Using maggots to clean wounds

Fly larvae have been used for centuries to clean wounds. Maggot therapy in modern wound care offers a sterile, and effective method of wound cleansing. This article reviews how maggots clean wounds and offers practical tips on looking after people undergoing maggot therapy.

The use of maggots in wound cleansing was first described by Baer in 1931. This method was used extensively in the 1930s and early 1940s, but was abandoned with the introduction of antibiotics and the use of aggressive surgical debridement. In the UK, maggots were reintroduced for this purpose in the mid-1990s (Thomas et al, 1996).

The removal of dead (necrotic) tissue in a wound is integral to wound healing. There are a number of methods for the removal of dead tissue from wounds; maggot therapy (also known as larval therapy) has been accepted as an effective and rapid technique (Gilead et al, 2012).

In healthy, progressing wounds, debridement takes place naturally (autolytic debridement), but if the process can be accelerated it can be beneficial for the patient in terms of quality of life, and for the clinician and the health service, in terms of costs, such as dressings and nursing time.

Maggots used in wound care are bred in a sterile environment and are free from bacterial contamination. These maggots are the larvae of the green bottle fly, *Lucilia sericata*. Not all species of fly can be used for medicinal purposes as some eat healthy tissue (Bonn, 2000). The green bottle larvae live for approximately 21 days before they transform into a fly.

Medical-grade maggots are 24 hours old when they are dispatched by the manufacturer to the clinic, around 48 hours old when applied to a wound, and are they removed within 3–4 days of application. It is not possible for the maggots to turn into flies while in the wound. The maggot will not reproduce or multiply within the wound, as only adult flies lay eggs.

Maggots do not have teeth and they do not bite. They secrete an enzyme that breaks down the devitalised tissue in the wound and in effect, the maggots "drink" the liquefied tissue and bacteria. As maggots do not have teeth, they take longer to break down hard, dry necrotic tissue, and if placed in such a wound, they can die of starvation.

Maggots are best used in sloughy, wet wounds, such as those found on diabetic feet, amputation sites, haematoma, and pressure ulcers

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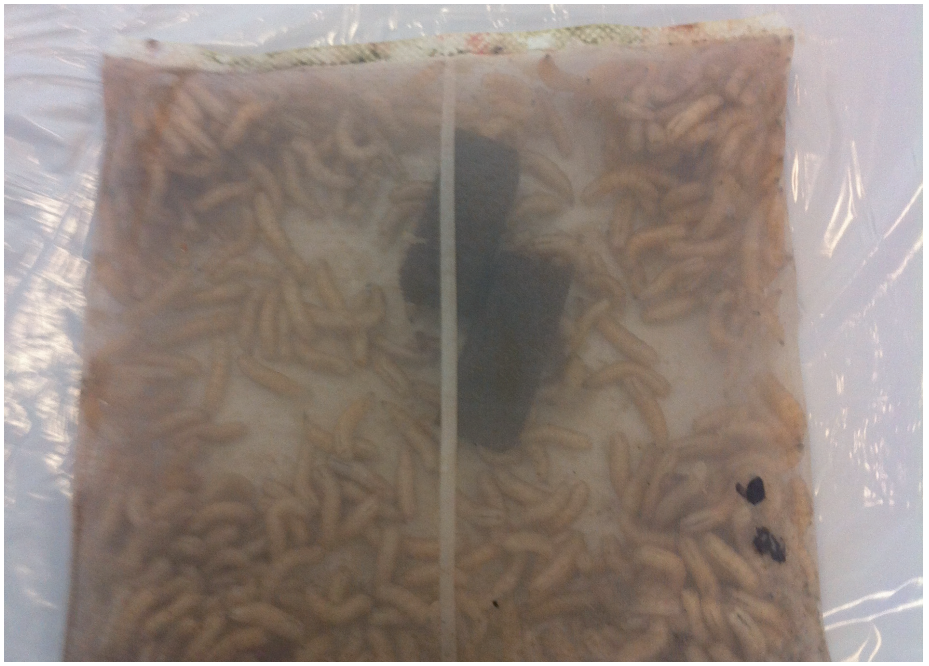

Figure 1. ***Dressing 4 days post-application (BioBag®; BioMonde).***

(as long as the pressure that has caused the damage is removed first). Because they eat dead tissue, which is often full of bacteria and may be malodorous, maggots are said to deodorise the wounds (Challinor, 2012). The selectivity of the maggots' digestive enzyme means that it is safe to use around viable structures, such as tendon and bone (Gottrup and Jørgensen, 2011). Furthermore, the enzyme is said to change the pH of the wound to a level where healing is stimulated (Dougherty and Lister, 2011), and stimulates the growth of new blood vessels (Stoddart et al, 1995).

