Spinal cord injury: using maggots to ease the pressure

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It is estimated that about 2,000 people suffer traumatic spinal cord injury every year in the UK (National Spinal Cord Injury Statistical Center, 2008) resulting in a loss or impaired function causing mobility or feeling to be reduced.

Patients who have had an SCI may have many secondary conditions to contend with, including flaccid bladder, poor bowel management, depression and neuropathic pain. One of the most common secondary complications are pressure ulcers (McKinley, 1999). Following an SCI there can be changes in sensation and muscle tone. The supply of blood to the subcutaneous tissue and skin can be altered which leads to a change in the normal elastic nature of the tissue underlying the skin. This produces increased stiffness and alteration to the vascular supply reducing the skin's ability to withstand pressure (Atiyeh et al, 2005).

In the community the management of patients with SCI-related pressure ulcers can often be challenging. These patients are usually bed-bound and the pressure ulcer can take some time to heal. Health professionals must assess the patient holistically not only taking into account their physical health but also their psychological well-being.

Preparation of the wound bed and the debridement of sloughy or necrotic tissue are essential if the wound is to heal quickly. Some larger pressure ulcers can take as long as a year to heal using conventional methods of debridement.

The reintroduction of maggot therapy to remove necrotic tissue has reportedly been very successful when treating SCI patients with pressure ulcers. Sherman et al (1995) stated that out of the eight patients with SCI-related pressure ulcers treated with maggot therapy, most of the necrotic wounds were debrided within one week and wound healing was more rapid when using maggot therapy than when using the conventional treatments. Maggot therapy is said to be significantly more effective and efficient than these other methods. Sherman et al (1995) described the use of maggot therapy as safe, simple and inexpensive.

Case report

Patient history

The patient was a 43-year-old man who lived with his partner and her 13-year-old son. His past medical history included being born with one kidney, hypertension, insertion of aortic stent and pulmonary oedema.

In 2006 the patient presented at A&E with sudden onset of interscapular back pain. He was admitted into the surgical intensive care unit post-insertion of an aortic stent for a dissection of an aortic aneurysm. A computed tomography (CT) scan confirmed spinal cord infarction resulting in T8 paraplegia meaning the SCI was on the eighth thoracic vertebra. T1 to T8 paraplegics have injuries in one of the first eight thoracic bones, and as a result are not able to use their legs. They also have poor trunk control, though they usually retain good hand control. This patient was transferred to the spinal injuries unit after being extubated.

After eight months of rehabilitation he was allowed to go home. He had a supra-pubic catheter inserted due to his flaccid bladder. He also had to manually evacuate his bowels on a daily basis. This procedure took at least half an hour to carry out. To aid him in his bowel care he was prescribed Senna and Lactulose. The patient managed his bowel care quite well but on occasionally he experienced accidents. These episodes were becoming more frequent, causing some embarrassment to him and subsequently stopping him from leaving home, which was having a huge impact on his family life.

Figure 1. This is the wound at the initial assessment. It has extensive areas of full-thickness skin loss and destruction to the tissue. The surrounding skin was red, inflamed and macerated in areas due to extensive amounts of exudate coming from the wound. One side of the buttock had an undermining sinus.

It was suggested by his GP that the formation of a colostomy could make his bowel management much easier. After some consideration the patient agreed to this.

After the colostomy was formed the patient suffered some complications and his bowel became badly infected. Further surgery took place and a new colostomy procedure was necessary. During this time in hospital the patient developed a large pressure ulcer to his sacral area (*Figure 1*).

Following his discharge from hospital his care was taken over by the long-term conditions team (made up of district nurses). During the initial assessment he explained that he was experiencing neuropathic pain, which is described by the Spinal Injury Network (2004) as a significant problem for some SCI patients. To help with this problem the patient's GP prescribed gabapentin (600mg) three times daily and

Figure 2. This was the wound after the first application of maggot therapy. At this stage there was noticeable reduction in the size of the wound bed although extensive areas of slough were still present. The margins of the pressure ulcers are showing signs of epithelialisation. The skin still remains red and inflamed due to a large amount of exudate from the wound.

Figure 3. At this stage there was a huge improvement in the wound. Only one sloughy area remained, the wounds had reduced considerably in size and less exudate was noted. There was noticeable regeneration of new tissue and the surrounding skin was less inflamed.

Figure 4. Following the last application of maggots the wound on one side of the sacrum was completely healed, the other area had reduced in size to 2cm x 2cm and the depth of the wound was approximately 2cm.

tramadol (100mg) slow release morning and night and tramadol 50mg four times a day.

