Woods_Larval_Therapy_Reset_GP_Layout 1 13/03/2013 17:38 Page 11

JCN

WOUND MANAGEMENT

Reviewing the effectiveness of larval therapy

Throughout history, it has been observed that wounds tended to heal more quickly with fewer complications when larvae found their way onto open wounds. Larval therapy (LT) is used for the debridement of chronic wounds and to create a wound bed conductive to effective healing. The aim of this article is to discuss the effectiveness of larval therapy for the debridement of chronic wounds through a critical analysis of the relevant literature.

Key words:
Larval therapy
Chronic wounds
Debridement

Laura Wood, BA (Nursing). Previously Staff Nurse, AMU, Heartlands Hospital, Birmingham

Mark Hughes RGN, DN, HV, BSc (Hons), MSc, PGCE, Lecturer, University of Birmingham

Article accepted for publication: December 2012

Larval therapy (LT) is used in both chronic and acute wounds for the debridement of necrosis, suppuration or infection[1,2]. Debridement by LT occurs through[1,3]: the presence and movement of larvae in the wound loosening surface debris; the secretion of proteolytic enzymes which liquify necrotic tissue ingested by larvae, and the secretions altering the wound pH, preventing the growth of bacteria.

The effectiveness of larval therapy (LT) has been demonstrated in non-empirical research. Such studies however, are classified as 'weak' in the hierarchy of evidence[4], and thus not robust enough to inform evidence-based practice (EBP). This review aimed amongst other things, to critically analyse relevant literature in order to determine the effectiveness of LT as a debridement method for all types of chronic wounds and ultimately, to make recommendations for future nursing practice.

Methodology

Key search terms included 'chronic wounds' and 'effectiveness of LT'. MEDLINE, EMBASE, CINAHL, British Nursing Index (BNI), Allied and Alternative Medicine (AMED), the Cochrane Library and PsycInfo, and all literature published in or since 1995.

Chronic wounds such as pressure ulcers (PU), diabetic foot ulcers (DFU), leg ulcers (LU) and fungating/malignant carcinomas[1] have been defined as "wounds which have failed to progress through the four stages of wound healing within an expected timeframe"[5], or those 'of long duration' or that 'recur frequently'[6]. 'The effectiveness of larval therapy' was measured by searching articles which detailed both improvements in wounds and those in which LT was less effective[7,8]. The assessment parameters identified included:

- a decrease in surface area
- a reduction in necrotic tissue
- increased growth of granulation tissue
- complete wound debridement
- LT versus conventional therapy
- maggot-associated pain

Results

The inclusion criteria were that the studies should be quantitative research papers relevant to the research question. They should be all full text, published articles in English since 1995, and conducted on human adult males and females. After evaluating the methodological quality of the 127 studies found[9], 116 were discounted, leaving 11.

Study design and sample size

Eight of the studies were quasi-experimental designs, of which five were case series[7,10,12] and three pre-post-test designs[13-15]. The final three were experimental designs; one randomised control trial (RCT)[8] and two controlled trials[17,18].

Sample sizes ranged from 10 to 267, (case studies, where events are bounded by time and well defined, and RCT respectively). Five studies[8,15-18] used a convenience method whereby the researcher chooses participants according to whom or what is available[19]. In these studies, participants had been referred to a local LT service[16], were inpatients in a vascular surgery unit at a local hospital[15] or were the first 20 patients alphabetically of a community nurses caseload[13]. Although convenience sampling is considered the lowliest method of gathering participants,[19], it was justified as these locations are where chronic wound patients are most likely to be receiving their care[8].

The articles had some significant methodological flaws which brought their reliability and transferability into question. For example, some participants had one cycle of treatment whereas others might have had four, or LT was also administered in different ways within the same study with some receiving free range larvae and some receiving bagged. The obvious exception is Dumville et al.[8], whose study had both validity and rigour; an RCT (267 patients) using a log rank test, a statistical method of comparing spreads of time until the inci-

