

Limited Access Dressing and Maggots

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Abstract: A case of infected wounds with lymphedema (non-pitting with skin changes) on the left leg showed maggots in the wounds that were covered by slough that extended under the skin edge. The patient had diabetes mellitus and hypertension (on treatment). Removal of the maggots with our routinely practiced method using turpentine oil and closed gauge dressing was tried but failed. After 3 days, closed dressing limited access dressing (LAD) technique was applied, which cleared the wound without allowing the maggots to escape from the dressing. In this case, LAD was a more controlled, hygienic, and effective method of maggot removal. This knowledge may help the surgeon in designing the better-controlled environment for maggot debridement therapy (MDT).

Sushruta (600 BC, India), in his surgical treatise Sushruta Samhita, described that flies deposit worms (maggots) onto wounds.¹ Like most of its contemporaries, Paré in the 16th century believed that maggots developed spontaneously as a part of the putrefaction process of devitalized tissue.² Sushruta also described the use of maggots in debridement of tumors.³ English translation of his description is as follows:

“Nispava, pinyaka (molasses), and paste of kulattha (herbal medicine) added with more meat and water of curd (whey) made a nice paste and was applied on the tumor so that flies shall swarm to it and krimi (worms/maggots) develop there and eat away the tumor. When only a small remnant (of the tumor) remains after the worms have eaten, the area should be scraped and burnt by fire; or if the base (of the tumor) is small it can be kept encircled (for some days) with thin sheets of tin, copper, lead, and iron.”

Jean Larrey and John Forney Zacharias, recognized that maggots removed only dead tissue, which accelerated the natural healing process.² William S. Baer (after World War I) used maggots in a cage type dressing for cleaning foul-smelling, pus-discharging wounds.² Fleischmann et al² and Sherman and Shimoda⁴ found that maggots were effective in debriding many nonhealing wounds, which lead to enhanced wound healing and aided in presurgical wound bed preparation.⁵

Maggots debride with their secreted digestive juices,^{2,5} mouth hooks, and spicules.² Wound healing improves with maggots because they kill microorganisms (including methicillin-resistant *Staphylococcus aureus* [MRSA] and



Figure 1. Photographs showing maggots in the LAD bag.



Figure 2. Close-up of the maggots in LAD bag—dead, black-colored maggots and live cream-colored maggots are seen.

pathogenic streptococcus strain) and flush the wound with increased fluid secretion, alter pH (acidic) through secretion of various chemicals, its larval immune system (defensins), and its digestive system. Growing larvae also secrete growth factors, which can improve wound healing.² Maggot therapy, also known as maggot debridement therapy (MDT), larval therapy, or biosurgery, was widely used in controlled and sterile settings^{2,5} before the discovery of antibiotics, as it serves to clean a wound (human or animal) in order to promote healing.

Since 1995, the Biosurgical Research Unit in Bridgend, South Wales has distributed sterile larvae commercially. German and Belgian factories have distributed fly larvae in middle Europe since 1998. Since 1996, an annual global meeting on larval therapy (or biosurgery as it was once known) has convened. This meeting is now titled the International Conference on Biotherapy and is organized by the International Biotherapy Society (IBS).⁵

Although maggot debridement therapy may be useful in certain situations, uncontrolled and infected maggots in large numbers can lead to infestation (myiasis) and infection, including tetanus and gas gangrene. A major problem also arises when maggots turn into flies and restart the life cycle. Within a few generations, the number of maggots exponentially grows and becomes a serious problem.

Removal of uncontrolled maggots from deeper wounds may pose a problem. In the present case, the problems of uncontrolled maggots has been effectively tackled by using the limited access dressing (LAD).⁶

Case Report

A 58-year-old man with a known case of grade III

(mainly non-pitting with skin hyper-pigmentation and warty lesions) lymphedema of 3 years duration with recurrent ulceration was admitted to the Department of Plastic Surgery, Kasturba Medical College, Manipal. The lower left limb ulcer had been treated for 3 months with maggots detected in the wound for 7 days. He developed uncontrolled maggot infestation while on antibiotics and regular closed bandage dressing by local doctors in his village. The maggots could not be removed with regular turpentine dressings, hence, he was referred to our department for further management.

