The combined use of maggot debridement therapy (MDT) and negative pressure wound therapy for the management of patients with diabetes foot osteomyelitis (DFO)

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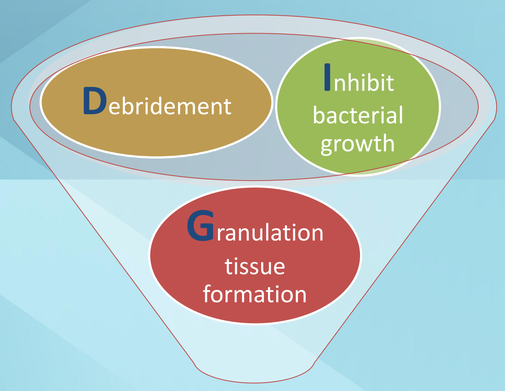
Introduction

Effective debridement is one of the key principles of wound bed preparation. The presence of biofilm in chronic wounds complicates the effectiveness of regular sharp debridement. Maggot debridement therapy is a form biodebridement of non-viable tissue in a continuous and pain-free manner. Their secreted proteolytic enzymes selectively liquify necrotic tissue without damaging healthy tissue.

The "DIG" model of Mechanism



Methods

Case report of 2 patients diagnosed with DFO with CLTI treated with combination of uncagged maggot debridement therapy (*L. curpina*) and NWPT

Illustrative case

Case 1

A 59-year-old Chinese male presented with worsening gangrene of left posterior heel despite previous revascularization and DAPT (Aspirin + Clopidogrel)

Phmx: T2DM, hyperlipidemia, Hypertension, PAD, diabetic peripheral neuropathy, ESRF

PE: 7cm by 7cm well-defined gangrene over left plantar heel; PTA non-palpable ; DPA palpable

Previous management: regular wet-dry dressing with 10% povidone iodine solution

Lab: Inflammatory markers flat

Imaging: Cortical erosions and signal accentuation within calcaneal marrow cavity on T2-FS weighted images

Bone Culture: *methicillin-resistance s. aureus*

WIFI: 322.

Patient Management

Revascularization: Drug-eluting balloon angioplasty of left SFA; Post-PTA scan shows single-vessel outflow to the feet via the PTA.

Abx regimen: Initial 10-days IV clindamycin 600mg and subsequent 5days oral clindamycin 450mg; additional 6-weeks IV vancomycin (dose-adjustment from 2g to 250mg)

Tissue culture during MDT: Reduction of MRSA count from heavy to moderate

Maggot species*:* *Lucilia Cuprina*

Maggot treatment cycle: Alternating treatment involving 1-week MDT, 1-week NWPT and back to 1-week MDT (See Figure 1 for details)

