

The use of maggots in head and neck necrotizing fasciitis

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Abstract

Historically maggots have been used to clean necrotic war wounds. With the ready availability of sterile maggots, they are being used increasingly in surgical practice.

Although maggots have most frequently been employed in the management of necrotic wounds and ulcers involving the lower limb, we have identified a particularly useful application in the head and neck and describe a case in which maggots played a significant part in the successful treatment of a florid necrotizing cervical fasciitis in a patient, who was unfit for repeated surgical debridement.

Key words: Larva; Fasciitis; Necrotizing; Head; Neck

Introduction

The early literature contains many references to the successful use of maggots in chronic or infected wounds including osteomyelitis, abscesses, burns and sub-acute mastoiditis. In the 16th century, surgeons in Napoleon's army recorded that maggots in wounds removed putrefying tissues resulting in improved granulation and healing. Maggots were deliberately used for the same purpose during the American Civil War.¹ However, non sterile maggots increased the risks of gangrene and tetanus.

The first clinical studies in treating wounds with maggots were conducted by Baer, who observed that *Wohlfahrtia* (fleshfly) maggots successfully cleared the wounds of soldiers left lying for hours on First World War battlefields. In the 1930s he sterilized the eggs of blowflies and then rearing the maggots aseptically, achieved a 90 per cent success rate in treating osteomyelitis.²

The use of maggots from sterilized eggs have subsequently been introduced into surgical practice. *Lucilia sericata* (greenbottles) is the fly most commonly used for larval therapy. They are also responsible for the condition known as 'blow-fly strike' in sheep.

This report documents our own personal experience with the use of maggots, in an unfit patient with a large necrotic neck wound secondary to necrotizing fasciitis.

Case report

A 72-year-old male, presented to the ENT department two weeks prior to admission for coronary artery bypass surgery with a 10-day history of progressive acute left neck swelling associated with symptoms of general malaise, fever, rigors and anorexia that had not responded to antibiotic treatment from his general practitioner.

On admission he was generally unwell and clinically dehydrated with a temperature of 38.3°C. Examination also revealed a larger tender swelling in the left anterior triangle of his neck extending from the mandible above to the clavicle below and accompanied by diffuse erythema of the overlying skin. No underlying cause for the neck swelling was evident on ENT examination. His blood

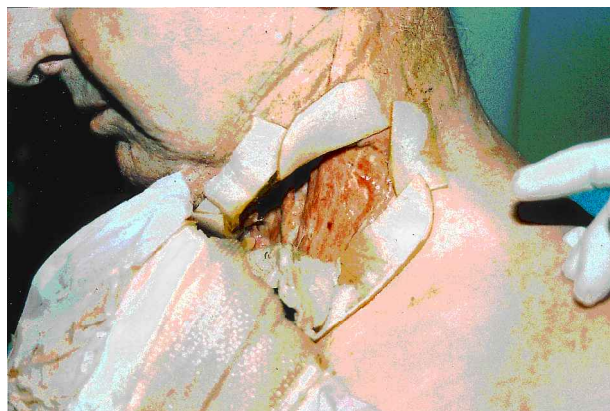


FIG. 1
Maggot therapy commenced.

picture revealed a neutrophilia with a total white blood count of $21.2 \times 10^9/L$ and an ESR of 108 mm per hour. An urgent magnetic resonance (MR) scan of his neck confirmed the presence of a large abscess deep to the sterno-mastoid.

In view of his severe coronary artery disease for which he was about to undergo coronary artery bypass surgery it was decided that aspiration under ultrasound guidance, together with appropriate intravenous antibiotic therapy, was preferable at that stage to open incision and drainage of the abscess under general anaesthetic. Seventy mls of pus was successfully aspirated which revealed Gram positive cocci on gram staining and he was therefore commenced on intravenous Augmentin. Subsequent culture grew a beta-haemolytic streptococcus Group F which was sensitive to penicillin. After a period of initial improvement the condition of his neck skin deteriorated and subsequently broke down over the next 10 days resulting in a sizeable cutaneous defect with profuse discharge arising from a large area of exposed necrotic



