

Case Report

Maggot therapy in Hong Kong: a case report

蛆蟲療法：香港的一宗病例

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Maggot debridement therapy (MDT) is the medical use of live maggots (fly larvae) for promoting debridement and healing of the chronic wounds. This article reports a case of MDT in Hong Kong for a non-healing infected wound after extensive surgical resection and radiotherapy treatment for malignant fibrous histiocytoma. A summary of the rationale of MDT will be discussed.

蛆蟲療法採用活蛆蟲敷料，覆蓋在慢性皮膚潰瘍上，蛆蟲把傷口內的壞死組織清除，促進傷口癒合。這宗病例顯示，患者患有惡性纖維組織細胞瘤，腫瘤經廣泛性外科手術切除和電療後，傷口歷久不癒，形成慢性潰瘍，而且受細菌感染。後來患者接受了蛆蟲療法，傷口明顯地癒合不少。作者透過這宗病例，對蛆蟲療法作出深入的探討。

Keywords: Chronic wound, Hong Kong, maggot therapy, malignant fibrous histiocytoma

關鍵詞：慢性潰瘍、香港、蛆蟲療法、惡性纖維組織細胞瘤

Introduction

Maggot debridement therapy (MDT) is the medical use of live maggots (fly larvae) for promoting debridement and healing of chronic wounds. During the 1930s, MDT was widely used in hospitals around the world for treating bone and soft tissue infection.¹ However wound infection had been largely treated with antibiotics after the discovery of penicillin.

In the past 30 years, there is a renaissance of MDT for patients with refractory wounds not responding to standard medical and surgical treatment. However, in Hong Kong there is still no such therapy available. This case report describes MDT is also possible in treating refractory non-healing wound in Hong Kong.

Case report

An 88-year-old lady without other medical illness developed malignant fibrous histiocytoma over the right lower rib area with surgical excision performed in March 2004 and subsequent excision in May 2004 due to margin involvement. She developed wound necrosis after six weeks of

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radiotherapy and a chronic non-healing ulcer was resulted. Basic blood parameters ruled out diabetes mellitus, anaemia or hypoalbuminaemia as contributing factors for the poor healing. Despite 10 weeks of daily wound dressing by community nurse, there was no sign of healing. On presentation to the author in September 2004, a 5 cm x 3 cm triangular shaped wound of 2 cm depth (Figure 1), with a necrotic base and thick tough yellow slough was noted. The edge of the wound was fibrotic. There was no sign of surrounding cellulitis.

Surgical debridement under general anaesthesia was suggested but refused. The option of using MDT was discussed and agreed. Live maggots of *Lucilia sericata* (Biosurgical Research Unit, Bridgend, United Kingdom), was first applied to the wound on 7 October 2004 (Figure 2). Tailor-trimmed duoderm film, maggots, a special sterile net, absorbable and then non-absorbable dressings were applied.

After two days the wound was inspected and maggots were cleaned up from the wound with normal saline and discarded in alcohol on day 3 (Figure 3). It showed dissolving slough and the wound was partially debrided. The wound was then dressed with chlorhexidine and packed with normal saline simple gauze. The initial five MDT were applied once weekly for a month. Partial debridement was observed each time but reaccumulation of yellow slough without granulation occurred few days after stopping MDT.

The next five treatment sessions were then accelerated with maggots being applied twice weekly until November 2004. Continuous sign of granulation and wound contraction were observed (3 cm x 2.5 cm x 1 cm). There was also softening of the wound edge with new epithelialization (Figure 4). In the next two months, the wound continued to show contraction, granulation with no recurrence of slough despite cessation of MDT.



Figure 1. Necrotic wound before maggot therapy.



Figure 2. Applying maggots to the wound with special sterile net.



Figure 3. Change of dressings showed maggots in the wound and the typical green exudates.



Figure 4. After 10th MDT. Wound contraction and re-epithelialization.

The wound became optimal enough for delayed suturing with local anaesthesia in February 2005. Near complete healing was achieved after suturing.

