

## CASE REPORT

**Maggot debridement therapy**Cambal M<sup>1</sup>, Labas P<sup>1</sup>, Kozanek M<sup>2</sup>, Takac P<sup>2</sup>, Krumpalova Z<sup>2</sup>

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**Abstract**

**Aim:** To establish a maggot debridement therapy unit and assess efficacy of this method in chronic conservative non-treatable leg ulcers in patient in whom conventional therapy failed.

**Material and methods:** From August 2004 to December 2005 we treated with Maggot debridement therapy (MDT) 10 patients, 6 men and 4 women, with 13 leg ulcers treated first with conventional and then with maggot therapy. Average age of these patients was 55 years, 11 wounds were of venous and 2 of arterial origin. 7 patients had diabetes mellitus.

**Results:** 1 patient with arterial ulcers underwent supracondylar amputation, 2 patients were re-admitted for recurrent ulcers, one extremely obese patient with cardiovascular co-morbidity did not heal, but all other ulcers have been healed, cleared or minimised during 4–8 week MDT. We observed massive growth of granulation tissue and microbiological cleaning of these wounds. No adverse effects were observed.

**Conclusion:** Maggot therapy was more effective and efficient in debriding non-healing leg ulcers than a conservative treatment (Fig. 3, Ref. 6).

**Key words:** maggot debridement therapy, conservative treatment, supracondylar amputation, ulcer.

For centuries, the infestation of wounds by certain species of fly larvae (maggots) has been recognized to debride, to enhance healing, and to decrease the mortality associated with the underlying injury (1).

Having observed the benefits of maggot-infested wounds firsthand during World War 1, the orthopaedic surgeon William Bear applied blowfly larvae to the open wounds of 4 children with osteomyelitis. Their previously non-healing wounds closed within 6 weeks. His results were first presented in 1929. Within 5 years of its American debut, “maggot therapy” was in widespread use. More than 1000 American, Canadian, and European surgeons were using maggot therapy by 1934, at which time more than 91 % of survey respondents were pleased with its results (2).

The popularity of maggot therapy decreased during 1940s, probably because of: 1) newly available antibiotics, 2) improved surgical techniques, and 3) reduced incidence of the chronic bone and soft tissue infections for which maggots had been used (4, 5). Yet, when conventional medical and surgical therapy failed to control a serious tissue infection, the value of maggot therapy had to be acknowledged.

Over the past few years, there has been a resurgence in the use of maggot therapy, even though its optimal role has not been clearly defined.

Maggot therapy is essentially a wound myiasis controlled such that the benefits outweigh the risks. The benefits are 3 distinct but often simultaneous effects of medical maggots upon the host wound: debridement, disinfection and tissue growth. Debridement is largely a result of extracorporeal digestion. The maggots secrete their proteolytic digestive enzymes that then selectively dissolve necrotic tissue. Maggot-induced wound disinfection is more complex and the details are not well understood. Recent studies confirm the high rate of bacterial killing within the maggot gut. Greenberg (6) showed that metabolic products of *Proteus mirabilis*, a commensal of larval gut, produced potent antimicrobial factors (2).

Medicinal maggots not only debride and disinfect wounds, they also appear to promote wound healing. *Lucilia sericata* appears to secrete various cytokines and tissue growth factors. Maggot therapy also has been associated with increased tissue

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Fig. 1. Wound with two-layered dressing by Sherman.

oxygenation, possibly as a result of vasodilatation. Multiple mechanisms appear to play a role in maggot-induced wound healing.

#### Material and methods

From August 2004 to December 2005 we treated with Maggot debridement therapy (MDT) 10 patients, 6 men and 4 women, with 13 leg ulcers not successfully treated with conventional therapy for approximately 14 months. Average age of these patients was 55 years, 11 wounds were of venous and 2 (1 female patient) of arterial origin. 7 patients had diabetes mellitus treated with insulin. 1 patient had phlegmone surrounding the venous ulcer and septic fever.

