Use of Occlusive Dressings in Wound Management

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As a consequence of being the largest and outermost organ of the body, the skin is often subjected to a variety of forces during sports participation. Traumatic skin lesions are a common condition faced by sports medicine clinicians. Yet, wound management is an often overlooked area of sports medicine.

Traditional intervention in wound healing left wounds exposed to the air or covered with a textile based wound dressing such as a cotton or paraffin gauze (Szycher & Lee, 1992). Wounds left to heal in this way develop a hard eschar (scab). The rationale for this approach was to protect the wound from the outside environment and thereby prevent infection (Falanga, 1988; Szycher & Lee, 1992).

Unfortunately, a dry environment that discourages infection also inhibits the cellular processes involved in healing. This approach to wound healing was the only standard available until several researchers reported that wounds covered with an occlusive material had shortened healing times. An occlusive wound dressing is one that maintains a moist interface with the wound surface.

The positive results from these studies were published several decades ago, yet occlusive dressings did not become available in the U.S. until 1980. Today, even with more than 30 of these dressings available, their use remains limited in the sports medicine arena. This may be due to the lack of education and training available to students in allied health fields, which leads to confusion about the rationale, unique features, and indications for each type of occlusive dressing (Eaglestein, 1993; Falanga, 1988; Feedar, 1995).

This paper introduces the 4 types of occlusive dressings available to sports medicine practitioners. It also gives a brief overview on the rationale, mechanisms, and benefits offered by occlusive wound management.

The Role of Dressings in Wound Healing

During healing, wounds progress through a specific chronology of events that ultimately lead to the resolution of the injured tissue to a normal or semi-normal preinjury status (Kirsner & Eaglestein, 1993; Szycher & Lee, 1992; Wokalek & Ruh, 1991). The entire healing process is divided into 3 phases: inflammatory, proliferative, and maturation. The events occurring during each phase of healing differ, therefore each phase requires a unique microenvironment.

The purpose of a wound dressing is to provide an appropriate microenvironment. At this time, a single wound dressing with the ability to accomplish this remains a manufacturing challenge. Therefore clinicians must choose between the different dressings available, matching the environmental demands of the wound with the environment created by the dressings.

The initial goals of wound healing are to limit further external damage, prevent microorganism invasion into the wound site, promote hemostasis and the clotting cascade, remove necrotic debris and exudate, and keep the wound warm. Best suited for early wound healing are the traditional textile based dressings, as they are effective in absorbing exudate and removing necrotic debris from the wound site as well as being convenient for field use. They can also be readily secured over a wound, preventing outside contact with blood or body fluids.

Unfortunately, prolonged application of these dressings may be detrimental to timely progression toward later stages of healing. These dressings will begin to adhere to the wound site, especially...
as a scab forms (Feedar, 1995). A scab forces epithelial cells, which will only migrate over a moist tissue bed, to burrow under the scab to move across the wound site, delaying reepithelialization of the wound (Szycher & Lee, 1992).

In addition, the textile fibers of the dressing often become incorporated into the scab, causing further irritation of the wound site. The continued absorption of the fluid released by the wound may cause dehydration and desiccation of the wound site. These dressings often become permeable to microorganisms (Feedar, 1995; Hulten, 1994; Hutchinson & McGuckin, 1990), resulting in infection.

All of these events will further delay healing, therefore the strategy for managing a wound must change after the initial goals are met.

The next phase of wound management requires a shift from protection, isolation, and debridement to the creation and sustainment of a microenvironment that is conducive to the proliferative phase of healing (Wiseman et al., 1992). Occlusive dressings are optimal for creating this environment.

By creating and maintaining a sealed microenvironment and a moist interface with the wound surface, occlusive dressings provide a number of advantages over traditional ones. Healing wounds produce throughout the entire healing process an exudate (Kirsner & Eaglestein, 1993; Szycher & Lee, 1992; Wiseman et al., 1992) containing growth factors that enhance the rate of healing.

Infection rates also appear to be suppressed with occlusive dressings. After reviewing the rates of infection reported under both traditional and occlusive dressings, Hutchinson and McGuckin (1990) found that the infection rate of nonoccluded wounds was 7% compared to 2.6% for occluded wounds.

Additionally, several studies have reported a reduction in pain from the use of occlusive dressings (Barnett et al., 1983; Kannon & Garrett, 1995; Madden et al., 1989). This might be attributed to the moist interface protecting the nerve endings from drying and from fewer traumatic dressing changes (Field & Kerstein, 1994).

Patients also report that occlusive dressings are more comfortable and convenient to wear (Moshakis et al., 1983). For example, since occlusive dressings are waterproof, patients can bathe with the dressings in place and not have to change them afterward.

Furthermore, several studies have reported a better cosmetic appearance of wounds treated with occlusive dressings (Hein et al., 1988; Moshakis et al., 1983). The reasons for these results are probably related to the quicker and more complete epithelialization that occurs under the occlusive dressings.

Therefore occlusive dressings keep the wound fluid, which contains various growth factors, in contact with the healing tissues. Textile based dressings, on the other hand, absorb the fluid, thereby starving the healing tissues of the growth factors that are essential to the healing process.

### Types of Occlusive Dressings

### Transparent Films

The category of transparent films includes sterile dressings consisting of a thin polymeric sheet with one side coated with a pressure-sensitive adhesive. Transparent films are also referred to as semipermeable films, moisture-vapor-permeable dressings, vapor-permeables, synthetic-adhesive moisture-vapor-permeable dressings, and polyurethane films.

The best material for the manufacturing of these dressings is polyurethane, which is semipermeable, allowing both gases (O₂ and CO₂) and water vapor to pass while blocking the passage of wound fluid. The transparent films currently available “breathe”...