Fuzzy Wale Compression (FWC) Stockinet Delivers Positive Pressure Wound Therapy (PPWT™)

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Abstract

Background: Compression is the cornerstone in the management of venous leg ulcers (VLU) and edema of multiple origins.[1, 2] Historically, compression dosage (mmHg) and gradience have been the principal determinates of therapeutic benefit of a compression application.[3] New research demonstrating a third dimension, pressure distribution across the tissue/wound, has unlocked new perspectives of how compression reduces edema and impacts wound healing.[4]
A novel textile, Fuzzy Wale Compression Stockinet, was observed *in vitro* to produce longitudinal vertical distribution of pressure with alternating areas of little or no compression pressure. This in contrast to the more uniform distribution of traditional compression applications.[4] The unique alternating pressure distribution observed in vitro has been clinically observed to produce better edema management and wound edge migration which mirrors the vertical pressure distribution.
Method: A case series (n=5), with photos before and after, clearly demonstrating the tissue deformation produced and clinical healing progress that followed the incorporation of the augmented compression textile as a direct interface with wound. Details of each case including comorbidities, previous treatment interventions, and detailed explanation of treatment application will be included.
Conclusion: Wound healing involves complex interplay between numerous cells types, cytokines, mediators, and the vascular system.[5] Local factors that can affect wound healing are pressure, tissue edema, hypoxia, infection, maceration and dehydration.[5] The authors postulate the utilization of the longitudinal elastic stockinette as a wound contact layer delivers positive pressure wound therapy (PPWT)©, analogous to negative pressure wound therapy (NPWT), in delivering physiologic cell micro-distortion known to signal DNA to synthesize the many proteins necessary to clear dermatitis and heal wounds.[6, 7]

*Positive Pressure Wound Therapy (PPWT)™ Suzie Ehmann, Albemarle, NC
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Case 1[3]

HPI: 72 y/o male presented with a stage IV PI L heel ulcer which had been present for 5mo, and a left leg ulcer which developed 3mo prior.

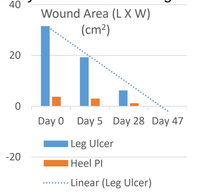
PMH: CHF, HTN, CVA – non-ambulatory/dependent for all transfers, DM, neuropathy, (+)tobacco

- Previous treatments including NPWT, debridement, offloading and topical dressings including both honey and silver creams/gels.

Day 0

Day 5

Day 28



Note the dramatic reduction in wound volume with initiation of PPWT

Note 'scalloped' healing edge to wound post inclusion of PPWT

Treatment: FWC direct wound interface -> collagen, absorptive pad, multilayer compression application

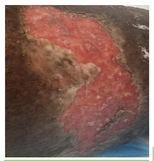
Case 2[1]

HPI: 58 y/o male presented with non-healing ulcerations bilateral LE. Wounds had copious exudate.

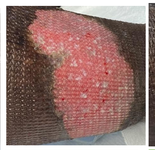
PMH: obesity, DM, HTN, PVD, CRD on HD.

-previous treatment included standard of care compression and alginate; exudate soaking through dressings in a 2 day time period.

Treatment: FWC direct wound interface (a) -> AFM → ABD pad. Toe bandage applied f/b two layer cohesive compression wrap (b) as depicted. Pt seen 2x/wk til wound closure at 4 wks



Initial Presentation



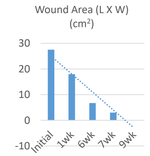
1 wk → note scalloped margins from FWC

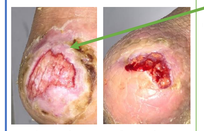
3 ½ wks → note epithelialization with hypopigmentation

Case 3[1]

HPI: 75 y/o male presented with stage III PI left heel sustained during extended ICU stay r/t CHF exacerbation.

PMH: obesity, DM, recurrent DFU r/t Charcot joint and ill fitting orthosis required for weight bearing, CVD, Lymphedema bilateral LE managed with custom flat knit garments.





