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RECOMPRESSION FACILITIES IN PALAU AND CHUUK

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Abstract

During the Second Micronesian Anaesthetic Refresher Course, in October 1995, sessions were devoted to diving and hyperbaric medicine and the pathophysiology and treatment of decompression illness. After the course the hyperbaric facilities of the Belau National Hospital and Chuuk State Hospital were inspected. The January 1993 to October 1995 statistics for the Hyperbaric Unit in Palau were reviewed and the incidence of decompression illness in both regions is discussed.

Key Words

Decompression illness, hyperbaric facilities, teaching, treatment.

Introduction

In October 1995 the Second Micronesian Anaesthetic Refresher Course was held at the Belau National Hospital, Koror, Republic of Palau. Two anaesthetists from the Royal Hobart Hospital, Dr Malcolm Anderson and myself, were the guest lecturers. We were financially assisted by the Australian Society of Anaesthetists (ASA) and the World Federation of Societies of Anaesthesiologists (WFSA). During the organisation of the course, donations of medical

products and sponsorship were obtained from: Abbott Australasia Pty. Ltd., Anaesthetic Supplies Australia, Ansell International, Astra Australia, Mallinckrodt Medical, Ohmeda, Organon Teknika, Pacific Medical Supplies Pty. Ltd., Portex, Roche Products Pty. Ltd. and Statemed Pty. Ltd. These companies donated much needed medical supplies to the four regions of Micronesia. QANTAS, Continental Micronesia Airlines and Allways Dive Expeditions Travel Service kindly provided substantial discounts and luggage waivers to enable transport of the medical supplies to, and throughout, Micronesia.

The four day course consisted of lectures in the mornings followed by a series of case presentations and clinical scenarios in the afternoon. The meeting was attended by 14 medical and nursing personnel from the islands of Palau, Yap, Chuuk and Kosrae. The course was structured to cover the essential aspects of anaesthetic care in the areas of trauma, preoperative assessment, anaesthetic emergencies, obstetrics, paediatrics and regional anaesthesia. Also included in the course were sessions devoted to diving and hyperbaric medicine and the pathophysiology and treatment of decompression illness (DCI). These were well-attended by medical and nursing staff and also by a 65 year-old American tourist who had developed mild decompression symptoms before undergoing his first treatment in Palau's new recompression chamber. On one evening, the Palau Pacific Resort provided facilities to deliver a lecture on diving emergencies to local medical staff and diving organisations.

After the course, I stayed in Palau for an additional five days and then a week in Chuuk to participate in further practical teaching in anaesthesia and to review the hyperbaric facilities of the Belau National Hospital and the Chuuk State Hospital.

The Belau National Hospital

The Belau National Hospital is a new establishment, about four years old, and has 120 beds serving a population of approximately 40,000. The medical facilities in Palau were very impressive for such a small island as the hospital was modern and well-equipped. This was in contrast to the very basic conditions found in other Micronesian islands such as Chuuk, Yap and Kosrae. The Belau National Hospital's most impressive acquisition is the new hyperbaric facility. In June 1995, a new multiplace recompression chamber was installed with the help of the US Navy, the National Ocean and Atmospheric Administration (NOAA), the Republic of Palau, the Koror Chamber of Commerce, the Professional Association of Diving Instructors (PADI), the National Association of Underwater Instructors (NAUI), the Divers Alert Network (DAN) and numerous other local and American supporters. The new multiplace recompression chamber replaced an outdated monoplace unit.

Incidence of Decompression Illness in Palau

The January 1993 to October 1995 statistics for the Hyperbaric Unit at the Belau National Hospital (Tables 1 to 4), were provided by Mary Thing, RN. During the 33 month period 46 patients presented after diving accidents, requiring 67 hyperbaric oxygen treatments (Table 1). There is an incidence of 1.3 cases per month and each patient averaged 1.46 treatments. The number of case of DCI treated in Palau has been increasing. In 1993 they had 8 cases, in 1994 there were 16 and from January to October 1995 there had been 22 of these 8 had been treated in the first five months of the year and the unit had treated 14 patients with DCI since the new chamber was installed in June 1995.

