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37 DECOMPRESSION SICKNESS CASES TREATED IN THE DEPARTMENT OF UNDERWATER AND HYPERBARIC MEDICINE, ISTANBUL FACULTY OF MEDICINE

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Abstract

The time interval between the onset of decompression sickness (DCS) and recompression therapy, and the first aid with medical treatments applied before reaching a recompression facility, will affect the outcome of the recompression therapy.

In this study 37 DCS cases were evaluated to find out the time interval to the onset of DCS, the type of the disease and symptoms, delay to recompression treatment, medical treatments applied during transport, recompression treatment protocols performed and outcomes.

All the patients were male. Professional divers (32 or 86.5%) outnumbered sports divers (5 or 13.5%). In 20 cases (54.1%) onset of symptoms was within the first 10 minutes after the dive. In three men (8.1%) symptoms came on underwater. Numbness, tingling and back pain were the most frequent symptoms reported by the patients with Type II DCS. Complete recovery was achieved in 32 (86.5%) of the cases by recompression therapy combined with medical treatment. Rehabilitation was needed in 12 (32.4 %) of the cases.

Omitted decompression was the most frequent cause of DCS in our cases. Additional hyperbaric oxygen therapy needed in delayed cases is evidence of the importance of immediate transport and adjunctive medical treatments.

Key Words

Decompression illness, first aid, transport, treatment.

Introduction

The hyperbaric facilities in Turkey are mostly situated in Istanbul. The only Hyperbaric and Underwater Medicine Department in civilian universities is in the Istanbul Faculty of Medicine. The Fisheries Research Institute also has a hyperbaric chamber for treating divers in Bodrum, in Aegean Sea region. The Turkish Navy has three hyperbaric units. Besides these public facilities, all with multiplace chambers, hyperbaric oxygen therapy is performed in three private hyperbaric centres, in Istanbul. The three private hyperbaric centres, which all have multiplace chambers and one also has a monoplace, are free standing and mostly use hyperbaric oxygen therapy for indications other than diving related disease. In March

Figure 1. Dive sites in Turkey.

1999 there were 11 doctors who specialised in underwater and hyperbaric medicine in Turkey. There were also four assistant doctors specialising in the subject.

Recompression treatment of the divers in this study was performed at the Department of Underwater and Hyperbaric Medicine, Istanbul Faculty of Medicine. None of the private hyperbaric facilities had been established when the patients covered in this paper were treated.

There is an inadequate decompression in most decompression sickness (DCS) cases, but DCS may also occur after a dive in which decompression is performed according to standard decompression tables. The time interval between the onset of DCS and recompression, and when first aid with medical treatments, such as 100% oxygen, fluid, steroids and acetylsalicylic acid, is applied will affect the result of recompression therapy and the course of the disease. Recompression therapy must be given for any doubtful DCS symptom, since it cannot be predicted whether the condition will deteriorate or not. In this study 37 DCS cases treated in our department were evaluated to find out the time interval of the onset of DCS, type of the disease, type of the symptoms, delay to recompression treatment, first aid and medical treatments applied during the transport, recompression treatment protocols performed, rehabilitation and outcomes.

Methods

Patient records were used for this study. The record for each patient included information about the dive site and time, dive profile, first aid and medication during transport, course of the disease, symptoms and physical findings, medical and recompression therapy, besides individual information such as age, sex and profession. We calculated the ratios concerning dive sites, type of the symptoms and onset time, delay to recompression therapy and recompression protocol performed.

Results

Although the number of female recreational scuba divers has increased in our country recently, all patients were males. The age of the divers varied between 16 and 57 years (average 31). There were 32 professional (86.5%) and 5 recreational scuba divers (13.5%) among our sample. The majority of the professionals consisted of shellfish divers mostly working on the Black Sea coast within 3 to 6 hours by an ambulance of our department. Recreational diving is carried out largely in the Mediterranean and Aegean Seas. Table 1 gives the numbers and proportions of our sample from each area and the times for overland ambulance transport. Figure 1 shows the distribution of Turkish diving sites.

There were neurological and cardiopulmonary symptoms in 18 (48.6%) of the cases. These patients were diagnosed as Type II DCS. Their symptoms are displayed in Table 2. Their most frequent symptoms were numbness, tingling and back pain. Nineteen patients had no neurological symptoms or signs (Type I DCS); of those who complained of musculoskeletal pain, the shoulder was the most often affected site.

TABLE 1

DISTRIBUTION OF CASES BY DIVE SITE

Dive Site	Cases		Road travel time to Istanbul
Black Sea	23	61%	3-14 hours
Sea of Marmara	6	17%	2-3 hours
Aegean Sea	4	11%	5-12 hours
Mediterranean	4	11%	12-14 hours
Total	37	100%	

TABLE 2

FREQUENCY OF SYMPTOMS REPORTED IN 18 TYPE II DCS CASES

Symptoms	Number	%
Back pain, numbness and tingling	6	33.3
Fatigue and muscle weakness	5	27.8
Chest pain, cough and difficulty in breathing	4	22.2
Abdominal pain and pain in extremities	3	16.7
Nausea and vomiting	2	11.1
Headache, dizziness and fainting	1	5.6

In five patients (13.5%) DCS occurred after a dive which was within US Navy (USN) no-decompression limits. But there was omitted decompression in the dive profiles of 31 divers (84%). In one case flying after diving caused DCS.