Maggots do not heal wounds, but help to prepare the wound bed and are thought to help reduce healing times, the need for antibiotic therapy, and the incidence of amputation (Sherman, 2003; Armstrong et al, 2005; Jones et al, 2011; Gilead et al, 2012).

Application

There are two methods of application:

- The BioBag® dressing (BioMonde): The maggots are sealed within a finely woven net pouch containing a small piece, or pieces, of foam that aid the growth of the larvae and manage wound exudate (*Figure 1*). The BioBag dressings come in varying sizes and are applied according to the nature and size of the wound being treated. The maggots remain sealed within the dressing throughout the course of treatment.
- Free-range maggots: The maggots are applied directly to the wound and are retained within a special dressing system. The exact nature of this is determined by the size and location of the area to be treated.

When applied to the wound the maggots are only a few millimetres in length (smaller than a grain of rice). During the treatment period, they will increase in size as they clean the wound, growing to a maximum of 12 mm.

The length of treatment varies based on wound type and extent, and the method of maggot application. BioBag dressings can be left in place for up to 4 days, while it is possible for the dressing to be removed on a daily basis to allow inspection of the wound. Free-range maggots are generally left in place for up to 3 days before being removed from the wound site. After that time, the maggot has eaten to full capacity and stops producing the digestive enzyme and is no longer of use in wound cleansing.

With both application methods, it is impossible to predict how long a course of treatment will take. Sometimes a wound is completely cleansed by a single application of maggots, but other wounds may require two or more treatments to achieve the desired effect.

Practical tips

Maggot care

Larval therapy works best when the maggots are moist and have plenty of oxygen. They need to breathe, so no occlusive dressings should be used to cover the wound. Film or foam dressings, such as Release (Synergy), Mesorb® (Mölnlycke) or Melolin® (Smith & Nephew), cannot be used in conjunction with maggots. Permeable dressings, such as cotton pads or gauze should be used.

Maggots are living creatures and the patient has to be careful not to squash them. If they are applied to the heel or foot, the patient must not walk on that leg. For the same reason, it is not ideal to use maggots on wounds on sacral wounds unless the patient is positioned on their side for the duration of therapy.

Although it is possible for the patient to carry out most normal activities while undergoing maggot therapy, they should not bathe or immerse the wound in water. The individual should also not sit with the wound too close to a source of heat, such as the living room fire or radiator, as the maggots may dry out and die.

All previous dressing and product residues must be removed prior to the application of maggots to the wound bed. For example, if a hydrogel containing propylene glycol has been used, the wound bed should be cleaned thoroughly with normal saline. There are no systemic medicines that contraindicate maggot therapy.

Pain

Patients will often ask if they will feel the maggots in their wound. This is unlikely, although individuals have described a tingling or stinging sensation. It is possible for people with painful wounds to experience an increase in pain with larval therapy.

Precautions

Maggots only feed on dead tissue, but if the dead tissue is near a major blood vessel, the wall of the vessel may weaken, increasing the risk of a major bleed. Maggots should not be used where the bowel is exposed, or if the patient is on warfarin and their international normalised ratio is not well controlled.

Acceptance

The use of maggots can be distasteful to patients, as well as clinicians. In clinical practice it has been reported that patient acceptability is high (Petherick et al, 2006). Commonly, it is nursing staff who dislike maggots, while the patient has often had to live with a malodorous wound for a numbers of days or weeks and is keen to try anything that may aid healing.

Accessing maggots

Maggots are available on FP10, can either be ordered via a community pharmacy or a hospital pharmacy, and must be prescribed by a GP, consultant, or an independent nurse prescriber. Once used, maggots are classed as grade A clinical waste and should be disposed of according to local policy.

Conclusion

Maggot therapy can be an effective therapy in wound debridement and it performs especially well in sloughy wounds. Maggots remove slough quickly in one or a few applications and prepare the wound for healing. Clinicians should be aware that the therapy is not always acceptable to the patient who might find the idea of having maggots placed in their wound distateful, however, if accepted, maggots work wonders in the right wound and the patient will be delighted with the results. WE

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