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DIVING DOCTOR'S DIARY

SCUBA KIDS

Carl Edmonds

Case summary

(The full and excellent description of this case report, by the child/patient/diver herself, can be read in *Scuba Diver*)¹

At the age of 12 years her father gave her a birthday present, a scuba diving course.

The family were very conscientious and ensured that she was examined by a diving doctor, who also performed lung function and provocation tests at the local hospital. I have not been able to track them down.

The qualification, which she received without difficulty, allowed her to dive in association with another certified diver. This she achieved by her father driving her many hours to the coast, every few months.

During one of these visits she did a dive to 6 m for 37 minutes, totally uneventful. Some 8 hours later, while travelling over the mountain range that surrounds Sydney, she became aware of a tingling in one knee. The usual plea from her father to tell him of anything that could possibly go wrong with a pain in the joint or something like that, was initially ignored but she finally did disclose the tingling sensation.

She was then starting to become a little apprehensive, made worse by reviewing a diving manual which described the symptoms of decompression sickness. At this stage both she and her father were panicking, she in tears and her father driving wildly to return to Sydney.

They contacted the Divers Emergency Service number on their mobile phone, and talked for some time to the doctor. By this stage, with the patient on the phone talking to DES, the whole situation deteriorated. The patient burst into tears and her father took the phone. She

was shaking all over and very apprehensive. As she stated "I am going to die here in this car, on some ***** mountain".

The symptoms developed further and she complained of numbness and tingling in all extremities and an increased numbness in the leg.

They then came down from the mountain, but at this stage she was in a bad state with chest pains, difficulty breathing, blurred vision and tiredness etc. She was crying, dad was swearing.

By the time they got to a local teaching hospital, the whole family was close to tears. By then it was all a very big emergency. Whatever else was happening, she was hyperventilating and confused.

The ambulance, the paramedics and the intravenous drips all combined to deliver a live, but very distressed, patient to the Naval base.

Hyperbaric treatment was then given, on the very reasonable presumption and diagnosis of a cerebral arterial gas embolism from pulmonary barotrauma. The patient responded well to this, and there were few, in any, remaining symptoms during the subsequent hospitalisation.

The professional diving physician who saw her did strongly suggest that, because of her asthma (did I not mention that she took Pulmicort regularly?) that she should not continue scuba diving.

She was seen by the "best diving doctors in the state", who gave her and her parents a variety of advice, including references to "wild cat bends" and suggestions to wait until she is a little older before she resumes scuba diving. (This certainly does not say much for the standard of diving medicine in New South Wales.)

It was on the basis of the above report, which has been much abbreviated by me, but is in all its colour and glamour in the *Scuba Diver* article, that I prepared the following response for the magazine.

Official recommendations

The South Pacific Underwater Medicine Society committee on medical standards for recreational diving met on this subject in 1990. They recommended a minimum age of 16 for scuba diver training. The decision was based purely on safety factors.

The Australian Standards Committee CS/83 reduced the recommended age to 14, to comply with the diving instructor agency's requirements.

The Australian Standard 4005.1 of 1992 states that the selection criteria required that the trainee shall comply with the following:

(a) be at least 14 years of age.

BUT, persons under 14 years of age may in some cases be eligible to train for conditional certification which allows the young person to dive with a certified diver, with consent of parents or guardians.

Under the medical section of the AS 4005.1 it is stated "Children under the age of 16 shall only be medically examined after consultation by the doctor with the parent or guardian to establish the child's physical and psychological maturity. Between the ages of 16 and 18 it is preferable to consult with the parent or guardian before medically examining the child."

Would you allow a 12-14 year old child to:
 fly an aeroplane?
 drive a motor vehicle?
 take out a loan?
 be legally responsible for decisions made?
 make medical and health judgments?
 make life-threatening decisions for himself and others?

If you agree that 12 to 14 year old children should be restricted in this way, then it would be interesting to compare your attitude with that of a similar aged child undertaking scuba diving.

The youngest child that I know of to die as a result of scuba diving was aged seven, but there are quite a few 10 to 14 year olds in the death statistics associated with recreational diving.

The Australian Surf Life Saving Association, whose judgment is not influenced by commercial factors but who is very committed to children's involvement, will not allow active life saving responsibilities until after the age of 15 years, and even then under the supervision of a patrol leader, 18 years or older.

Comment on AS 4005.1

SPUMS recommends a minimum age of 16, with parental informed consent and approval necessary between the age of 16 and 18.

The Australian Standard unfortunately was not prepared by diving physicians. Although there was a representative of SPUMS on the committee, he was greatly outnumbered by the industry and diving training organisation representatives. They have different agendas, and different motivations from physicians. There was no one present with paediatric psychological training.

Looking at the Australian Standard document, it is implied that there is some concern regarding a child's safety, until the age 18. Off loading the responsibility to parents who have no practical knowledge of the risks of scuba diving was a reprehensible act.

I was, and am still, surprised that the committee accepted that an under 14 year old diver could safely "dive with a certified diver". This is clearly inadequate, as it allows one young "conditionally qualified" child to dive with another diver who may be equally inexperienced.

Psychological maturity

This is the main reason why doctors would prefer children not to be given diving certification.

