Treatment of calcinosis associated with adult and juvenile dermatomyositis using topical sodium thiosulfate via fractionated CO_2 laser treatment

Sirs,

Several therapies, such as intravenous gammaglobulin (IVIG), pamidronate, and probenecid, have shown unpredictable performance for dermatomyositis-associated calcinosis (1-4). Topical sodium thiosulfate (STS), however, has successfully treated calcinosis secondary to juvenile DM (JDM) in two case reports (5, 6). Theoretically, STS decreases tissue calcification by reacting with calcium deposits to form soluble calcium thiosulfate (7). We conducted a pilot study investigating the efficacy and safety of fractionated CO_2 (FCO_2) laser assisted delivery of STS in treatment of calcinosis in patients with DM.

Two patients, from the Departments of Dermatology and Rheumatology at the George Washington Medical Faculty Associates, completed the study. Inclusion criteria consisted of mild or inactive DM (≤2.5 cm on the Physician Global Activity visual analogue scale, MDGA) and at least six weeks on stable dosing of systemic medication. Exclusion criteria included elevated creatinine kinase, active infection or recurrent calcinosis superinfections, cancer-associated myositis, and pregnancy.

For each participant, a target lesion (A) and control lesion (B) were selected. At each visit, a 2 x 2cm (± 1cm) area of lesion (A) was treated with one pass of FCO_2 laser, immediately followed by application of 4mL of 5% STS. Patients received a total of 6–7 of these FCO_2/STS treatments over a six-month period. Due to the variability in wound healing, treatment schedules occurred in varying intervals (biweekly to bimonthly). Lesion (B) was not treated.

Assessment of lesions was completed every other treatment visit using the Physician Calcinosis Visual Analogue Scale (PCVAS), an overall assessment of the severity of calcinosis, and Calcinosis Questionnaire, an assessment of systemic manifestations of DM. DM activity and damage assessments were performed including the MDGA, Myositis Disease Activity Assessment Tool total score, Myositis Damage Index, and Manual Muscle Testing 8 score, and Health Assessment Questionnaire (HAQ) (8). Additionally, the Patient Calcinosis Visual Analogue Scale, durometer measurements, the Dermatology Life Quality Index (DLQI), radiographic plain films, and photographic documentation were conducted.

Patient 1 was a 29-year-old Caucasian female diagnosed with JDM at age 16, taking IVIG, methylprednisolone, and mycophenolate mofetil. Both her target lesion (on

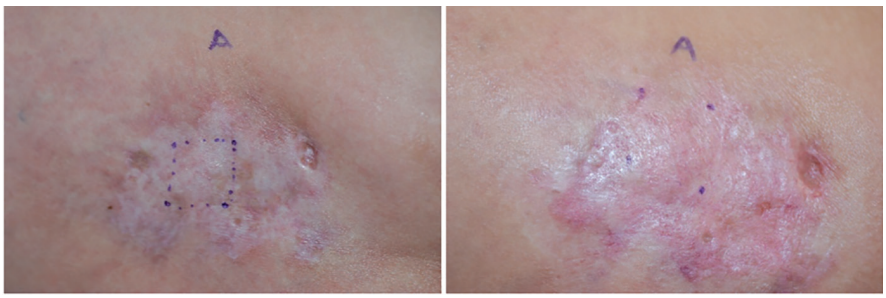

Fig. 1. Lesion A of Patient 1 before sodium thiosulfate intralesional therapy administered via fractionaed CO_2 laser (left) and after therapy (right). Assessment of photographs performed by blinded investigator. Noticeable changes are seen in the texture and size of the lesion. After therapy, there was an increase in the pliability of the skin, less induration and tethered scarring.

Table I. Assessing changes to calcinosis lesions and myositis disease activity before and after sodium thiosulfate laser therapy.*

Physician Calcinosis Visual Analogue Scale (PCVAS)	Initial assessment Visual analogue scale (0-10 cm)	Final assessment Visual analogue scale (0-10 cm)	Percent change (%)
Patient 1			
Lesion A	5	3.1	-38.0%
Lesion B	6	6.2	3.3%
Patient 2			
Lesion A	4.9	2.3	-53.1%
Lesion B	4.9	5	2.0%
Durometer measurement	**Average measurement (DU)**	**Average measurement (DU)**	
Patient 1			
Lesion A	43.6	28	-35.8%
Lesion B	47.3	38.6	-18.4%
Patient 2			
Lesion A	31	33.3	7.4%
Lesion B	36.6	45.3	23.8%
DLQI score	**Initial score**	**Final score**	
Patient 1	8	5	-37.5%
Patient 2	7	11	57.1%
Calcinosis Questionnaire (CQ)	**Initial score**	**Final score**	
Patient 1			
Lesion A	2	1	-50%
Lesion B	2	2	0%
Patient 2			
Lesion A	2	2	0%
Lesion B	2	3	50%
Global Disease Activity Visual Analogue Scale (GDVAS)	**Initial score**	**Final score**	
Patient 1	0.8	0.4	-50%
Patient 2	0.5	0	-100%
Physician Global Activity (MDGA)	**Initial score**	**Final score**	
Patient 1	1.3	0.4	-70%
Patient 2	0.8	1.4	75%
Manual Muscle Testing Subset of 8 muscles (MMT8)	**Initial total score**	**Final total score**	
Patient 1	145	150	3.4%
Patient 2	150	149	-6.7%
Health Assessment Questionnaire (HAQ)	**Initial total score**	**Final total score**	
Patient 1	0.625	0.375	-44.5%
Patient 2	0	0.125	N/A
Myositis Disease Activity Assessment Tool (MDAAT) Total Score	**Initial total score**	**Final total score**	
Patient 1	0.03	4.1	13,566.7%
Patient 2	0.8	0	-100%
Myositis Damage Index (MDI)	**Initial total score**	**Final total score**	
Patient 1	0.24	0.26	8.3%
Patient 2	0.18	0.16	-11.1%

*For the calcinosis lesions, lesion A was the lesion treated with laser sodium thiosulfate and lesion B was observed without treatment.

the left hip) and her control lesion (on the left anterior thigh) appeared as erythematous indurated plaques with bound-down scarring. After seven FCO_2/STS treatments to the target lesion, the texture and pliability of the skin over the area of calcinosis improved (Fig. 1). There was also greater improvement of the PCVAS and durometer measurements of the target lesion compared to the control lesion. Additionally, her DLQI score and HAQ significantly improved, and she was able to discontinue her pain regimen (tramadol, oxycodone, and gabapentin).

Patient 2 was a 64-year-old Caucasian female with a 21-year history of DM taking prednisone, IVIG, and hydroxychloroquine. After six FCO_2/STS treatments to the target lesion on the left upper gluteal area, she had improvement in calcinosis lesion size, skin texture, and PCVAS measurements. Compared to her control lesion, there was less percentage increase in durometer measurement of the treated lesion.

For both patients, radiographic plain films of both lesions demonstrating subcutaneous soft tissue calcifications remained unchanged throughout the study. All other assessments showed no significant improvement from baseline (Table I). No adverse events occurred during treatment.

Overall, our findings demonstrate a proof-of-concept that FCO_2 assisted delivery of STS may have beneficial effects on calcinosis and its sequelae. Additionally, we demonstrated the utility of several outcome measures that may be helpful in future calcinosis therapeutic trials. To our knowledge, there are no studies evaluating the effect of FCO2 laser alone on calcinosis lesions. Further research comparing laser assisted drug delivery of STS to topical STS alone is warranted to fully investigate which therapeutic agent demonstrates greater efficacy in improvement of calcinosis lesions.

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