Long Fiber Activated Carbon Cloth as a Skin Contact Layer Reverses Moisture Associated Dermatitis:

probable therapeutic mechanisms include water transport and absorption of inflammatory molecules

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Presentation:

- 94 y/o F with chronic of intertrigo chest wall skin folded onto abdominal wall, with moisture associated dermatitis the result of thoracic spine kyphosis.

Treatment:

- Patient lived independently in her farm home and did self-care. There was no response over 30 months to shower sprays, topical antifungals, oral and topical antibiotics.
- Activated Carbon long fiber cloth sheets*, 8 x 10 inches, held by undergarments in loose contact with the intertriginous rash, was changed twice a week. Skin improvement was observed after the second dressing change.

Rx Day #0: 01/27/17. Cell phone photograph, taken by the patient's daughter who is an RN, showed raised folds of skin with painful chronic inflammation that is undergoing contraction. This contraction in response to inflammation is similar to the scar contractures that form in burned skin. Breasts are not involved in this process, the horizontal ridge seen in photograph is formed by chest wall skin folded against abdominal wall due to thoracic spine kyphosis.

Rx day #47: 03/15/17. Improvement in moisture damaged skin is obvious.

Observe complete healing of macerated, inflamed, painful skin with kissing hyperpigmented skin patches after ~ 10 weeks of wearing sheets of Zorflex in contact with rash, held in place by loose underclothes.

Outcome:

- Complete resolution of macerated skin ~10 weeks.

Presentation:

- 73 yo obese F discharged after 10 days in ICU for urinary tract sepsis with 60 lb. weight gain.
- Anasarca due to heart failure and renal insufficiency.
- Resolving renal failure due to urinary tract cancer obstructing L ureter.
- Moisture damaged L leg skin due to massive edema.

Treatment:

- Debridement of dried serum and macerated skin.
- Activated carbon cloth contact layer.*

Rx Day 0#: Moisture damaged skin due to lymphorrhea and edema following 10 days in ICU. Blue arrows point to patches of inspissated serum which was removed at first visit using hypochlorous acid and a terry wash cloth.

Rx Day # 21: Activated carbon cloth*

Rx Day # 21: Dramatic exfoliation and healing of moisture damaged skin, the result of activated long fiber carbon cloth contact layer. Observe cornrow furrows due to fuzzy wale elastic compression.**

Outcome:

- Complete resolution of moisture associated damage skin damage MASD day #21 with long fiber activated carbon cloth contact layer and Robert Jones compression dressing.

Presentation:

- 87 y/o F, painful weeping venous leg ulcer.
- Treated 5 months with oral antibiotics by referring physician.
- Zinc oxide was used to prevent periwound skin from moisture damage.
- Comorbidities: CHF and immobility with dependent feet with 6mm pitting pretibial edema.
- Occlusive arterial disease (pedal pulses absent).

Treatment:

- Long Fiber Activated Carbon cloth contact layer
- Robert Jones Compression Dressing

Rx Day #0: Painful R VLU. Observe exuberant exudate, senile skin and zinc oxide paste on skin used to protect skin from moisture damage. Note that the wound edges exhibit mild epiboly. Patient refused debridement of desiccated eschar in central wound due to exquisite pain.

Rx Day #7: The black carbon cloth with serrated edges in this photograph, was sourced from a deconstructed anti-odor cloth dressing by removing a thin white nylon cover.*** Activated carbon cloth has been used to control odor in dressings since 1960's and recently has be found to be a highly effective therapeutic contact layer. Hypochlorous acid irrigation augmented "soft" wound debridement with dry terry cloth.

Rx Day # 7. Photo shows Robert Jones dressing after 7 days. Observe decreased peri wound erythema, increased granulation and epithelization, and flattened wound edge epiboly. The 3 layer dressing elastic compression dressing seen in photo delivered elastic compression via fuzzy wale elastic stockinet** with activated carbon cloth as the wound contact layer.* This patient demonstrated dramatic robust wound bed preparation as the result of the unique therapeutic chemistry of activated charcoal interacting with the granulation wound bed.

Rx Day #31: This pair of photos shows a healed VLU with dry eschar. Following curette debridement, the wound is 98% healed. Patient discharged from clinic with prescription to shower legs with soap daily and to wear fuzzy wale compression stockinet** to prevent recurrence.

Outcome:

Complete healing day #31.

Problem

Skin maceration often complicates elastic compression of venous leg ulcers (VLUs). Bacterial colonization of macerated epidermis leading to skin break down is the feared coup de grace leading to an open VLU. We observed that activated carbon cloth as a skin contact layer often reversed peri wound skin dermatitis due to moisture damage.[1]

For decades, long fiber activated carbon cloth was used inside composite dressings to control odor, and recently has proven effective as a skin contact layer that speeds wound bed preparation.[2,3] Rayon cloth baked in a nitrogen environment acquires a thick patina of activated carbon via pyrolysis. Fibers thus transformed to activated carbon are 1. hydrophilic, making them effective in transporting water, 2. have a massive effective surface area (> 100 meters2 per gram), and 3. sport reactive surface electrons that bind all manner of molecules via London dispersion forces.[4] These 3 mechanisms act to decrease inflammation in macerated skin colonized with bacteria.[1]

This anecdotal series asks, Can a contact layer of long fiber activated carbon cloth* reverse moisture associated skin damage (MASD)?

Methods

Three cases of MASD, two lower extremities, and one case of anterior torso kyphosis skin fold intertrigo, were treated with long fiber activated carbon cloth in contact with skin.

Results

Photographs document presentation, treatment, and patient outcomes. Clearing of dermatitis was dramatic in each case.

Conclusion

Anecdotally long fiber activated carbon cloth as a skin contact layer appears to reverse MASD.

References

1.Winkler, S. Activated Carbon Cloth in Contact with Venous Leg Ulcer Granulation Tissue is Synergistic with Fuzzy Wale Focused Elastic Compression Therapy, Science Poster, SAWC Denver May 1, 2013. http://www.compressiondynamics.com/clinicalresearch.asp

2.Stadler et al. Survey of 12,444 patients with chronic wounds treated with active carbon cloth. Akt Dermatol 2002; 28: 351-354

3.White, R.J. A Charcoal dressing with silver in Wound Infections: Clinical Results. British Journal of Community Nursing, Vol 6, Issue 12, 10 Dec 2001, p 4-11.

4.London, F. "Über das Verhältnis der van der Waalsschen Kräfte zu den homöopolaren Bindungskräften". Zeitschrift für Physik. 60 (7–8), 1930, also available as, London, F. Zeitschrift für Physik, vol. 44, p. 455 (1927). English translation in H. Hettema, Quantum Chemistry, Classic Scientific Papers, World Scientific, Singapore (2000).

* Zorflex® Activated Long Fiber Carbon Cloth, Calgon Carbon, Chemviron Division, Tyne on Wear, New Castle UK, available in USA from NovaGran Wound Care Products, a division of PBE, Bowling Green, Ohio 43402 Top of Form

** EdemaWear® Fuzzy Wale Elastic Compression Stockinet, Compression Dynamics LLC, Omaha, Nebraska 68102

*** Actisorb® Airebank Mills, Skipton, North Yorkshire, UK