FIG. 2
After 48 hours of maggot therapy.

sterno-mastoid muscle and fat. The appearance was now consistent with a diagnosis of necrotizing fasciitis. In view of this, urgent debridement of the wound was undertaken under general anaesthetic with the removal of as much dead tissue as possible, although in view of his general health and cardiac status the procedure had to be limited. As a result maggot therapy was used in the immediate post-operative period in an attempt to remove all the remaining necrotic tissue (Figure 1). After 48 hours a marked improvement was seen with clearance of slough and two days later when the maggots were removed the wound was found to be granulating with evidence of early epithelialization at the margins (Figure 2). In view of his coronary problems the wound was left to heal by secondary intention and had fully epithelialized within six weeks (Figure 3) with an acceptable cosmetic result and only a minor degree of contracture which did not require any further treatment.

Materials and method

Maggot therapy was obtained from SMTL Bridgend Hospital (www.smtl.co.uk).

A hydrocolloid sheet with a wound-sized hole is applied to the patient. Young larvae, which are about 2 mm long, are then introduced into the wound. A sterile piece of a fine nylon mesh, a little larger than the wound but smaller than the hydrocolloid dressing, is then stuck to the back of the hydrocolloid using Sleek. A wound pad is applied to the outer surface of the net to contain any exudate or liquefied necrotic tissue. This dressing protects the intact skin from the potent proteolytic enzymes produced by the



FIG. 3
Six weeks following maggot therapy.

larvae. No more than 10 larvae per cm should be introduced into a wound. The larvae are removed from the wound after three days, and destroyed by incineration.

Discussion

Our case illustrates an alternative to surgical debridement in the management of necrotizing fasciitis. Although the use of maggots has regained popularity in the management of leg ulcers it is rarely used in our specialty.

When obtaining the consent of the patient for maggot treatment we informed him of the tickling sensation that he would endure. In addition to this symptom our patient felt an awareness of the maggots moving. These symptoms were a mild irritation and at no time was the patient distressed or in pain.

Our nursing staff found the treatment easy to undertake however they noted a slight difficulty in retaining the maggots in the wound at the first dressing change. This problem was managed by ensuring the wound was well covered to prevent escapes.

During the therapy we observed a dramatic increase in the maggots' size, reflecting the considerable amount of necrotic material that they are capable of ingesting.

Mechanism

The mechanisms by which these larvae act are not fully understood. The following theories have been suggested:

- (1) production of natural antibiotic-like agents;³⁻⁵
- (2) modification of wound pH;
- (3) the ingestion and destruction of bacteria as part of the normal feeding processes;
- (4) growth-promoting agents detected in larval secretions;
- (5) enhanced healing by physical irritation;
- (6) production of enzymes that help to macerate the tissues.^{6,7}

Disadvantages of maggot therapy

The principal disadvantage is the sensation of tickling and of formication. There is a possibility that the patient could develop an allergic reaction to the foreign protein of the larvae but such an effect has never been reported. The presence of large numbers of larvae in a relatively clean wound has caused bleeding. The use of larvae in the immediate vicinity of exposed or damaged blood vessels is also probably best avoided.

Future developments in biosurgery

Sterilized eggs have been reared successfully through to bacteria-free (axenic) adult flies that, in turn, have been used to produce eggs free from microbiological contamination.⁸ Studies are underway to isolate the enzyme systems and antimicrobial agents produced by larvae from different species of flies.

Conclusions

Maggots promote rapid cleansing of necrotic and sloughy wounds of all kinds. They prevent or control infection and also limit the production of offensive wound odour produced by proteolytic bacteria.

Maggots should not be used on, or in the vicinity of, a tracheostome or in the circumstances where infection extends to the wall of a blood vessel.

The selective use of maggots in necrotic wounds of the head and neck reduces the usage of antibiotics and preliminary studies suggest that larvae are able to eradicate antibiotic-resistant bacteria such as methicillin resistant *Staphylococcus aureus* (MRSA) from infected wounds.⁸

In advanced malignancies of the head and neck, fungating or necrotic tumours are very difficult to debride with dressings alone. Maggot therapy may well provide a valuable role in their management.

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