Discussion

Maggots were first used clinically in promoting wound healing in the 1860s during the American Civil War, by J.F. Zacharias.² MDT has been successfully used to treat various types of intractable wound such as diabetic foot ulcer, pressure sore, post irradiation and venous ulcer.³ Clinically maggots clean up necrotic tissue in the wound without harming healthy tissue. This promotes rapid growth of granulation tissue and rapid conversion of necrotic and static ulcer to a healthy wound bed that can be grafted or surgically closed. On average, maggot treated wound can be debrided and covered 60% by healthy granulation tissue within three weeks.⁴

In this case, maggots were purchased commercially and used as soon as possible since they would die quickly with no food supply. Initially, the maggots were only applied for two to three days per week and discharge and slough recurred quickly during the rest days with little sign of

granulation. After increasing the MDT to twice weekly, obvious signs of wound contraction, granulation and re-epithelialization were observed. Despite stopping the MDT, wound healing continued until to a size suitable for surgical suture under local anaesthesia two months after the last MDT. No side effect was observed throughout the treatment period. Experience on this case showed that MDT should be used continuously throughout the treatment course until the wound is optimised for further treatment such as surgical suturing.

The rationale and mechanism of MDT in promote wound healing include wound debridement, its antimicrobial activity and growth promoting activity. In the wound, fibrin would prevent the exchange of gases, growth factors and nutrients between plasma and dermis, leading to tissue anoxia, ulceration and the inhibition of angiogenesis and neovascularisation.⁵ Maggots not only eat away the dead necrotic tissue but previous experiments showed that the excretory/secretory products (ESP) of *Lucilia sericata* contained chymotrypsin-like and trypsin-like activities that might promote wound healing and remodelling of extracellular matrix (ECM). The ESP solubilised fibrin clots and degraded fibronectin, laminin and acid-solubilised collagen types I and III.⁶ These might explain why the first half of the treatment was not so effective since the rest periods were too long for discharge and slough to re-accumulate, and prevent spreading of fibroblasts across the area and so hinder continuous healing process.

Antibacterial effect of maggots was demonstrated in experiments showing significant decreased amount of bacteria in the hindgut of maggots.⁷ Antibacterial agent was isolated from maggots which had a wide spectrum of activity against many resistant Gram negative (e.g. *Escherichia coli*, *Salmonella* and *Pseudomonas aeruginosa*) and Gram positive (e.g. *Staphylococcus aureus*, *Streptococcus epidermidis*, *Listeria* and *Methicillin*

resistant *Staphylococcus aureus*) bacteria.⁸ This activity may enhance wound healing process.

An experiment showed that the ESP from *Lucilia sericata* significantly reduced fibroblast adhesion to both fibronectin and collagen indirectly through proteolytic fragmentation of the fibronectin protein surface.⁹ This modulates the behaviour of fibroblast, including their adhesion to the ECM, proliferation, and migration into the wound space. A possible implication can be the acceleration of healing with promotion of a wider distribution of viable fibroblasts within the wound, and an enhancement of fibroblast-ECM interactions. Another study showed that the haemolymph and alimentary secretions of larvae stimulated growth of human fibroblasts *in vitro* and increased the proliferation of epidermal growth factor or interleukin-6 stimulated fibroblasts.¹⁰ These may explain why healing continues after cessation of MDT.

Reported side effects of MDT include pain, tickling or itching sensation and bleeding.¹¹ Digestive enzyme may cause erythema or cellulitis. Feter smell is often present, due to the liquefaction of necrotic or ammonium salts excreted by maggots. Transient fever may occur due to pyrogenic material released from the lysed bacteria in the maggots' guts.¹² In this case, the patient's acceptance was very good.

In the view of effectiveness of MDT, we may see a revival of this old method in treating refractory wounds in Hong Kong in the future. This mode of therapy may reduce the chance of emergence of antibiotics resistance and may reduce the total costs in wound management, such as drug and dressing costs.

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