The largest age group (18 or 39%) was 20 to 29 years (Table 2). Thirty three (72%) of the DCI cases were aged between 20 and 39. There was a slight trend towards younger patients presenting to the hospital but this was not statistically significant. Thirty two (70%) were male and 14 (30%) were female, a male to female ratio of 2.3:1 (Table 3).

Between January 1993 and October 1995 there were 6 diving related deaths. In 1994 a group of 5 were swept out to the open ocean by strong currents and lost. The single fatality in 1995 was labelled as "drowning by unknown causes while diving" (Table 1).

TABLE 1

DIVING ACCIDENTS TREATED AT THE BELAU NATIONAL HOSPITAL HYPERBARIC CHAMBER JANUARY 1993 TO OCTOBER 1995

Month	1993		1994		1995	
	Cases	Treatments	Cases	Treatments	Cases	Treatments
January	-	-	-	-	1	1
February	-	-	1	2	2	2
March	1	2	2	2	3	3
April	1	3	3	3	2	2
May	-	-	1	1	-	-
June	1	3	1	3	4	6
July	1	1	0	0	1	2
August	1	1	0	0	6	9
September	-	-	2	4	3	7
October	2	2	3	3		
November	-	-	-	-		
December	1	1	3	4		
Annual total	8	13	16	22	22	32
Diving deaths			5		1	

TABLE 2

AGES OF DIVING ACCIDENTS VICTIMS TREATED AT BELAU 1993 TO OCTOBER 1995

Age	1993	1994	1995 (to October)	Total
< 20	-	-	-	-
20- 29	1	7	10	18
30- 39	2	6	7	15
40-49	3	-	4	7
50-59	2	2	-	4
> 60	-	1	1	2
Total	8	16	22	46

TABLE 3

SEX OF DIVING ACCIDENTS VICTIMS TREATED AT BELAU 1993 TO OCTOBER 1995

Sex	1993	1994	1995 (to October)	Total
Male	6	12	14	32
Female	2	4	8	14
Total	8	16	22	46

Discussion

Palau has 3 major live-aboard dive ships each able to offer 10 to 20 divers up to 5 dives per day. There are also approximately 10 shore based diving organisations which generally offer 2 dives per day diving from fast runabouts which take 90 minutes to reach the dive sites. During a typical week in the peak seasons in Palau, there would be about 2,400 dives logged (calculated from 10 divers in 10 boats doing 2 dives a day [1,400] and 30 divers doing 5 dives a day [1,050]). This figure may well be an underestimate. I believe the number of cases presented to Belau National Hospital is only the tip of the iceberg. The incidence of decompression illness is in the order of 0.1 % to 0.01%, which translates to 1:1,000 to 1:10,000 dives.¹⁻³ The 1996 Diver Alert Network (DAN) report deals with 1994 statistics when 1,164 cases of DCI were recorded.⁴ DAN estimates of the number of active scuba divers is between 1,000,000 and 3,000,000⁵ which gives comparable figures to those quoted above. Thus, in Palau one would expect to see 1 to 2 cases of decompression illness per week. However, the Palauan Hyperbaric Unit is treating only about 15 cases per year.

The breakdown of the citizenship of the patients with DCI treated in Palau (table 4) is also interesting. There is a discrepancy between the nationality of the patients treated with DCI and the distribution of tourist divers to Palau. Eighteen (39%) of the cases were US citizens, 7 (15%) were Japanese and 2 (4%) each from Palau, Hong Kong and the Philippines, in 9 cases (19.5%) the citizenship was not recorded. This distribution of cases is in contrast to the distribution of divers visiting Palau. Over 50% are either Japanese or Taiwanese tourists, but they only comprise 17% of the incidence of treated decompression illness in Palau. One can only assume that affected Asian divers were reluctant to present to the Palau Hospital for treatment because of language and social barriers. I hope that they do eventually seek treatment in their own countries, but I suspect this may not be the case.

