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EC GASTROENTEROLOGY AND DIGESTIVE SYSTEM

Research Article

Clinical Efficacy of Hyperbaric Oxygen Therapy in Patients with Radiation Proctitis Refractory to Medical Treatment

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Received: October 21, 2018; **Published:** February 26, 2019

Abstract

Introduction: There are multiple treatments for radiation proctitis. However, the efficacy of hyperbaric oxygen (HBO) therapy is understudied. In our hospital. This therapeutic approach is cheaper to use than other treatments such as argon plasma and is available in our hospital. The objective of this study was to assess if treatment with HBO is an effective alternative for patients with refractory radiation proctitis.

Methods: Through an observational, longitudinal and retrospective design, we collected the clinical results (frequency and intensity of symptoms) of patients with refractory radiation proctitis and who were treated with hyperbaric oxygen. We performed the Statistical Analysis with Student's t and ANOVA. We analysed categorical variables were using Chi-square and Fisher's exact test.

Results: Fifteen patients were treated with HBO in the General Hospital of Mexico from January 2017 to January 2018. Their main symptom was bleeding (100%). Twelve patients reported resolution of symptoms (80%) and three patients did not show any improvement (20%). We found a positive correlation between smoking history and the severity of the radiation proctitis (P = 0.012). Additionally, we also found a higher risk for recurrence when the smoking index was > 12 (P = 0.017). There was no association between the number of sessions provided with HBO and the resolution of symptoms (P = 0.344). We also did not find differences after comparing monotherapy with HBO and HBO with argon laser (P = 0.659). The mean bleeding analog visual scale (BAVS) at baseline for patients treated solely with BVAS was 8.67 ± 0.81, while for patients who received both treatments was 8.11 ± 1.53. After treatment, the BVAS for the monotherapy group was 3 ± 2.09, while as adjuvant therapy was 2.78 ± 2.63 (P = < 0.001)

Conclusion: Treatment with HBO as monotherapy or together with argon plasma improved bleeding in patients with refractory radiation proctitis. However, a larger sample of patients is needed to corroborate our findings.

Keywords: *Radiation Proctitis; Post-Radiation Proctitis; Hyperbaric Chamber; Hyperbaric Oxygen*

Abbreviations

HBO: Hyperbaric Oxygen; HBOT: Hyperbaric Oxygen Therapy; BVAS: Bleeding Analog Visual Scale; ATM: Atmospheres

Introduction

The incidence of chronic radiation proctitis ranges between 2% and 20%, with approximately 85% of patients developing symptoms within the first 2 years after treatment [1]. Because the rectum has a fixed position in the pelvis, it becomes more susceptible to radiation injury [2].

The main symptoms of radiation proctitis are diarrhoea, faecal urgency, rectal bleeding and faecal incontinence [3].

Medical therapy should be the initial intervention after the conservative management fails. Medical options offer a minimal risk compared to invasive treatment approaches. However, there is a percentage of patients who do improve with thus, requiring invasive procedures such as dilation, bipolar cautery, Argon laser and radiofrequency ablation [4].

Although hyperbaric oxygen therapy (HBOT) has been used for the treatment of radiated soft tissues, there is uncertainty about its clinical effectiveness [5]. In recent years, emerging evidence suggests HBO improves the results in patients with post-radiation soft tissue injury [6].

In the present study, we collected data on the use of HBO to treat patients with radiation proctitis to assess its clinical results in our context. The aim of the study was to show the results of the HBOT in patients with radiation proctitis in a single center.

Patients and Methods

This was a analytic longitudinal study in which clinical and biochemical data from fifteen patients with radiation proctitis from the General Hospital of Mexico were analysed before and after receiving THOB in a period that spans January 1, 2017 to January 1, 2018.

All the patients we included were patients form the General Hospital in Mexico with diagnosis of radiation proctitis that remained symptomatic despite receiving medical treatment (mesalazine, sucralfate, steroids) for more than three months or after receiving coagulation sessions with argon plasma. We excluded paediatric patients (>18 years old), less than 15 sessions of HBOT and patients who did not attend follow-up visits.

HBOT consisted in introducing the patient in a multichamber camara and give 15 to 60 sessions lasting between 60 to 90 minutes with a pressure of 2.5 atmospheres (ATM).

Our outcomes for analysis were bleeding persistence, the number of sessions needed to reduce symptoms and recurrence. Additionally, we compared BVAS at baseline and after treatment with HBO.

The data was analyzed with the statistical package SPSS version 23 (IBM SPSS Statistics). The distribution of the variables was determined by the Shapiro-Wilk test. The continuous variables were presented in means and standard deviation. The comparison of the quantitative variables was carried out using the Student's T test for independent samples. The categorical variables were analyzed by Pearson's Chi square test and when there were values to compare, less than 5 was performed with the Exact Fisher test. The p value was considered statistically significant when it was less than 0.05.