1 week

6 week

'Scalloped' Healing Edge → PPWT

7 week

9 week

Treatment: FWC direct wound interface → AFM → dry gauze → 2-layer cohesive; Pt seen 2x/wk for first 4 wks, then weekly.

Case 4[1]

HPI: 77 y/o male with PAD, not a surgical candidate, presents with chronic LE ulceration dorsum of foot resulting from a trauma. Wound is worsening over the last 3mo

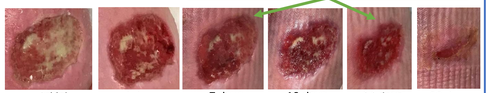
PMH: PAD (ABI 0.6, 70% occlusion of Tibial Artery), HTN, DM, CAD, A-fib, CHF, h/o DVT left LE, non-ambulatory/transfers only, lymphedema B/L LE

Previous Treatment: Unna Boot – patient did not tolerate d/t 'pain', wrap 'cutting into' leg causing patient to remove.

Treatment: FWC direct wound interface →AFM →dry gauze → Kling; multi-component lymphedema wrap.
Patient seen initially 3x/wk for 2 wks, then reduced to 2x/wk. Continued to wound closure at 45 days.

Note improved appearance of wound with adequate compression

Note 'scalloped' healing edge to wound post inclusion of Lymphatic Alternating Pressure Profile (LAPP) textile



Initial Presentation | 4 days | 7 days | 10 days | 14 days | 39 days

Standard of care – Unna Boot

Multi-component lymph wrap

'Augment' compression with addition of FWC to multi-component lymph wrap consisting of open cell rolled white foam and 4 short stretch compression bandages..

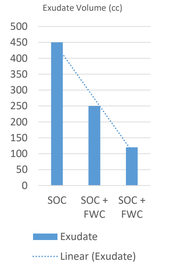
Case 5[2]

HPI: 81 y/o female with h/o progression LE ulcerations, with copious drainage, both LE x 3mos.

PMH: CVD, Afib, HTN

-previous treatment include absorbent dressing and multi-component lymph wrap. NPWT initiated with the multi-component lymph wrap applied over the NPWT dressing. This was continued for 3mos at which time the change in the wound healing stalled.

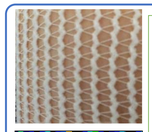
Treatment: Standard of care (SOC) included NPWT →with multi-component lymphedema wrap consisting of rolled white foam and four short stretch compression bandages. When the wound healing stalled, FWC was applied over NPWT dressing →continued with multi-component lymphedema bandage. After 3 applications of augmented compression, the exudate reduced to <120cc. The NPWT d/c. FWC was applied direct wound interface → AFM →ABD pad → kling →multi-component lymphedema wrap. This was continued until wound closure.

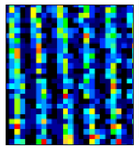


SOC

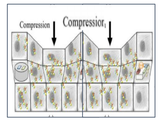
SOC + FWC

SOC + FWC





Application of FWC produces distinct, alternating, vertical channels of pressure which mechanically deform the tissue.[4] Clinically, observe unique scalloped wound margin, linear advance of wound edge and overall accelerated wound healing.



Take Away Message

1. **Therapeutic compression is more than dosage (mmHg) at B1 (ankle) position. Distribution of pressure in the vertical and horizontal space is also relevant.**
2. **FWC is an elastic stockinette that produces a unique longitudinal pattern of alternating high and low (or no) channels of compression.**
3. **FWC is an elastic stockinette that when worn alone produces 8-10mmHg compression.**
4. **Combination of FWC and other forms of compression produces statistically higher IP.[4]**
5. **Combination of FWC with other forms of compression harnesses both macro-and micro-vascular benefits of compression.**
6. **Regardless of etiology inclusion of FWC channels PPWT!!!**

References

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