The stress of completing an expensive diving vacation and connecting with international flights, may explain why many cases of DCI are not presenting in Palau. Divers often deny the possibility of DCI being the cause of their symptoms and mistrust of the foreign local medical facilities is common in tourists.

Decompression illness often requires multiple hyperbaric oxygen treatments, but the patients at Belau had an average of only 1.46 treatments. I suspect that many of the tourist patients deny residual symptoms in order to return home and that often these patients are not followed up when they get home. It is possible that some divers get inadequate treatment.

TABLE 4

CITIZENSHIP OF DIVING ACCIDENTS VICTIMS TREATED AT BELAU 1993 TO OCTOBER 1995

Citizenship	1993	1994	1995 (to October)	Total
USA	5	6	7	18
Unknown		1	8	9
Japan	1	4	2	7
Hong Kong		1	1	2
Palau		1	1	2
Philippines		1	1	2
France			1	1
Germany	1			1
India		1		1
Singapore	1			1
Taiwan		1		1
UK			1	1
Total	8	16	22	46

Chuuk State Hospital

After Palau, I spent a week at Chuuk State Hospital demonstrating and lecturing on aspects of anaesthesia and diving medicine. The Chuuk State Hospital is about twenty years old and serves a population of 60,000. In contrast to Palau, Saipan and Guam the conditions and standards in Chuuk were very primitive. During my visit, Chuuk State was in a financial crisis and the hospital was run down and there were severe shortages of medical supplies and equipment. The hospital survives solely on donated medical supplies.

Truk Lagoon is a Mecca for enthusiastic scuba divers who wish to explore the numerous sunken Japanese WWII wrecks. Most of the diving in Chuuk occurs in deep water and there are many repetitive and decompression dives performed. As a result, the DCI rate is much higher than normal. In Truk Lagoon there are two live-aboard diving boats offering up to 5 dives per day and 4 shore based diving organisations which generally provide 2 dives per day. These diving facilities generate approximately 1,000 dives per week and thus, assuming that the incidence of decompression illness is approximately 0.1%, the inference is that Chuuk will produce at least 1 case per week.

Unfortunately, the nearest recompression facility is in Guam, a two hour flight by commercial airlines. It is tragic that although the US Navy donated and installed a new multi-place recompression chamber at the Chuuk State Hospital in 1990 it has never been used. This is due to the lack of trained medical, technical and nursing staff to

operate and maintain the unit. Another problem is a lack of adequate supplies of oxygen. There are no facilities available to fill cylinders with medical gases on the island, so oxygen is purchased, (at considerable cost), directly from Guam and unfortunately the deliveries are often unreliable.

When I inspected the recompression chamber, I noted that one of the compressors was not functioning and that a regulator in the built-in breathing system (BIBS) needed to be repaired. Otherwise, the hyperbaric system was in pristine condition. I suggested that a medical team from Chuuk should be sent for training in diving and hyperbaric medicine and the unit be repaired as soon as possible. The chamber would be financially profitable with the number of tourists requiring recompression treatment and in conjunction with the Diving Association of Chuuk, a diving levy could also be imposed to generate funds to maintain the facility. Volunteers from the diving tourist industry could also be recruited to be attendants for the chamber.

Micronesia is one of the best diving locations in the world but in certain parts of the region, as expected, the medical facilities are far below the standards that are found in Australia and New Zealand. The majority of tourists to Micronesia are Japanese, Taiwanese or American, but with the resumption of flights from Sydney to Guam by Continental Micronesia Airlines, there will be an increase of Australian divers visiting the area. Even now some of the Hyperbaric Units in Australia see divers who develop symptoms on the aircraft while flying home after a stint in Truk Lagoon.

When travelling to such areas for diving vacations, several guidelines should be followed. Dive conservatively, limit the number of repetitive dives, avoid decompression dives, do safety (decompression) stops, avoid deeper dives, do not mix alcohol with diving, do not fly until 24 hours after diving and have adequate travel insurance to cover medical emergencies, as the cost of treatment of diving accidents can be astronomical, should all be adopted as essential parts of a diving holiday. Finally, recreational diving is supposed to be for fun and most diving incidents are preventable so take care and enjoy the diving!

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