Clinical management of non-uremic calcific arteriolopathy

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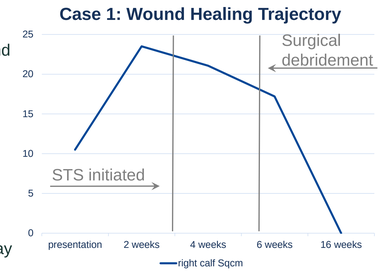
Background/Introduction: Calcific arteriolopathy, also known as calciphylaxis, results in calcium deposition in the arteries and arterioles of the soft tissues leading to painful ischemia, thrombosis, and cutaneous necrosis. Calcific arteriolopathy is commonly associated with end stage renal disease (ESRD) and hemodialysis patients, but it can also occur outside of ESRD. This is then known as non-uremic calcific arteriolopathy (NUC). NUC has a high associated mortality rate of 52%, which is primarily due to sepsis (50%). Biopsy of lesions is considered the primary diagnostic. Therapeutic interventions have historically been targeted towards the presumed etiology of uremic calcific arteriolopathy including sodium thiosulfate administration. These interventions have less available evidence of clinical success when used in NUC.

The cases herein describe the clinical presentation and successful treatment of 3 cases of NUC treated at a southeastern Wisconsin community hospital outpatient department.

Methods: For all cases a PICC line was placed, and infusion of sodium thiosulfate was provided 2-3 times per week; ondansetron was utilized as premedication for nausea. Cases 1 and 2 underwent discontinuation of infusions when symptoms were resolved and wounds were epithelialized or near epithelialization. Case 3 was continued on twice per week infusions after complete wound closure due to ongoing indurated plaque development.
The principles of wound hygiene were utilized to guide treatment. At each visit the wound, periwound, and extremity was cleansed with mild soap and water. All cases were initially unable to tolerate sharp debridement or therapeutic compression. Debridement was achieved as tolerated via sharp debridement, conservative sharp wound debridement, enzymatic ointments, concentrated surfactants, and microfiber pads. A hypochlorous acid soak was performed followed by a prophylactic no-sting skin protectant. Antimicrobial dressings were then applied. Compression was initiated and advanced to the highest tolerated level. In addition to interventions described above Case 2 received non-contact low-frequency ultrasound (NLFU) 2-3 times per week throughout the course of healing.

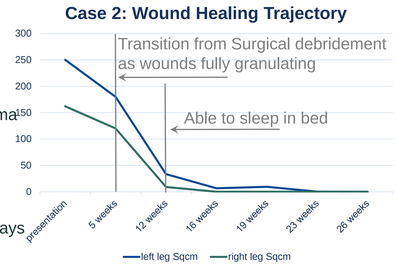
Case 1: STS + Wound hygiene

NUC of the right calf
(A) RLE at presentation to wound center, prior to punch biopsy
(B) Follow up: 2 weeks 1 day; progression of necrosis
(C) Follow up: 7 weeks 4 days; purpuric borders resolved, increased granulation
(D) Epithelialized: 16 weeks 1 day



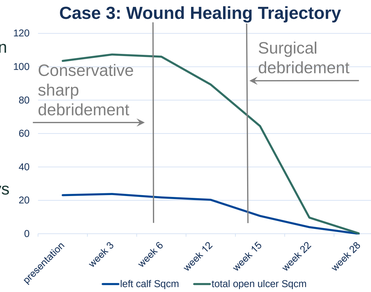
Case 2: STS + NLFU + Wound hygiene

NUC of bilateral calves
(A) RLE prior to presentation in the wound center
(B) Follow up: 2 weeks, erythema resolved
(C) Follow up: 5 weeks 2 days; healthy granulation tissue
(D) Epithelialized:16 weeks 2 days



Case 3: STS + Wound hygiene

NUC of the BLE, buttocks
(A) Left medial calf at presentation to wound center
(B) Follow up: 3 weeks; limited wound hygiene
(C) Follow up: 15 weeks 2 days
(D) Epithelialized: 28 weeks 2 days



Debridement progression:
- Autolytic
- Concentrated Surfactants
- Enzymatic
- Mechanical
- Conservative Sharp
- Surgical/sharp

Compresion progression:
- Exercise and elevation
- Tubular elastic bandages (8-10mmHg)
- Edemawear (20-30mmHg)
- 2 layer compression wraps (30-40mmHg)

Results: All three patients displayed increased tolerance of compression and debridement. All three patients successfully epithelialized with no discernible impact to long term function or quality of life. Wound infection occurred in each case. Case 1 received expedient diagnosis and STS infusion and healed a solitary lesion in 16 weeks. Case 2 received NLFU and had a mean heal time of bilateral calf lesions of 19.5 weeks. Case 3 insurance denied multiple healing modalities including smoking cessation medication and NLFU, complete wound closure of all wounds noted at 28 weeks. Mean heal time for all cases: 20 weeks.

Discussion:
The cases discussed herein represent successful multi-disciplinary management of NUC via wound specialist providers, rheumatology, dermatology, nursing, pharmacy, and dermatopathology.

Non-contact low frequency ultrasound was chosen to augment the healing process, provide biofilm based wound management, decrease inflammation, and decrease wound pain.

Multi-modal treatment with an emphasis on wound hygiene, pain management, and infection control were key management strategies. Wound infection occurred in each case. Pain management was a key factor in ability to tolerate surgical debridement and thorough cleansing.

Calcific arteriolopathy factors presumed to be involved include chronic kidney disease associated mineral bone disorder, dysregulation and deficiencies of the inhibitors of vascular calcifications, and chronic inflammation. Case 1 had a history of multiple autoimmune disorders including Crohns, Sjogrens, Raynauds, adrenal insufficiency, long term steroid usage (20 years), and autoimmune hepatitis. Case 2 had a history of hyperparathyroidism in addition to a renal transplant 5 years prior due to ESRD from hypertension. Historical renal transplantation or other instigating factors of mineral bone disorder may represent a latent nidus of disease pathophysiology in calcific arteriolopathy. Case 3 developed lesions following necrotizing pancreatitis and sepsis from an exacerbation of alcohol abuse, chronic inflammation was also promoted via continued tobacco use.

References
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