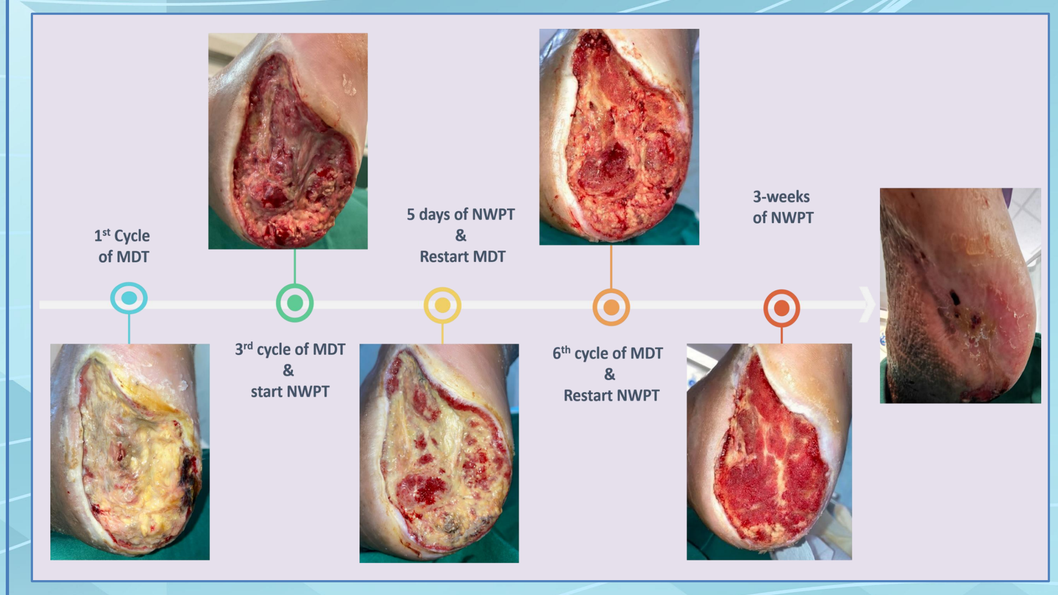


Figure 1: Alternating treatment involving 1-week MDT, 1-week NWPT and back to 1-week MDT, after which NWPT is continued for another 2 months. wound closure achieved within 3-month from initial presentation

Case 2

A 72-year-old Indian male presented with infected gangrene of left hallux toe

Phmx: T2DM, Asthma, colon diverticulitis, PAD

PE: wet gangrene + purulent pus from left hallux toe; DPA non-palpable, PTA palpable; TBI 0.48

Previous management: 1-week NWPT following First ray amputation + revisional shortening of hallux

Lab: Elevated leukocytosis (WBC: 20.25 x10^9/L; CPR: 382mg/L),

Imaging: Bony erosion of first MTPJ on plain radiographs

Bone Culture: *Streptococcous agalactiae + peptostreptococcus spp* (taken during initial first ray amp)*; Seratia . marcescens* (revisional shortening of first ray)

WIFI: *233*

Patient Management

Revascularization: Plain balloon angioplasty L Anterior Tibialis Artery (ATA); Post-PTA AO: good run-off via PTA + ATA.

Culture-directed Abx regimen: 2-weeks IV Augmentin 1.2g (s/p first ray amp) to 1-week IV cefepime (s/p revisional shortening of first ray); Stepdown to oral regiment of combination of 10-days Augmentin and 6-days Ciprofloxacin

Culture during MDT: *Trichosporon asahii (fungal)*

Maggot species*:* *Lucilia Cuprina*

Maggot treatment cycle: Continuous 2-weeks of MDT and followed by 3-weeks of NWPT. (See figure 2 for details)

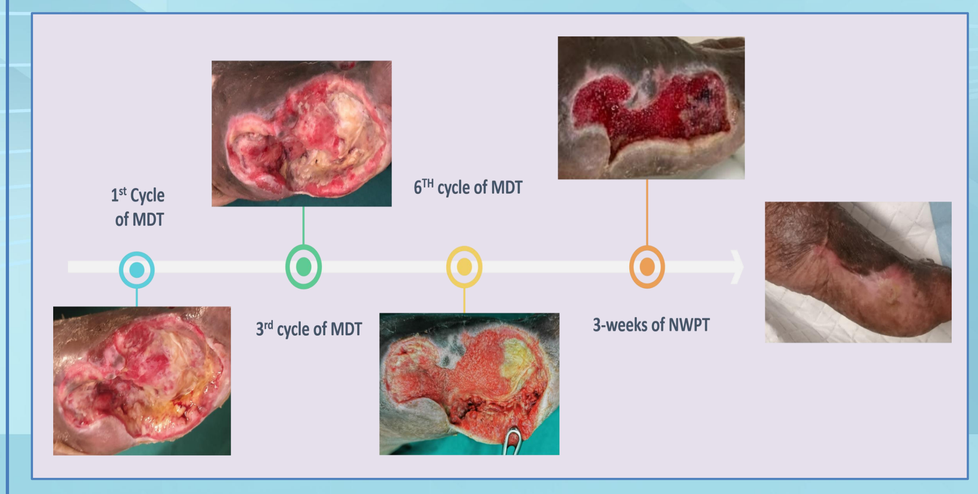


Figure 2: Continuous 2-weeks of MDT and followed by 3-weeks of NWPT. Biodegradable temporizing matrix (BTM) skin substitute applied after wound becomes superficial and healthy granulation tissue observed . *Wound closure achieved within 3-month from initial presentation*

Discussion/Conclusion

- MDT facilitate the ease of removal of necrotic and cellular debris in a pain-free manner
- Continuous treatment cycle of 2-weeks MDT may promote more thorough debridement leading to better clinical outcomes than intermittent treatment cycles
- Preliminary observation of bioburden profile change with MDT. Future studies are required to deliberate this phenomenon to expand our understanding of the mechanism