

MAGGOT DEBRIDEMENT THERAPY

FOR PRESSURE INJURY MANAGEMENT IN TETRAPLEGIC PATIENT IN MALAYSIA

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CASE STUDY: AB-004



BACKGROUND

Pressure injury are one of major complication affecting patient with spinal cord injury (SCI). It is the consequence of a long standing pressure on area of skin over bony prominence. Such wounds can produce pain and deteriorate daily function and diminishes their physical, mental, emotional and social domains in life. As such, various management methods should be explored to ascertain a holistic management for each patient. This case report illustrates wound healing progress with maggot debridement therapy (MDT) of a 56-year-old man with level C4 incomplete tetraplegia from cervical spondylotic myelopathy complicated with infected bilateral gluteal pressure injury, and multiple drug resistant organism infection.

CASE SUMMARY

Mr. W is a 56-year-old man bedbound with underlying Diabetes Mellitus type II and C4 incomplete tetraplegia level from cervical spondylotic myelopathy, presented with an unstageable bilateral gluteal pressure injury.

Initial examination revealed patient to have multiple drug resistance organism, *Pseudomonas aeruginosa* from the urine specimen with unstageable non infected pressure ulcer, and was started on polymyxin E antibiotic. On day 4 of admission, the patient showed worsening of septic parameters despite antibiotic initiation and bedside wound exploration showed evidence of infection, thus warranting surgical debridement.

Despite wound care, antibiotic commencement, proper positioning and proper drainage of urine and evacuation of faeces, the patient required up to 3 surgical debridement as wound status continued to decline after each debridement. However, no osteomyelitic changes were noted throughout the admission. Maggot debridement therapy (MDT) was then initiated after the 3rd debridement, to facilitate in wound healing and minimizing recurrence of infected tissue.

The patient received a total of 4 cycles of medical grade maggot (*Lucilia cuprina*) for MDT. 150 to 200 maggots were placed for each cycle on the wound using sterile technique and replaced every 4 days within a 2 week period. *L. cuprina* were placed on the wound, covered by fluff gauze and followed by a transparent and breathable wound dressing. Improvement in the wound bed granulation tissue, wound size and slough/necrotic tissue were documented weekly using a direct measurement of wound dimension and calculated using formula, surface area = $0.73 \times \text{Length} \times \text{Width}$ [1].

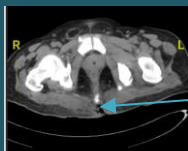


Figure 1 shows CT Pelvis done during admission (2/3/2021) shows:

Right sacral pressure sore involving right gluteal maximus muscle and exposing coccyx bones. No frank intramuscular or surrounding collection is detected. No OM changes noted.



Figure 2 above shows 3 images labelled A, B and C shows wound condition throughout admission prior to MDT Image A: Wound condition prior to 1st wound debridement (WD). Image B: Wound condition with acetic acid, dermasyn, and bactigrass dressing prior to 2nd WD



Figure 3 shows wound progress after 3rd WD from before MDT commencement (left), then post completion of 4 cycle of MDT (middle), to wound condition before patient discharge (right).

References:

1. Mayrowitz HN. Shape and area measurement considerations in the assessment of diabetic plantar ulcers. *Wounds*. 1997; 9:21-28.
2. Chronic ulceration of the leg: extent of the problem and provision of care. Callam MJ, Ruckley CV, Harper DR, Dale JJ. *Br Med J (Clin Res Ed)*. 1985 Jun 22; 290(6485):1855-6.
3. Pressure and shear: their effects on support surface choice. Jay R. *Ostomy Wound Manage*. 1995 Sep; 41(8):36-8, 40-2, 44-5.
4. Pascal S, Cathrien J, Doorn V, Steenvoorde P, Jacobi CE, Van Doorn L, Oskam J. Maggot debridement therapy of infected ulcers: patient and wound factors influencing outcome. *Ann R Coll Surg Engl* 2007; 89: 596–602.
5. Sherman RA. Maggot therapy for treating diabetic foot ulcers unresponsive to conventional therapy. *Diabetes Care* 2003; 26: 446–51.
6. A. G. Paul, N. W. Ahmad, H. Lee et al., "Maggot debridement therapy with *Lucilia cuprina*: a comparison with conventional debridement in diabetic foot ulcers," *International Wound Journal*, vol. 6, no. 1, pp. 39–46, 2009.
7. Whitaker IS, Twine C, Whitaker M, Welck M, Brown CS, Shandall A. Larval therapy from antiquity to the present day: mechanisms of action, clinical applications and future potential. *Postgrad Med J* 2007; 83: 409–13.
8. Kerridge A, Lappin-Scott H, Stevens JR. Antibacterial properties of larval secretions of the blowfly, *Lucilia sericata*. *Med Vet Entomol* 2005; 19: 333–7.
9. Van Der Plas MJ, Jukema GN, Wai SW, Dogterom-Ballering HC, Lagendijk EL, Van Gulpen C, Van Dissel, Bloemberg VG, Nibbering PH. Maggot excretions/secretions are differentially effective against biofilms of *Staphylococcus aureus* and *Pseudomonas aeruginosa*. *J Antimicrob Chemother* 2008; 61: 117–22.
10. Bexfield A, Nigam Y, Thomas S, Ratcliffe NA. Detection and partial characterisation of two antibacterial factors from the excretions/secretions of the medicinal maggot *Lucilia sericata* and their activity against methicillin-resistant *Staphylococcus aureus* (MRSA). *Microbes Infect* 2004; 6: 1297–304.

