

Maggot Debridement Therapy in the Treatment of Nonhealing Chronic Wounds

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Abstract

Background: Maggot therapy utilizes freshly emerged, sterile larvae of the common greenbottle fly, *Phaenicia (Lucilia) sericata* which secrete digestive enzymes that selectively dissolve necrotic tissue, disinfect the wound, and thus stimulate wound healing. **Introduction:** The purpose of this paper was to review the literature in an attempt to determine the efficacy of maggot debridement therapy (MDT) of skin ulcers (e.g. diabetic foot ulcers, venous stasis, osteomyelitis), with specific focus on assessing the healing time and amputation rate. **Methodology:** Efficacy was measured by comparing MDT to traditional treatment (i.e., antibiotics and surgical debridement). Level of evidence included case-control, cohort retrospective, retrospective, prospective control, non-randomized in-vivo, and report studies. **Results:** Overall results of the thirteen articles that met the inclusion criteria indicate that MDT healing time was equal to or significantly shorter and amputation rate was less than traditional treatment. **Limitations:** Limitations to these studies include minimal amount of subjects involved in each study, the inability to conduct randomized control studies and insufficient number of articles found. **Conclusion:** Preliminary studies confirm that MDT successfully accelerates debridement of long-standing chronic wounds leading to enhanced healing time and reduced amputation rates, making it a particularly safe and affective method in wound care.

Introduction: Removing necrotic (dead) tissue while keeping healthy tissue intact is a major problem for doctors trying to save extremities with open wounds. This study will focus on maggot debridement therapy, (MDT), as an alternative to conventional methods of surgery and antibiotics. For centuries, maggots have been known to have the ability to help in healing wounds much like antibiotics. With the invention of penicillin and other antibiotics, maggot therapy was replaced and its practice became obsolete. However, in the past 30 years, due to the overuse of antibiotics, large arrays of pathogens resistant to many common antibiotics have developed. Due to this resistance, maggot therapy is once again becoming a viable, first line option for physicians in treating non-healing

wounds, especially wounds that typically do not respond to antibiotics or surgery.

There are two components to maggot therapy in the treatment of non-healing wounds. [1] The first component is the eating of only the necrotic (dead) and infected tissue and leaving the healthy tissue unharmed. The second component is disinfecting of the wound which helps with healing. [1] These two things together make maggot therapy another option for physicians to help treat wounds.

Methodology: The criteria used in selecting studies for this paper were as follows: evidence based controlled trials, maggot therapy, and non-healing wounds. Using these criteria, 13 studies were selected for this paper.

Some of the strongest evidence to support the use of MDT has been done by Dr. Ronald Sherman. Sherman has been credited with bringing MDT back to the forefront in the 1980's. Two of his studies, one retrospective study [2] and one cohort retrospective [3], used patients with various ulcers to study MDT. Both studies found maggot therapy to be more effective than conventional methods. [2-3] Three other studies by Sherman [4-6] also demonstrated the effectiveness of maggots. One of these studies [4] involved a prospective control study of patients with pressure ulcers in their spinal cords. Results of this study [4] indicated a reversal of worsening ulcers with a majority of those ulcers being completely debrided within two weeks.[4] Another study by Sherman [5] concerned pre-surgical maggot debridement of soft tissue wounds which focused on the issue of whether or not there was a significant decrease in rates of postoperative infection. Sherman and colleagues [5] found that none of the wounds treated with MDT developed infection, leading to another area where maggots are successful in treating wounds. Sherman and colleagues also did a prospective study [6] where 86% of patients saw complete or significant debridement in wounds. [6]

Besides Sherman and colleagues, other researchers have studied the usefulness of maggot therapy. Jukema and colleagues [7] focused on maggot therapy in the treatment of wounds that were unresponsive to classical methods and antibiotics

This study [7] reported that maggot therapy successfully saved all extremities from amputation, again demonstrating that maggot therapy can help debride and heal wounds. Similarly, Mumcuoglu et al., [8] studied maggot therapy for intractable wounds and reported complete debridement in 38 of the 43 wounds with 3 wounds displaying significant debridement. [8] Tanyuksel did a similar maggot therapy study [9] in which complete debridement was achieved in 91% of patients. [9]

Steenvoorde and associates did a study [10] using maggot therapy alone. This study [10] was a retrospective non-comparative cohort study that involved the antimicrobial activity of maggots. More specifically, in-vivo results of the use of maggots to treat gram-positive and gram-negative infected wounds. The study found that gram positive bacteria were digested and killed more easily than gram-negative bacteria. [10]

Armstrong and colleagues [11] did a case-control retrospective study on MDT on lower extremity hospice wound care. The results of this study [11] found MDT shortened healing time, and gave patients significantly more antibiotic free days after follow up. Wolfe and Hansson [12] focused on the debridement of chronic ulcers by maggot therapy. They [12] reported that larval therapy was not only effective in debriding necrotic ulcers, but that it was also fast and very precise, as the larvae avoided healthy tissue.

Wayman et al., [13] compared larvae debridement therapy versus hydrogel therapy in treating necrotic venous ulcers. This study found larvae debridement therapy was more cost-effective and faster in debridement of ulcers with all patients needing only one application.[13] Wollina did a study [14] on the investigation of the clinical effects, side-effects, and mechanisms of action of biosurgery(maggot therapy) with the use of remittance spectroscopy as an objective approach in monitoring. Results [14] showed that biosurgery was selective with removing necrotic tissue while leaving healthy tissue unharmed and being most effective on neuropathic ulcers.

Conclusion: These studies strongly suggest that MDT is an effective and successful method of wound healing. Conventional methods can work, but it is often difficult for a surgeon to differentiate between healthy and infected tissue. This makes surgery risky

for the patient. Antibiotics can work for some patients, but many wounds do not respond to antibiotics. Maggot therapy has not only been shown to remove necrotic tissue, it has also been proven to work on disinfecting wounds unresponsive to antibiotics. In the past, maggot debridement therapy was used as a last resort method of wound healing. These studies indicate that maggot therapy could be considered as a first line treatment for non-healing, chronic wounds.

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