In three men (8.1%) the first DCS symptom was experienced in the water while the diver was still decompressing. Most of the cases (24 or 54.1%) DCS occurred within the first 10 minutes after the dive. One case reported the first symptom 18 hours after his dive (Table 3).

Most patients (20 or 54%) took more than 12 hours to reach to our department (Table 4).

No adjunctive medical therapy was used in 13 patients (35.1%) during the transport. Medical therapy was performed as a combination of oxygen breathing, acetylsalicylic acid, steroids and fluid therapy in only three cases (8.1%). In-water recompression on air was tried by nearly half, 15 out of 32 (40.5%), of the professional divers. Except for the diver who developed DCS during flight, land transport was used in all cases.

Initial recompression therapies are shown in Table 5. Five patients (26.3%) patients with Type I DCS required additional hyperbaric oxygen therapy. Sixteen of the 18 cases of Type II DCS (89%) required follow up treatments.

Complete recovery was achieved in 32 divers (86.5%) by recompression therapy combined with

TABLE 3

TIME TO ONSET OF SYMPTOMS

Onset of symptoms	All patients		Type I DCS		Type II DCS	
Number	%	Number	%	Number	%	
While diver is in water	3	8.1	1	5.3	2	11.1
First 10 minutes	20	54.1	9	47.3	11	61.0
10 minutes-1 hour	9	24.3	6	31.6	3	16.7
1 hour-2 hours	4	10.8	3	15.8	1	5.6
18 hours later	1	2.7		-1	5.6	
Total 37		19		18		

TABLE 4

DELAY TO RECOMPRESSION

Delay	<3 hours	3-6 hours	6-9 hours	9-12 hours	12-24 hours	24-72 hours	3-7 days	>7 days
Ratio (%)	5.4	10.8	21.6	8.1	18.9	27.1	5.4	2.7
Numbers	2	4	8	3	7	10	2	1

TABLE 5

INITIAL RECOMPRESSION THERAPY TABLES

	Type I DCS			Type II DCS	
Recompression	US Navy TT 5	US Navy TT 6	HBO Protocol	US Navy TT 6	US Navy,TT 6 with extentions
Ratio	31.6%	26.3%	42.1%	16.7%	83.3%

adjunctive medication. Rehabilitation was needed in 12 patients (32.4%). Residual symptoms such as weakness in some muscles and patches of numbness were left in 4 cases (10.8%). One case (2.7%) was resistant to the therapy and remained paraplegic.

Discussion

Omitted decompression was the main reason of DCS in our cases. When their dive profiles were compared it was clear that recreational scuba divers paid more attention to the decompression rules than professionals. Inadequate decompression increased the risk of DCS, but cases did occur after no-decompression dives, confirming that DCS can be seen even after a dive within the no-decompression limits.

The frequency of the onset of DCS symptoms in the first 10 minutes after the dive shows the importance of both the dive profile and the ascent history in the differential diagnosis of DCS and arterial gas embolism due to pulmonary barotrauma.

Most of our cases presented late for recompression therapy since the importance of quick transport is usually not realised. For the majority of the cases the time intervals between the onset of the symptoms and recompression therapy was more than 12 hours. This occurred although most cases came from a distance which only takes 3-4 hours in an ambulance. Those cases delayed by geographical factors, position of the dive sites and difficulties encountered during the transport, indicate the necessity of recompression chambers in remote areas.

The percentage of the cases who had adequate first aid with adjunctive medical treatment was very low. The poor outcome of recompression therapy, the need for additional hyperbaric oxygen therapy and rehabilitation in delayed cases are evidence of the importance of immediate transport and adjunctive medications. Appropriate first aid and medical treatment can be provided by training medical staff near the diving sites about diving related disease and its treatment. Deterioration of the cases who applied in-water recompression on air shows the harmful effect of its improper application. Air transport was not used in these cases because of its high cost and the fact that there is no well established insurance system in Turkey.

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DECOMPRESSION ILLNESS TREATED IN SOUTH THAILAND DURING 1998

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Key Words

Decompression illness, recreational diving, treatment.

Abstract

Decompression illness (DCI) occurred in 30 European recreational scuba divers, using compressed air, in South Thailand in 1998. This is the first report on such treatment. Of interest is the high proportion of patients who were employed in the recreational diving industry.

Introduction

Recreational diving in South Thailand is done on the west coast from live-aboard boats (predominantly near Surin, Similan and also in Burma) and from shore based dive shops. Day trips and shore diving are done off Phuket, Phan Nga Bay, the Phi Phi Islands, Hin Daeng and also in the Gulf of Thailand on the islands Ko Samui and Ko Tao. There are about 100 dive shops in the region with an estimated 1,000 dives per day are done during the high season (December-April).