The patient had diabetes mellitus and hypertension for 4 years (on irregular treatment).

At admission, the patient's blood pressure (BP) was 150/96 mmHg, pulse was 102/min, and temperature was 99° F. Examination of the lower left limb revealed nonpitting edema with tender, multiple deep ulcers over the calf region (the largest measuring 4 cm x 5 cm) with slough and maggots over the wound bed extending beneath the skin margin. The skin was thick and rough and showed hypo-pigmented scars from previously healed wounds. Investigation revealed hemoglobin of 10.8 g/dL and total leukocyte count of 14,600 cells/mm³. Differential leukocyte count showed neutrophils (81.9%), lymphocytes (10.5%), monocytes (4%), and eosinophils (3.6%). Erythrocyte sedimentation rate was 57 mm/hr (normal range 0-10 mm/hr). Fasting glucose level was 159 mg/dL (normal range 60 mg/dL-110 mg/dL) and postprandial glucose level was 237 mg/dL (normal range 90 mg/dL-140 mg/dL). Immunoglobulin levels were IgG 2350 mg/dL (normal range 1200 mg/dL-1480 mg/dL) and IgM 34mg/dL (normal range 110 mg/dL-136 mg/dL).

Intravenous antibiotics (amoxicillin [1 g] with clavulanate potassium [200 mg] twice daily, and ceftazidime [1 g] twice daily) were started. Amlodipine 5-mg/tablet once a day was used to control blood pressure; diabetes was controlled with human insulin (monocomponent-recombinant DNA origin) 6-8-8 units subcutaneously 30 minutes before food intake. Wounds were dressed with 10% povidone iodine solution-soaked gauze and turpentine oil-soaked gauze. The smell of the turpentine oil forced the larvae out from the wound margin. The wounds were not cleared of the maggots after 3 days of treatment with conventional methods. The dressing was left open (for maggots to come out from under the skin edge) after turpentine oil application. Some of the maggots escaped and were found on the bed and floor of the patient's room.

Hence, the LAD dressing was applied (Figure 1) with relatively wider lumen tubes (16 Fr).⁶ Limited access dressing suction was done for 30 minutes every 4 hours. Each day a LAD saline wash was performed with 2-mL turpentine oil instilled in the bag. During suction following the wash, dead (black-colored) as well as living (cream-colored) maggots were removed (Figure 2). Two days after applying the LAD, antibiotics were switched to oral cefixime (200 mg) with dicloxacillin (500 mg) twice daily. Within 3 days the wounds were maggot-free with reduced signs of inflammation.

Discussion

Although Sowani et al⁷ reported on the experiences of 71 patients with maggot infestation over a 6-year period, the exact incidence in India has not been reported. In the author's experience, infestation is often reported in foul-smelling and fungating wounds.

Uncontrolled infected maggots are common in wounds in lower socioeconomic groups and patients in an unhygienic environment. Insecticide sprays, keeping trash in a sealed container, and using a garbage disposal or freezing rotting leftovers until trash collection day can help control fly and maggot problems.

Maggot infestation is a distressing problem due to negligence at personal and professional levels. A moist, soiled dressing covering the wound is not a protective barrier.⁷ The sight, smell, and stigma can lead to patients being forced out of their homes and being viewed as "cursed." The sight of maggots is often frightening for both the patient and the caregiver, therefore, support and counseling are critical. The caregivers are taught proper wound care and counseled not to show revulsion.

Removal of uncontrolled and infected maggots from deep wounds requires special care. Maggots usually come out of a deep wound when turpentine oil soaked gauze is placed over it. If they are not controlled, it is likely they will escape onto the bed and floor.

The LAD was effectively used in the present case to remove maggots from the wound. The wound was maggot-free within 3 days. All of the maggots remained confined within the LAD bag and after removal of the LAD the maggots were disposed of safely along with the bag. The main limitation of the LAD is that removal of maggots from the LAD bag is possible only during dressing changes.

Conclusion

Application of LAD is an effective, hygienic, more efficacious and economical modality for removal of uncontrolled maggots especially in under-resourced or remote environments. The LAD may help surgeons in designing a controlled environment for larger wounds—similar to cage dressing for smaller wounds for MDT.²

References

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