowed transmission of good image.

Discussion

An ideal wound dressing should have the following properties:

1. It should maintain a moist environment to promote cell growth and prevent cell dehydration necrosis, thus decreasing the chance of wound infection.

2. It should promote easy removal of dirt and necrotic tissue from the wound. The chance of bacterial

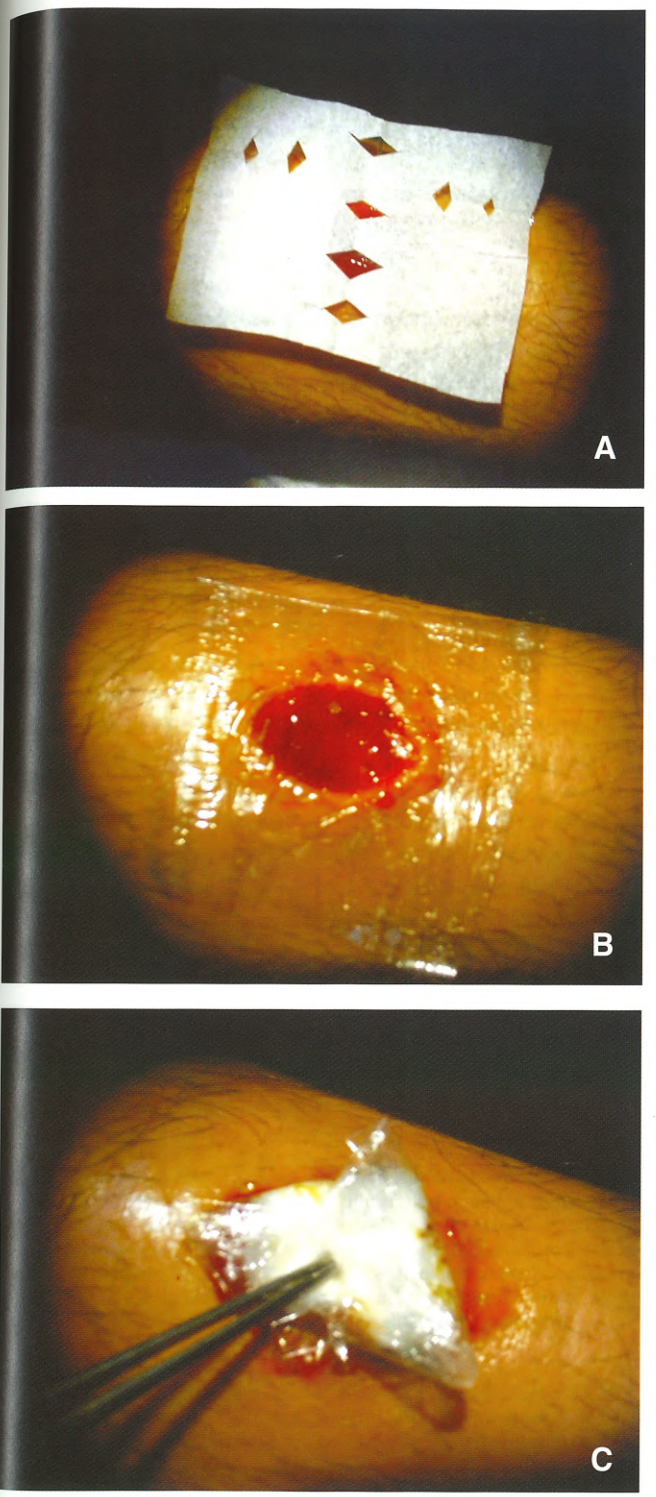

Fig. 5 Photographs showing transparent plastic film dressing application in an abscess cavity.

A. Abscess wound with drainage openings through the plastic film dressing before the removal of outer layer of paper.

B. Thin transparent plastic film dressing was placed to line the abscess cavity

C. Abscess cavity lined with plastic film dressing and packed with sterile gauze.

overgrowth would be minimized.

3. There should be minimal chance of wound infection, which would lead to less likelihood of conversion from partial thickness to full thickness wound.

4. The non-adhering property of the dressing would cause less pain and discomfort during dressing changes.

5. When changing the dressing only few or none of the new epithelial cells may be removed in comparison with conventional gauze dressings.

6. The material should be inexpensive, readily available and easy to prepare.

A thin transparent plastic film dressing made from non-toxic food wrapping polyvinyl chloride plastic possesses the ideal properties for an open wound dressing such as secondary burns and abrasions. Wound infection is not a contraindication for this type of dressing. However, the dressing must be changed frequently or at least daily.

In burn wound, the eschar and necrotic debris on the wound should be removed with saline gauze, with no attempt being made to totally remove them on the first dressing. Polyvinyl chloride ointment is spread over the wound then covered with the thin transparent plastic film dressing and gauze. The moisture under the plastic film dressing gradually loosens up debris on the surface of the eschar. The appearance of the wound on the second day is horrifying as liquefied debris is seen under the dressing. The necrotic debris should be washed with saline solution, and the plastic film dressing and gauze are re-applied as before. By the third day, the wound will appear significantly different and the healing process beginning to take place.

When the plastic film dressing is applied to the hand or foot, the sweat that collects under the dressing could cause maceration of the surrounding skin. Applying the plastic film dressing to fit the exact size of the wound or making multiple holes for drainage will correct the condition as well. Discontinuation of the use of plastic film dressing will allow the surrounding skin to return to the normal condition.

In addition, this transparent film prepared and sterilized from food wrapping polyvinyl chloride plastic film may be used as a sterile drape for skin incision, wrapping of ultrasonographic probe for intraoperative examination, and as any non-permeable sheath or draping in a sterile situation.

Conclusion

In the era of escalated cost of health care, any cost saving possible is essential. The introduction of transparent plastic film taken from food wrapping plastic material for wound dressing helps to meet this goal. The material used is very inexpensive and is readily available in the supermarkets. It is simple to prepare with little technical expertise required. Any hospital, large or small, could use its existing personnel to prepare the dressing. Patients are satisfied with the wound healing results and less suffering from pain during dressing changes.

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