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Case Report

Treatment of Raynaud phenomenon and ischemic ulcers associated to systemic sclerosis with hyperbaric oxygen[☆]



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ABSTRACT

We describe 4 patients with Raynaud's phenomenon associated with systemic sclerosis, 3 with ischaemic ulcers, successfully treated with hyperbaric oxygen. This therapy has been useful in the treatment of chronic wounds due to its anti-inflammatory, antimicrobial and angiogenic effects. Hyperbaric oxygen treatment could be a therapeutic option in patients with Raynaud's phenomenon refractory to conventional treatment.

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Tratamiento con oxígeno hiperbárico en el fenómeno de Raynaud y las úlceras digitales asociadas a esclerosis sistémicas

RESUMEN

Presentamos 4 pacientes con fenómeno de Raynaud asociado a esclerosis sistémica, 3 de ellos con úlceras isquémicas, con intolerancia o falta de respuesta a tratamiento convencional, que presentaron mejoría tras tratamiento con oxígeno hiperbárico. Esta terapia ha sido utilizada para el tratamiento de úlceras de diversa etiología debido a su efecto cicatrizante, angiogénico, antiinflamatorio y antimicrobiano. El oxígeno hiperbárico podría constituir una alternativa terapéutica en pacientes con fenómeno de Raynaud o úlceras isquémicas de difícil manejo.

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Palabras clave:

Esclerosis sistémica

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Introduction

Raynaud's phenomenon (RP) is characterised by reversible episodes of vasospasm in acral areas (mainly fingers and toes) triggered by a physical or emotional stimulus¹. RP is called secondary when it occurs in the context of another disease; it is sometimes

present in different connective tissue diseases, such as systemic lupus erythematosus or systemic sclerosis. These patients may develop ischaemic digital ulcers, which significantly affect their prognosis. We present a series of 4 cases with RP associated with systemic sclerosis, 3 of them with ischaemic ulcers, who were treated with hyperbaric oxygen (HBO).

Clinical observation

The 4 patients were women aged between 34 and 57 years, 2 of whom were diagnosed with limited systemic sclerosis and the other 2 with diffuse systemic sclerosis. The main clinical features are summarised in Table 1. The patients were selected after previ-

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Table 1
Clinical characteristics of the four cases.

Patient	Age	Sex	Diagnosis	Time of evolution (years)	Systemic involvement	Antibody profile	Previous RP ttm	Current RP ttm	DU prior to HBOT	RP episodes/day prior to HBOT ^a	Episodios RP/día tras HBOT ^a	Dolor antes de HBOT ^b	Dolor tras HBOT ^b	Entumecimiento antes de HBOT ^b	Entumecimiento tras HBOT ^b
Case 1	41	Female	Limited SSC	8	No	ACA	PG	CA	0	14	7	57,5	25	50,36	21
Case 2	34	Female	Diffuse SSC	26	ILD, PH, esophageal, intestinal	Anti-Sc170	PG, CA	No	6	14	8	100	76	100	75
Case 3	47	Female	Limited SSC	12	Esophageal	ACA	CA	ERA	3	2,7	0,2	46,3	10,14	52	11,7
Case 4	57	Female	Diffuse SSC	21	ILD, esophageal, intestinal	Anti-Sc170	PG	ERA, CA	2	3,5	2,5	33,9	46	26,7	17,6

ACA: anticentromere; CA: calcium antagonist; DU: digital ulcer; ERA: endothelin receptor antagonist; HBOT: hyperbaric oxygen therapy; ILD: interstitial lung disease; PG: prostaglandins; PH: pulmonary hypertension; RP: Raynaud's phenomenon; SSC: systemic sclerosis; Ttm: treatment.

^a Arithmetic mean of the number of episodes per day of Raynaud's phenomena occurring in the previous 14 days, according to the Raynaud Condition Score.

^b Measured using a visual analogue scale from 0 to 100. Arithmetic mean of the score obtained in the previous 14 days according to the Raynaud Condition Score.

ously ruling out severe interstitial lung involvement, which could be a risk factor for pulmonary barotrauma. Of these, 3 had digital hand ulcers before starting HBO treatment (2, 3 and 6, respectively) and 3 of them were receiving treatment for RF with an endothelin inhibitor or a calcium antagonist. The hyperbaric chamber treatment in all 4 cases consisted of a total of 30 sessions performed 4 days a week. In each session the patients stayed for one hour with 100% O₂ at a pressure of 2.4 atmospheres absolute. Ulcer improvement was assessed according to the degree of epithelialisation (less than 50%, greater than 50% or complete epithelialisation). Additionally, the severity of RF was measured using the Spanish version of the Raynaud's Condition Score (RCS), a self-administered questionnaire that patients completed daily for 14 days. The RCS captures the frequency, duration, severity and impact of RF episodes².

Three of the patients had complete epithelialisation of their digital ulcers. According to the results obtained in the RCS, all 4 patients experienced a decrease in the frequency of RF episodes and 3 of them also experienced less pain and less numbness during the episodes (Table 1). As a side effect, 2 patients experienced mild middle ear barotrauma, which required discontinuation of HBO therapy for one week, although they subsequently resumed therapy without further incident.

Discussion

The treatments used in secondary RF are mainly vasodilators, including calcium antagonists, phosphodiesterase E5 inhibitors, endothelin-1 inhibitors and prostaglandins^{3,4}. Hyperbaric oxygen therapy consists of the administration of 100% oxygen in a closed chamber at a pressure of 2–3 atmospheres absolute (the hyperbaric chamber). This therapy has been used for the treatment of ulcers of different aetiologies due to its healing, angiogenic, anti-inflammatory and antimicrobial effect⁵. However, there are no clinical trials that support its usefulness in the treatment of digital ulcers associated with systemic sclerosis; only case reports have been found in the literature^{6–8}. In this series, as a novelty, the impact of HBO on RF was also evaluated, and improvement was observed in 3 of the 4 patients. HBO therapy is considered a safe treatment, with middle ear barotrauma as the most frequent adverse event. Other adverse events, such as neurological oxygen toxicity or pulmonary barotrauma, are very rare⁹ if patients are appropriately selected.

Conclusions

HBO treatment could be a therapeutic alternative in patients with secondary RF who are intolerant or refractory to conventional treatments.

Conflict of interests

None to declare.

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