Woods_Larval_Therapy_Reset_GP_Layout 1 12/03/2013 17:16 Page 12

Table 1: Meta-analysis of the study findings

Article	Country of origin	Aim of Research	Research Design	Sample Size	Results
10	Bratislava	To test the effectiveness of LT for the treatment of chronic leg ulcers where other therapies have failed	Case series design	10 patients with 13 ulcers	• Massive growth of granulation tissue • Pain and itching associated with maggots
21	Israel	To test the effectiveness of LT for the treatment of chronic wounds and ulcers in hospitalised patients	Case series design	25 patients with 43 wounds	• Some patients experienced increased pain whilst others reported reduced pain • Decrease in wound odour • LT salvaged limbs that would otherwise have needed amputating • Prevented patients from developing septicaemia
14	Germany	To test the clinical effects of maggot therapy on chronic leg ulcers as well as any possible side effects and mechanisms of action	Pre- and post-test design	30 patients	• Temporary increase in wound exudate and inflammation • Mild pain • Debridement achieved • Increase in granulation tissue
7	Sweden	To test the effectiveness of LT on chronic ulcers	Case series design	74 patients	• Decrease in necrotic tissue • Maggots had no debridement affect on sloughy tissue • Worked well in diabetic patients • Decrease in odour • Increased pain • Physiologically repellent
11	UK	To test the effectiveness of LT on chronic wounds? – No research question given	Case series design	34 patients	• Decrease in necrotic tissue
16	USA	To test the effectiveness of LT for foot and leg ulcers in diabetic patients, where other therapies have failed	Controlled trial	18 patients with 20 ulcers	• LT debrided faster than conventional therapy • Reduction in necrotic tissue • Faster growth of granulation tissue • Mild pain – but same patients reported pain during conventional therapy as well
18	USA	To test the effectiveness of LT for the treatment of pressure ulcers	Controlled trial	103 patients with 145 pressure ulcers	• Patient anxiety due to maggots • LT debrided faster than conventional therapy • Reduction in necrotic tissue • Rapid growth of granulation tissue. • Mild pain – but same patients reported pain during conventional therapy as well
15	Egypt	To test the effectiveness of LT for the treatment of diabetic foot ulcers	Case series design	10 patients with 13 ulcers	• 100% of ulcers debrided. • Decreased amount of necrotic tissue • Decreased size of ulcers – some completely closed
8	UK	To test the effectiveness and cost-effectiveness of LT on chronic leg ulcers compared to other debridement methods	Randomised control trial	267 patients	• No difference in outcome in loose or bagged larvae • Sped up wound debridement but not overall wound healing • Increase in pain
12	Turkey	To test the effectiveness of LT on chronic wounds in a military hospital	Case series design	11 patients	• Complete debridement achieved • Increase in granulation tissue • Increased pain
17	USA	To test the effectiveness of LT for treating pressure ulcers in spinal cord injury patients	Pre- and post-test design	8 participants	• All ulcers completely debrided • Increased healing rates of ulcer

Woods_Larval_Therapy_Reset_GP_Layout 1 12/03/2013 17:16 Page 14

dence of an event (wound debridement). Sherman[18] and Sherman[16] were also found to be methodologically competent.

Findings

Table 1 shows a meta-analysis of the study findings.

Healing assessment parameters

Sherman[16] and Sherman[18] compared LT with conventional hydrogel therapy, and found LT to be more effective for debridement and overall wound healing in both DFus and PUs. These results partly reflect the findings of others[7,14,15], who observed that participants with diabetes had effective outcomes with LT compared to other treatments. Dumville et al.[8] however, found that LT was considerably faster at debriding LUs than conventional hydrogel therapy, but did not speed up the overall healing process. These results indicate the effectiveness of LT in overall wound healing is subjective to the type of chronic wound.

Although the frequency of applications of LT varied in and between the studies, Tanyuksel et al.[12] achieved complete debridement in the shortest time – 10 out of 11 wounds were completely debrided in eight days. Complete debridement of PUs and DFUs took an average of one to four weeks[13] and one to nine weeks[15] respectively. Unfortunately, there was no comparison with a conventional debridement technique in any of the studies, so it cannot be stated for certain that a conventional technique would have debrided these wounds in less time.

Wolff and Hansson[7], Turkman et al.[11] and Tantawi et al.[15] observed a reduction in necrotic tissue after LT, although these studies only stated either the amount of reduction or the percentage of participants who had experienced a reduction.

Pain

Dumville et al.[8] reported that 40 per cent of participants experienced increased pain during LT compared to 4.3 per cent of participants who underwent conventional therapy. However, in other studies, the proportion of patients experiencing pain was the same for both interventions[16,18].

Discussion

This study enhances the understanding of the effectiveness of LT as a debridement method in chronic wounds and in the authors' opinion, has successfully answered the research question. Based on the weighting of the studies from the critical appraisal, the main findings that can be supported by reliable evidence are that:

- LT is significantly more effective at debridement than hydrogel or a mixture of conventional therapy modalities[20], although is no more effective for overall wound healing
- effectiveness depends on the type of chronic wound; LT appears to be more effective on PUs than other chronic wounds[13], and on wound debridement (but not healing) in leg ulcers[8]
- some experience increased pain during LT, although not appreciably more than with conventional therapy
- LT can reduce the surface area of all chronic wounds[16,18], but so will other debridement methods
- LT can achieve complete debridement within a shorter time period in certain types of chronic wounds, such as sloughy and/or necrotic chronic venous and mixed venous/arterial leg ulcers compared with hydrogel[8]

The results of this review are based on a sample of 590 participants across 11 different studies. This would be a large enough sample to have an impact on practice if all of the studies had been found to have rigorous methodologies, yet they did not. Despite this, the studies that were found to be rigorous made up 65.7 per cent of the 590 participants, increasing the prospect of transferability. Recommendations for practice include:

- promoting the wider use of LT for the initial debridement of chronic wounds until an optimum wound bed is achieved
- increasing the availability of training to use LT
- promoting wider availability of LT to match the availability of conventional methods

Conclusion

This review was conducted to test the effectiveness of LT as a treatment intervention for chronic wounds. The quality of evidence was found to be variable; only three of the articles[8,16,18] had reliable and rigorous methodologies leading to them being given a greater weighting in our findings.

