

THE ROLE OF HYPERBARIC OXYGEN IN MANAGING ANKLE SPRAIN

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ABSTRACT

Objective: To confirm the efficacy of hyperbaric oxygen therapy in acute ankle sprain.

Methods: This study was conducted at Princess Haya Al-Hussein Hospital's Hyperbaric chamber / Aqaba-Jordan, on 36 patients, treated in the Emergency Department. They had been divided according to the type of treatment in to A, B and C. Group A had been treated at one absolute atmospheric pressure (1 ATA), group B at 2 ATA, and group C at 2.5 ATA. All groups received seven hyperbaric sessions, as outpatients in 5 consecutive days, twice a day for two days followed by once a day for the remaining three days, for a 90 minute- session.

Results: All patients with acute ankle sprain with no history of recurrent attacks, had been treated at 2.5 ATA (group C) were completely free of pain and of swelling by the end of the last session.

Conclusion: Hyperbaric oxygen therapy is the best choice for the rapid recovery of acute ankle sprain.

Key words: Ankle sprain, Injury, Hyperbaric oxygen.

JRMS June 2004; 11(1): 21-23

Introduction

Because of its weight-bearing function and the construction of its articulation, the ankle joint is the most commonly injured joint in athletes ⁽¹⁾. It is a frequent cause of high morbidity in the general population, especially when there is a physical activity. In Yeoung's study, 73% of athletes had recurrent ankle sprain, of those 59% had significant disability and residual symptoms ⁽²⁾, and 85% of all sprains were of inversion type ^(2,3). Cross-country runners, footballers, and basketballers are the most affected ^(1,3,4). However, most ankle injuries can be treated by the family physician but some of the more serious injuries are referred to the orthopedic surgeon for further management.

Many treatment modalities have been developed to treat ankle sprains, acupuncture, chiropractic, magnet therapy, pulsed electromagnetic energy, massage therapy, relaxation techniques, and hyperbaric oxygen therapy (HBO) ⁽⁵⁻¹²⁾.

Methods

This study was conducted on 36 patients at Princess Haya Al-Hussein Hospital's hyperbaric chamber in Aqaba-Jordan, who were referred from the Emergency Department. All patients with acute ankle sprain type II (injury within 36 hours), were young males, with no history of chronic diseases, were included in this study. The chamber used was a multi-place type, which is composed of strong steel, cylindrical in shape that can be occupied by 6 patients in sitting position and breath 100% oxygen through fit facemask. Patients were randomly divided into 3 groups, 12 patients in each group, A, B, and C with history of acute ankle sprain type II. All patients aged between 20 to 40 years (mean age 34 years), with the mean body weight 73.4 Kgs.

All patients had been examined for possible conditions that would be aggravated by using HBO therapy like sinusitis and otitis media, so those who were found to have such conditions were excluded from the study. All patients had to sign a consent form after a

complete explanation for the hyperbaric complications and side effects.

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Manuscript received November 5, 2002. Accepted April 3, 2003

All occupants were provided by special anti-fire gowns, and the chamber is monitored continuously while in use to maintain the oxygen concentration up to 24% to reduce the incidence of fire, Group A was treated as a control group at sea level 1 ATA (sea level), group B, at 2 ATA (Fig. 1) and Group C was treated at 2.5 ATA (Fig. 2)

All groups received 7 hyperbaric sessions, in five consecutive days, twice a day for two days followed by once a day for the remaining three days, for a 90 minute-session.

In assessing the benefit of this treatment modality, we have depended on the patients' evaluation of their pain, and swelling were observed and followed up. An adjuvant therapy, like bandages, splints, analgesics, or NSAID's were not used. All patients were treated with oxygen only and were advised not to bear weight exceeding one sixth of their body weight, using one crutch in the opposite site of the injured ankle.

Results

No pain relief reported by group A can be attributed to HBO. In groups B and C, pain relief was reported by all patients from the first session, in group B pain disappeared by the 3rd session (Table I). In evaluating the regression of edema, group A revealed 30% improvement by the end of the 7th HBO session, 80% and 97% improvement was achieved in group B and group C respectively (Table II).

Discussion

Table I. The course of pain in treated patients during and 2-hours after each hyperbaric session.