Certification implies that the diver can make informed judgment about dive planning, environmental conditions, equipment use, and the interrelationships of all these. For a dive to be safe, this judgment is sometimes essential. It is related to maturity and experience, not just intelligence.

A child may have no difficulty handling the intellectual content of the diving course, but she or he will have difficulty with its application.

Unfortunately children do not have the same understanding of mortality (death) and the implications of morbidity (disease or accidents) as adults.

Kids are immature. That is what makes a child. They tend to be more immediate in their gratification needs and with a shorter attention span. They are not as good at long term planning as adults. Unfortunately, sometimes the long-term planning will not be needed if the child dies or does significant damage.

Materialistic factors also come into play. Kids are less likely to abort a dive, if they have already committed themselves financially or logistically. With age, judgment does come. Older people see death more clearly.

Psychological reactions are also different in children. Kids react with behaviour that, in adults, would be abnormal. They are far more likely to display anxiety or hysterical reactions, and the control of these is part of the maturation process.

The appropriate response to a life-threatening situation, or even one that is perceived to be life-threatening, is not to burst into tears. Unfortunately this is a child's natural reaction, and is often very successful in obtaining assistance. Tears are not easily seen through a face mask, and in any case, tend to simply add to the large ocean environment. They do not have the same power under water as they do on land, with mummy watching.

Children's reactions are certainly rapid, but not always appropriate for their long-term health and safety.

Endurance and perseverance are characteristics which develop with age. These take over when panic and tantrums have been controlled. Imagination is a characteristic that is endearing, but makes kids susceptible to fear and terror.

Dependency

Children are dependent. They slowly mature to become independent, and act responsibly. Thus they are more likely to rely on the statements and decisions of others, as opposed to deciding what they themselves are capable of doing. This might be all right on a trip to the zoo, but it is not good in open ocean diving.

In the latter environment divers have to be self-reliant and to recognise their own limitations, but also have to be able to act accordingly. They are responsible for the safety and rescue of their companions. Would you really want a twelve year old child being responsible for your safety, or your child's safety?

Children are suggestible and very easily impressed. They can be intimidated directly by their parents, and also by the encouragement and enthusiasm that their parents may give them.

Thus the child might well continue an activity such as scuba diving, to please mum or dad, to impress their parents and peers and to gain attention. These are not good motivations for scuba diving. Kids are very easily intimidated, and for the sake of the child, I would prefer to see an indifferent parental reaction than an enthusiastic one.

Physical immaturity

The problems of good quality equipment purchase

include the need to upgrade regularly during the growing years.

There is the likely problem, sooner or later, of the child having to swim against unexpected tides or currents to return to safety. Some children may have this physical ability, but do not have the psychological endurance in such an emergency. Others will have neither.

A small child could have great difficulty in coping with the rescue of a larger "buddy".

With physical immaturity, there is also the problem of increased dangers from certain diving medical disorders. These include such things as hypothermia, gas toxicities, susceptibility to marine venoms, barotraumas, etc.

Medical aspects

The reason that children get "glue ears" is that their Eustachian tubes are narrower and smaller. So are their sinus ostia. So are their respiratory airways. That is the reason why children have far more trouble with barotraumas in aviation, as well as diving, exposures.

Some diseases, such as asthma, are more likely to occur in young children than in late adolescence, when the airways have grown relative to the lung volumes. That is why children sometimes seem to "grow out" of asthma.

Children's upper and lower respiratory passages are much narrower in comparison to the air cavities associated with them. Barotrauma is very common in children exposed to pressure changes.

Many have questioned the safety of exposing children to diseases such as pulmonary barotrauma and arterial gas embolism (one cause of acute decompression illness), especially in children where there is still growth of organs, i.e. where a bubble can do more damage than it would in a full-sized adult.

Such tissues that could be so affected include the brain, inner ear, bone, coronary artery etc. The worry here is that, for the same degree of bubble development, there could be a much greater ultimate damage.

When should children dive?

In my opinion, a child under the age of 16 should only have a "dive experiences" under the following, moderately safe, conditions:

- 1 They want to, without parental or peer pressure.
- 2 They are medically fit to do so.

3 A maximum depth of 9 m, to prevent some of the problems referred to above. The 9 m depth will certainly not prevent a child from developing pulmonary barotrauma, cerebral arterial gas embolism or any of the other respiratory tract barotraumas. It will, however, usually prevent decompression sickness manifestations unless the exposure time is excessive.

4 They are trained and taken by a qualified instructor, and under the personal and total control of that instructor (i.e. not three or four trainees together). A buddy line between the child and the instructor is prudent, to prevent panic ascents.

5 After this acquaintance dive, all other dives are only to be carried out in safe environmental conditions, and with the same controls as referred to above (1-4), with an experienced diver of instructor standard taking absolute control.

Giving a certificate to dive to children under the age of 16, other than one which stipulates diving under the above very special conditions is, in my opinion, irresponsible.

Reference

- 1 Haines S. Why? *Scuba Diver* 1996; July/August: 74-75

Key Words

Case report, decompression illness, fitness to dive, hyperventilation, panic, recreational diving, training.

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