Due to the extent of the pressure ulcer on the patient's sacrum and the fact that the skin was necrotic in some areas and sloughy in others the district nurses suggested the use of maggot therapy. LarvE BioFOAM dressing was ordered as the patient was not keen on the idea of free-range maggots being placed in the wound.

ZooBiotic Ltd's (Bridgend) product LarvE BioFOAM has maggots contained in foam pouches. The dressing makes the patient feel more at ease as they do not worry about the free-range maggots escaping or worrying that the the maggots have not been removed when the treatment is completed. The pouches are easy to place in the wound and also easy to remove.

Maggot therapy

The first application of maggot therapy was in February 2008. The condition of the wound at this stage was very poor. There were large necrotic areas, the wound was also sloughy in other areas and exuding large amounts of offensive smelling exudate which was also damaging the surrounding skin. At this time the wound measured about 7cm x 4cm in one area and 4cm x 3cm in the other. At this stage it was difficult to judge the depth of the wound due to the necrotic tissue and also the amount of slough present in the wound bed.

After only one application of the maggot therapy which remained in situ for four days, with the outer dressing changed on a daily basis, the improvement in the wound was easily noticeable. Most of the necrotic tissue had been lifted and the sloughy areas were reduced in size. On examination there were obvious signs of epithelialisation at the margins of the wound (*Figure 2*). When the maggot therapy was removed conventional methods of debridement were used using silver dressings to remove the slough but this was a slow process and the patient became increasingly more anxious about how long he would be confined to bed.

The application of maggots had moved a significant amount of the slough present in the wound. Further consultation took place with the district nurses and the nurse specialist from Zoobiotic Ltd. At this stage everyone agreed that the wound would indeed benefit from further treatments of maggot therapy. During the time this treatment was being used and with the patient's consent regular photographs of his wound were taken. This allowed the documentation of the progress but also showed the patient how well his wound

was healing which helped to lift his mood considerably. By April 2008 the wound had healed significantly with only one area where the slough remained. One more application of maggots was used and this debrided the wound bed completely allowing the wound to heal much quicker than was initially expected (*Figure 3*).

After only four months and just three treatments of maggot therapy the wound was completely healed on one side of his sacrum, and reduced to 2cm x 2cm with a depth of approximately 2cm (*Figure 4*). The patient was confident in the fact that he could get out of bed for short periods at a time, giving him a much better quality of life.

It is essential when using maggot therapy that the surrounding skin is assessed as the enzymes responsible for cleaning the wound can cause maceration to the healthy tissue around the wound. To protect this skin Sudocrem (Forest Laboratories, Bexley) was applied around the margins of the wound. Regular wound swabs were taken to ensure no infection was present which could delay the healing process, although it has been reported that maggot therapy also helps to combat infections such as methicillin-resistant *Stapylococcus aureus* (MRSA) and also *Pseudomonas aeruginosa* (Parnes et al, 2007). The aim of regular wound swabbing was to detect any infection quickly in order to prevent any delays to healing.

Discussion

Maggot therapy is effective as it promotes rapid cleaning of the wound by removing necrotic and sloughy tissue. It can also control the production of offensive odours produced by some bacteria, as well as controlling infection. After ingesting micro-organisms, the maggots then go on to digest these micro-organisms causing the maggots to secrete chemicals such as allantoin, which has broad spectrum antibacterial properties. The maggots promote the healing process by eating the necrotic tissue and stimulating production and granulation of new healthy tissue.

There have been many papers published on the use of maggot therapy which discuss the use of maggots to debride and heal wounds in not only SCI but also diabetic foot ulcers. Using maggot therapy has been shown to be a positive experience for both patients and health professionals (Lodge et al, 2006).

In this case one application of maggot therapy produced significant improvements, and after only three applications the wound had practically healed. When the maggots had removed enough of the slough to move on to another method of healing, Promogran Prisma (Johnson and Johnson Wound Management, Ascot) was used which is designed to provide protection and growth by addressing continuous changes in the wound micro-environment.

By using maggot theapy the cost to the NHS can be greatly reduced. Thomas (2006) states that the saving to the NHS of using maggot therapy to debride wounds and promote quicker wound healing could be as much as £200m per annum.

The use of maggots in this instance promoted wound healing by removing the sloughy areas quicker than any other product that we tried (such as silver dressings). Although the other products used did lift the sloughy areas the process was slow and the patients holistic well-being had to be considered. He was becoming increasingly more depressed at the length of time the wound was taking to heal. This prompted the return to maggot therapy.

As stated previously SCI patients have many complications to contend with. When pressure ulcers form, it is important to help them heal as quickly as possible as this will greatly improve the patient's quality of life. This is hugely beneficial to both the patient but also to the NHS and healthcare professionals. WUK

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