In cooperation with the Slovak Academy of Sciences, which produces for us sterile larvae of *L. sericata*, we applied Maggot debridement therapy in these patients. The average duration of therapy was 3.6 weeks (2–7), we used 2 cycles of MDT per week, every cycle took 48–96 hours. In 9 patients we applied two-layered dressing as was described by Sherman (3) 1997: The

bottom layer (cage layer) was affixed to the intact skin surrounding the wound. Its purpose was to contain the maggots in the wound while permitting oxygen to enter the dressing and liquefied necrotic tissue and secretion to drain out. We used chiffon, which was attached by disperse glue to colostomy pads Coloplast surrounding the ulcer and adherent to intact skin. (Fig. 1) Under plastered chiffon were applied 1-day-old sterile larvae *L. sericata* in amount of 5–8 per cm<sup>2</sup>. We did not use semi-permeable transparent dressing, as was recommended by Sherman. In the first cases we noticed escaping larvae, but we resolved this problem by using another chiffon (80 Mesh Nylon Monofilament, Vestergaard Frandsen Group, Denmark) and a special disperse glue (developed by Institute of polymers, SAS, Bratislava). A top layer of dry gauze was placed over the cage layer so as to absorb the drainage. Only that top gauze was changed regularly (every 4–6 hours) by the nursing staff.

In our last patient we used special “biobag” made by Polymedics Bioproducts, Belgium.

Handling with these sacks was very pleasant, we did not notice any larvae escape. The application removal and disposal was simple and practical. We can recommend this way of maggot’s application.

Microbiology was taken from every ulcer before and during MDT repeatedly. We noticed microbial multi-resistant tribes of *Ps. aeruginosa*, *E. coli*, *Staphylococcus sp.*, *Klebsiella* etc. and yeasts before MDT applications.

Explanation of the basic principles and voluntary agreement of each patient was a necessary prerequisite for our therapy.

#### Results

The patient with arterial ulcers underwent supracondylar amputation, because of non-reconstructive peripheral vascular disease. Ulcers in this patient were extremely painful and despite arterial damage we noticed clearing of ulcer’s base.

2 patient were repeatedly re-admitted for recurrent ulcers, both of whom were diabetics suffering of ulcers for several years.



Fig. 2, 3. Wound before and after 1 cycle of Maggot debridement treatment.

After cleaning up and compression sclerotherapy we achieved complete healing of these ulcers. Unfortunately both of them were social cases without further medical care. One was admitted to our hospital with septic status due to phlegmon around crural defect. After 1 cycle of MDT we achieved decrease of local finding and loss of fever. One extremely obese patient with cardiovascular co-morbidity and chronic oedema and lymphedema did not heal completely. A 24-year old nun with impaired immune system with crural defect not-healed for 3 months by standard therapy was completely healed after 4 cycles of MDT in 3 weeks.

All other ulcers have been healed during 4–8 week of MDT. We observed massive growth of granulation tissue.

We recorded *interesting microbiological changes* of these chronic wounds. After first applications of MDT we achieved repeatedly only *Proteus mirabilis* sensitive to all common used antibiotics in microbiological swab and disappearance of yeasts. No adverse effects were observed.

Maggot applications were well tolerated by our patients, they sometimes felt pain responding to long lasting analgetics and sometimes to morphine derivates. Some patients complained of prickling or itching.

Unpleasant complications were in the first cases of maggot migration from their “cage”, but we resolved this palaver by using special chiffon and glue specially arranged for our needs. We can only recommend “maggot sacks (biobag) by Polymedics Bioproducts, Belgium”, manipulation with it is very easy and practical (Figs 1, 2 and 3).

## Conclusion

Despite a low cultural esteem for maggots, more and more clinicians and patients are turning to maggots for assistance with the healing of lower extremity and other wounds. Because mag-

got therapy is often used as a last resort for patients with poor prognoses, it is important to define the conditions, such as the degree of vascular insufficiency, in which maggot therapy is likely to be futile.

*In our experience Maggot therapy was more effective and efficient in debriding non-healing leg ulcers than conservative treatment.*

Although the number of patients in our study is small, our results in healing of chronic wounds can demonstrate the value of this modality as a treatment for non-healing ulcers. We believe, MDT can be a valuable therapeutic option for the treatment of chronic wounds, pressure ulcers as well as non-healing soft tissue wounds.

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Received October 30, 2006.  
Accepted November 14, 2006.