ISCHEMIC SCLERODERMA WOUNDS SUCCESSFULLY TREATED WITH HYPERBARIC OXYGEN THERAPY

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BACKGROUND:
Scleroderma is a chronic, and often debilitating disease characterized by fibrotic arteriosclerosis of the peripheral and visceral vasculature. The Arthritis Society reports that the incidence of scleroderma in the US is 19 cases per million people, with a prevalence of 19 - 75 cases per 100,000 adults. The clinical manifestations of these changes are broad in spectrum, including the generalized tightening of the skin, Raynaud’s Phenomenon, as well as vasoconstriction of multiple organ systems with fibrosis as the end-result.

Limited Scleroderma:
- Skin tightening limited to symmetrical changes of fingers, distal arms, legs, neck, and face
- Progression of disease after onset of Raynaud’s phenomenon
- Late visceral disease with prominent hypertension and digital ulceration
- CREST syndrome: calcinosis, Raynaud’s phenomenon, eosinophilic vasculitis, telangiectasia
- Associated with antitopoisomerase antibodies
- Relatively good prognosis; survival - 70% at 10 years

Diffuse Cutaneous Scleroderma:
- Proximal skin tightening involving the face, neck, trunk, whole upper and lower extremities
- Rapid onset of disease following appearance of Raynaud’s phenomenon
- Significant visceral disease: lung, heart, skin, gastrointestinal
- Associated with antinuclear antibodies and absence of antitopoisomerase antibodies
- Variable disease course but overall poor prognosis: survival 40%-60% at 10 years

The Cutaneous manifestations of the disease include:
- Digital ulcers, an end-point of Raynaud’s Phenomenon
- Extremity ulcers, usually on bony prominences: olecranon, malleoli, calcaneus

PURPOSE:
Scleroderma presents a unique challenge as the ulcers that can develop are multifactorial, and often refractory to traditional wound care management techniques. We describe 2 patients in productive years of early/midlife both suffering with chronic, intractable, painful bilateral extremity ulcers secondary to scleroderma. Both cases, transcutaneous oxygen oximetry near the lesion was utilized to demonstrate the presence of local ischemia, as well as its reversibility when breathing gas was changed to oxygen. The role of work-related minor trauma was noted in both cases as an ongoing hazard and represented a physical stress is likely beyond the regenerative capacity of the perfusion-compromised-tissue. A 30 treatment course of hyperbaric oxygen therapy (at 2.4 atmospheres absolute pressure) was then provided with resulting positive response and wound resolution. Although hyperbaric oxygen therapy has been used to treat systemic disease for the last several decades, much of the research has focused on ischemic wounds secondary to peripheral arterial occlusive disease, especially ischemic diabetic ulcers. This may be the first reported successful use of HBO to treat locally ischemic scleroderma ulcers.

RESULTS:

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age</th>
<th>Sex</th>
<th>Occupation</th>
<th>Sites of Skin Tightening</th>
<th>Scleodema manifestations</th>
<th>Site of ulceration</th>
<th>Collateral Tissue</th>
<th>Scleroderma</th>
<th>Systemic Treatments</th>
<th>Lesion</th>
<th>Total Number of Dives</th>
<th>Duration of Initial Dive</th>
<th>Duration of Subsequent Dives</th>
<th>Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>56</td>
<td>Male</td>
<td>Police officer</td>
<td>Bilateral upper and lower extremities, abdomen, chest</td>
<td>Calcinosis, Raynaud’s Phenomenon</td>
<td>Bilateral 3rd fingers</td>
<td>Great vessels present</td>
<td>Monophasic</td>
<td>Calcium Channel Blocker Antibiotics</td>
<td>R Malleolus</td>
<td>30</td>
<td>60 minutes</td>
<td>90 minutes</td>
<td>None</td>
</tr>
<tr>
<td>2</td>
<td>33</td>
<td>Female</td>
<td>Medical student</td>
<td>Bilateral upper and lower extremities, abdomen, chest</td>
<td>Calcinosis, Raynaud’s Phenomenon</td>
<td>Bilateral 3rd fingers</td>
<td>Great vessels present</td>
<td>Monophasic</td>
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</table>

DISCUSSION:
This case series demonstrates the potential utility of HBO for ulcers secondary to scleroderma by illustrating both improvements in transcutaneous oxygen measurements, as well as ulcer healing in two patients with scleroderma ulcers. There was clear evidence in both patients of reduction in wound size by measurement, increased perfusion by TcO2, and subjective pain sensation. Moreover, because the study patients differed in their scleroderma variants (patient 1 - diffuse, patient 2 - limited) and ulcer locations, there is a further suggestion of utility across disease spectrum. Given the intractable and cyclically progressive nature of these lesions, our findings suggest that further research into this area may yield important treatment options in the care of these patients.