DISCUSSION

Pressure injury occurs from a product of sustained increased pressure over an area of skin. Tissue perfusion is compromised in high pressure area as flattened blood vessels cause microcirculatory occlusion. This initiates a downward spiral toward ischaemia, tissue death and ulceration [2]. The resultant distortion of the internal conjugation of soft tissues are significantly high in spinal cord injury patients [3].

The infected pressure injury highlighted in this case was treated using MDT after 3rd surgical debridement. Before implementing MDT, the authors investigated the efficacy of MDT and discovered that MDT implementation in the UK had a 67% successful outcome rate in wound healing [4]. Other researches using MDT for diabetic foot ulcer also showed a greater rate of granulation tissue formation, reduction in wound size [5] and shorter ward stay [6].

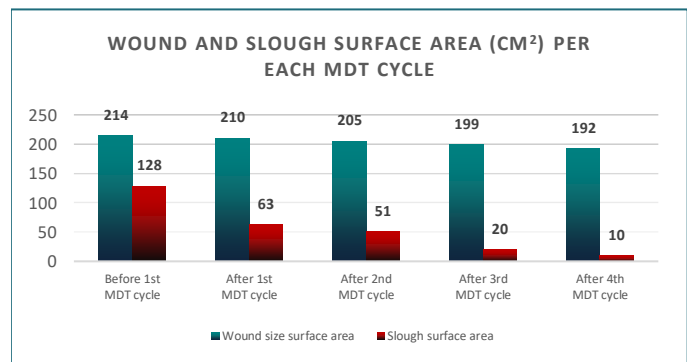


Figure 4 shows wound and slough surface area (cm²) per each maggot debridement therapy (MDT) cycle

Usage of MDT in our patient finally resulted in resolution of wound infection (figure 4) after failure to achieve a healthy wound bed despite exhaustive treatment with multiple surgical debridement. During each MDT cycle over the total course of 2 weeks, the infected wound surface was shown to decrease from 60% (128cm²) to 5% (10cm²). *L. cuprina* produces a mixture of proteolytic enzymes, including collagenase, which disintegrates necrotic tissue to a semi-liquid form that can then be absorbed and digested by the maggots. The mobilisation of maggots on the wound bed also facilitated mechanical debridement by causing wound disturbance. *L. cuprina* also produces antibacterial compounds that are similarly found in studies of *L. sericata* maggots which have been shown to be effective against a range of bacteria, including *Methicillin-resistant Staphylococcus aureus* [7] and to a lesser extent of Gram-negative *Pseudomonas aeruginosa* [8][9]. Their antibacterial properties are designed for self-defence to facilitate destruction of ingested microorganisms. Both *L. cuprina* and *L. sericata* also has been shown to produce similar wound healing secretions [10].

To facilitate wound healing, strict bowel regulation and urinary diversion with continuous bladder drainage was employed to prevent wound contamination. Prone positioning was emphasised amongst the nursing team to offload wound. Subsequently Mr W underwent modern dressing for 1 month with no recurrent infection over the wound bed, before being discharge with family members continuing wound care.

CONCLUSION

Maggot debridement therapy proved to be a good option in wound management and facilitating pressure injury healing for the SCI patients provided incontinence management and good off-loading mechanism is executed.