The amalgamation of the results of all the studies under these themes led to a number of findings which correspond with the background research, have implications for future nursing practice and helped to identify any necessary needed further research.

References

1. Parnés A, Lagan KM. (2007) Larval Therapy in Wound Management: A Review. *International Journal of Clinical Practice*. 61; 3:488-493

2. Acton C. (2007) A Know-how Guide To Using Larval Therapy For Wound Debridement. *Wound Essentials*. 2: 156-159

3. Pyatt V. (2011) The use of larval therapy in modern wound care. *Wounds International*. 2; 4: s23-24

4. Aveyard H. (2007) *Doing a literature review in health and social care: a practical guide*. OU Press

5. Myers BA. (2004) *Wound Management – Principles and Practice*. (1st ed.) Prentice Hall, USA

6. Stacey M, Lazarus G. (2010) The "chronic" wound debate. www.woundsinternational.com/made-easys/the-chronic-wound-debate

7. Wolff H, Hansson C. (2003) Larval therapy - An effective method of ulcer debridement. *Clinical and Experimental Dermatology*. 28; 2: 134-137

8. Dumville JC, Worthy G, Soares MO, et al. (2009) VenUS II: a randomised controlled trial of larval therapy in the management of leg ulcers. *Health Technology Assessment*. 13; 55: 1-182

9. Greenhalgh T. (2006) *How To Read A Paper – The Basics Of Evidence-Based Medicine*. (3rd ed.) Blackwell Publishing, London

10. Cambal M, Labas P, Kozanek M, et al. (2006) Maggot Debridement Therapy. *Bratislavske Lekarske Listy* (Bratislava Medical Journal). 107; 11-12: 442-4

11. Turkmen A, Graham K, McGrouther DA. (2008) Therapeutic applications of the larvae for wound debridement. *Journal of Plastic, Reconstructive and Aesthetic Surgery*. 63; 1: 184-188

12. Tanyuksel M, Araz E, Dundar K, et al. (2005) Maggot debridement therapy in the treatment of chronic wounds in a military hospital setup in Turkey. *Dermatology*. 210; 2: 115-118

13. Sherman RA, Wyle F, Vulpe, M. (1995) Maggot Therapy for Treating Pressure Ulcers In Spinal Cord Injury Patients. *The Journal of Spinal Cord Medicine*. 18: 71 – 74

14. Wollina U, Liebold K, Schmidt W, et al. (2002) Biosurgery supports granulation and debridement in chronic wounds - Clinical data and remittance spectroscopy measurement. *International Journal of Dermatology.*, 41; 1: 635-639

15. Tantawi TI, Gohar YM, Kotb MM, et al. (2007) Clinical and microbiological efficacy of MDT in the treatment of diabetic foot ulcers. *Journal of Wound Care*. 16; 9: 379-83

16. Sherman RA. (2003) Maggot therapy for treating diabetic foot ulcers unresponsive to conventional therapy. *Diabetes Care*. 26; 2: 446-451

17. Sherman RA. (2002) Maggot Therapy for Foot and Leg Wounds. *The International Journal of Lower Extremity Wounds.*, 1; 2: 135-142

18. Sherman RA. (2002) Maggot versus conservative debridement therapy for the treatment of pressure ulcers. *Wound Repair & Regeneration*. 10; 4: 208-14

19. Polit T, Beck CT. (2006) *Essentials of Nursing Research – Methods, Appraisal and Utilization.*, (6th ed.) Lippincott Williams & Wilkins, Philidelphia

20. Zarchi K, Jemec GBE. (2012) The efficacy of maggot debridement therapy – a review of comparative clinical trials. *International Wound Journal*. 9: 5; 469–477

21. Mumcuoglu K, Ingeber A, Gilead L et al (1990) Maggot therapy for the treatment of intractable wounds. *International Journal of Dermatology*. 38; 8: 623-627

Making healing possible

BioMonde is a European wound care company specialising in the manufacture and distribution of larval therapy for chronic, infected and necrotic wounds.

Our state-of-the-art pharmaceutical production units in the UK and Germany, together with our commitment to research, development and education make BioMonde the first choice in larval debridement therapy and wound cleansing.

For more information about Larval Debridement Therapy, or to arrange a clinical visit or an education session, please call **0845 230 1810** or visit:

www.biomonde.com

BioMonde®

BM201_01_0313

BM201_01_0313_journalAd_A4 artwork.indd 1 11/03/2013 08:51