	1 st Session	Second	Third	Fourth	Fifth	Sixth	Seventh
Group A	Severe	Severe	Severe	Severe	Severe	Less Severe	Less Severe
Group B	Minimal	Minimal	No Pain	No Pain	No Pain	No Pain	No Pain
Group C	Minimal	No Pain	No Pain	No Pain	No Pain	No Pain	No Pain

Table II. The course of edema in treated patients after every hyperbaric session.

	1 st Session	Second	Third	Fourth	Fifth	Sixth	Seventh
Group A	5%	10%	15%	15%	20%	30%	30%
Group B	10%	15%	20%	30%	50%	70%	80%
Group C	25%	30%	50%	70%	85%	95%	97%

It is the first study on the effect of HBO on ankle injuries conducted in Jordan. It shows that this treatment for acute ankle sprains is effective and can lead to complete recovery in those with acute ankle sprain who were treated within the first 36 hours. Contrary to Borromeo *et al* results, which indicated that HBO, does not enhance healing time for soft-tissue sports injuries⁽¹⁰⁾. That study was conducted on patients with ankle sprain for more than 30 hours after the injury. In addition, the study was conducted on two groups, the control group received 100% oxygen at 1.1 absolute atmospheric pressure (ATA); the second group received 100% oxygen at 2 ATA; all groups received just three sessions, one session for 90 minutes and the other two for 60 minutes each, while in our study all patients received 7 hyperbaric sessions for 90 minutes each. Few studies, which were conducted on rats, proved that HBO might reduce the ischemic-induced skeletal muscle injury⁽¹³⁾.

Early return to sports occurs after almost every ankle sprain; however, dysfunction persists in 40% of patients for as long as 6 months after injury⁽¹⁴⁾.

Conclusion

HBO therapy is an effective tool in treating those with acute ankle sprain to attain the rapid return to their normal daily activities and sports if initiated within the first 36 hours of injury.

Further studies are needed to verify these results and explore the potentials of HBO in managing other entities, and to establish even some centers of HBO mainly for sport injuries.

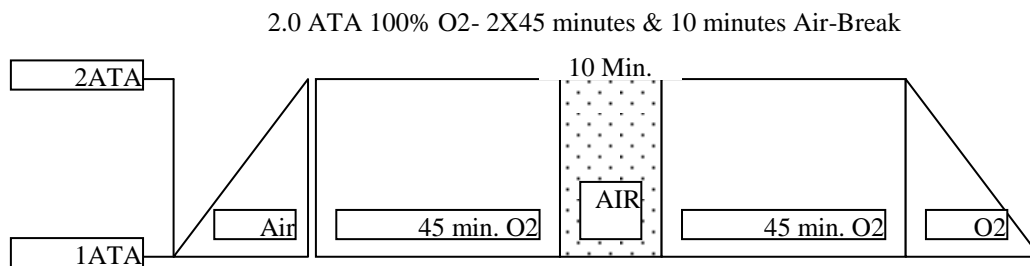


Fig. 1. Treatment Protocol Guidelines

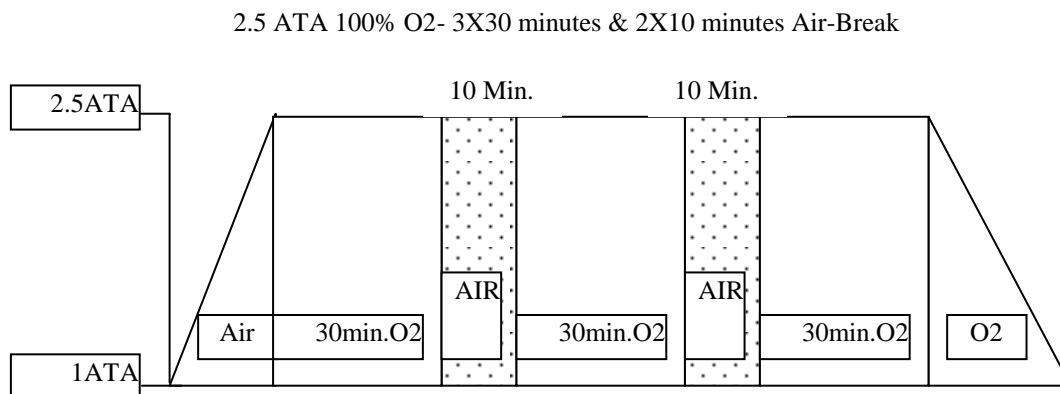


Fig. 2. Treatment Protocol Guidelines

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