Results

After considering inclusion and exclusion criteria, we found fifteen patients from the General Hospital of Mexico followed up between January 2017 to January 2018. The main symptom by which they referred to HBOT was bleeding (100%).

Twelve patients reported resolution of symptoms (80%) and three patients did not show any improvement (20%) (Table 1). Of the patients who reported improvement, six patients presented it after session #15 (50%), three patients referred it after session #30 (25%), and the rest of the patients referred it after session #30 (25%). Of the twelve patients with resolution of symptoms, two patients recurred symptoms after six months (13.3%). There was no association between the number of sessions provided with HBO and the resolution of symptoms (P = 0.344). We also did not find differences after comparing monotherapy with HBO and HBO with Argon laser (P = 0.659). The mean BVAS at baseline for patients treated solely with BVAS was 8.67 ± 0.81, while for patients who received both treatments was 8.11 ± 1.53. After treatment, the BVAS for the monotherapy group was 3 ± 2.09, while as adjuvant therapy was 2.78 ± 2.63 (P = <0.001) (Table 2).

	N	Minimum	Maximum	Mean	Standard Deviation
Age	15	33	65	50,80	9,719
Weight	15	35	102	65,57	15,328
Height	15	1,47	1,75	1,5513	,07827
Body mass index	15	16,40	37,90	27,1740	5,40974
Radiotherapy sessions	15	25	50	28,60	7,239
Grays	15	50	52	50,53	,915
Months after RT before proctitis onset	15	2	24	8,13	6,105
Proctitis severity	15	2	4	2,33	,617
HBO sessions	15	15	150	52,60	34,684
HBO minutes	15	60	90	72,00	15,213
ATM in HBO	15	2,30	2,50	2,4733	,07037
BVAS pre HBO	15	5	10	8,33	1,291
BAVS post HBO	15	1	9	2,87	2,356
Sessions before resolution	12	15,00	60,00	27,9167	16,01964
Haemoglobin	15	4,00	13,90	8,8600	3,11352

***Table 1**: Variables.*

	Dichotomy	N	Mean	Standard Deviation	Standard error of the mean
BAVS before HBO therapy	Monotherapy	6	8.67	.816	.333
	Adjuvant	9	8.11	1.537	.512
BAVS HBO therapy	Monotherapy	6	3.00	2.098	.856
	Adjuvant	9	2.78	2.635	.878

***Table 2:** BVAS with HBO as monotherapy and as adjuvant therapy.*

Although it was not a primary objective, We found a positive correlation between smoking history and the severity of the radiation proctitis (P = 0.012). Additionally, we also found a higher risk of recurrence when the smoking index was > 12 (P = 0.017).

Discussion

Most of our patients were female, 93.7% and presented radiation proctitis secondary to Cervical Cancer treatment. The only male in our population had Prostate Cancer. This distribution is similar to a double-blind, randomised controlled trial which involved 37 patients with radiation-induced proctosigmoiditis, with 36 female patients treated for Cervical Cancer and one man treated for prostate cancer [7].

The symptoms seen in radiation proctitis are diarrhoea, faecal urgency, rectal bleeding and faecal incontinence [3]. Haemorrhage typically begins one year later and persists or worsens characteristically for approximately three years but may diminish spontaneously during the next decade [8]. In our series, the main symptom was bleeding (100%), this is expected since it was precisely the reason why they were referred to receive hyperbaric oxygen therapy.

Feldmeier and Hampson in 2002 found 71 reports including 1193 participants in eight different countries. In these participants, for whom conservative treatment had failed, there wasn't clinical improvement with HBO for most people. Only 7 of the 71 reports indicated a poor response to HBO [9]. In our study, 12 patients reported resolution of symptoms (80%) and three patients did not show improvement (20%). In 2008 Clarke conducted a randomised double-blind study and found that approximately 45% of patients without response to treatment had local recurrence.

Given this finding, an initial course of more than 40 sessions of HBO was indicated.

This finding (slight or no improvement) triggered a protocol to detect a probable recurrence before continuing with hyperbaric treatment [10].

As mentioned before, two patients recurred and received treatment with more argon plasma sessions with subsequent improvement. Mohd in 2014 published that the clinical response rate for chronic radiation proctitis is 95% and that in around half of the cases there is a longer lasting response, with some patients experiencing relief of symptoms lasting up to seven years [11]. After our review of the literature, we did not find another study reporting a relationship between smoking and the degree of proctitis, as well as with recurrence risk.

HBO therapy should be administered within a pressurised chamber between 2 and 2.5 absolute atmospheres. Treatment schemes usually involve sessions lasting between 60 to 120 minutes; twice a day for approximately 30 to 60 sessions (depending on the patient's response) [12], different to our study that only given them between 15 to 60 sessions lasting between 60 to 90 minutes.

Conclusion

Treatment with HBO as monotherapy or together with argon plasma improved bleeding in patients with refractory radiation proctitis. However, a larger sample of patients is needed to corroborate our findings.

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Volume 6 Issue 3 March 2019