

ASTHMA AND DIVING

by **Dr Simon Mitchell**
Current at time of writing (2002)

There is no single subject in diving medicine that I am asked about more often than the implications of asthma and diving for fitness. This is hardly surprising. Asthma is a prevalent disease in Australia and New Zealand, affecting up to 10-15% of the population of children in both countries. Many “asthmatics” eventually want to dive, and unfortunately, there are a number of concerns about the effect of asthma on diving safety. Diving physicians have traditionally taken a conservative approach to asthma in diving fitness assessments. Mention the word and you were ejected from the surgery faster than you could say “but it wasn’t serious and it’s gone now”. More recently, some diving physicians, myself included, have begun to take a more liberal “informed consent approach” to the assessment of previous or mild asthmatics for diving. This has seen some candidates who would previously have been prevented from diving being allowed to dive after making an informed choice about risk acceptance. In this article I will describe asthma and why it is a concern in diving. I will also describe what I consider to be a modern and sensible approach to diving fitness assessment for an “asthmatic”.

What is asthma?

Asthma is a condition that affects the medium to small airways in the lungs. In the asthmatic, these airways are prone to becoming narrowed, thus impeding the flow of air in, and in particular, out of the small air sacs (alveoli) where gas exchange occurs.

The narrowing occurs by 3 potential mechanisms:

1. Constriction of the muscle within the walls of the airway
2. Swelling of the tissues lining the inside of the airway, and
3. The secretion of mucus from those tissues

The trigger for these events is often an allergic response to a specific stimulus such as pollen, animal fur, house dust, and many other allergens. Some asthmatics respond to what appear to be physical stimuli such as exercise or a change from breathing warm air to cold air. The irritation of the airways during a viral chest infection is another potent stimulus for airway narrowing in some patients. The potential stimuli form a very long list.

The result is that the patient feels short of breath and there may be an audible wheeze, especially on exhalation. It is notable in the context of a discussion on diving medicine that for reasons I won’t go into, the restriction to breathing is more on exhalation than inhalation. In other words, there is a tendency for air to become trapped in the lungs. In serious cases airway narrowing can cause severe difficulty breathing, and asthma attacks can certainly be fatal.

One of the biggest problems in discussing asthma, and this is particularly true of discussing asthma in the context of diving, is that the spectrum of severity is extraordinarily wide. To begin with, there is a large group of patients who are best described as “previous asthmatics”. In other words, they suffered asthma as a child, but like nearly half of all childhood asthmatics, they grew out of the problem around puberty and have not wheezed or used medication for years. In at least some previous asthmatics the diagnosis may have been wrong in the first place. Unfortunately, the diagnosis of asthma tends to stick for life, and especially in the past, many diving candidates were failed because of a history of childhood asthma.

This educational article is written with the intention of making balanced information available to all individuals, particularly those involved in diver training or diver safety. You are free to download this information and print copies for wider distribution. If sections of the articles are used in other publications, they should be fully referenced with acknowledgement being given to the NZUA and the author(s) – www.nzunderwater.org.nz

Then there is an intermediate group of intermittent asthmatics who wheeze only occasionally, usually in response to a clearly identifiable stimulus such as a cold. Finally there are the “active” asthmatics who wheeze frequently and require regular medication. Of course, these “groups” that I describe are somewhat arbitrarily defined, and not every asthmatic falls exactly into one of them. Indeed, every patient needs to be considered “on their own merits” for want of a better expression, and my main point here is that the word “asthma” can mean many things.

Asthma is treated with two main classes of drugs, frequently known to users as “relievers” or “preventers”. Relievers are usually used to treat asthma once the patients have actually developed symptoms. They are classically drugs that act to relax the smooth muscle of the airway walls, but some also target the swelling and mucus production that also cause narrowing of the airway. Preventers are designed to be taken all the time, even in the absence of problems, in order to prevent symptoms arising. These agents are usually designed to blunt the allergic response to irritant stimuli and they are often very effective as long as the patient is compliant with taking them. The division between these classes of agents has become more blurred recently with the development of combination drugs and longer acting relievers that help to prevent further symptoms as well.

Problems with asthma in diving

There are 3 main concerns about asthma and diving. I will revisit this later, but as you read of these concerns you should be aware that at least some of them are speculative and derived more from first principles than from concrete evidence that there really is a significant problem.

First, asthma may make the diver more likely to suffer a diving related illness. We are all taught that the most important rule in diving is to breathe normally and to never hold your breath. If a diver ascends whilst holding their breath, then the expanding air can damage the delicate lung tissue, and air may be introduced directly into the blood, travel to the brain and cause an arterial gas embolism (AGE).

There is concern that an asthmatic may suffer narrowing or blocking of small airways during a dive, and that expansion of any trapped air during ascent may lead to the same problem. There is also concern that the use of reliever medication such as ventolin prior to diving may cause the lungs to be less efficient at filtering the venous nitrogen bubbles that we all form after most dives. These bubbles may then get through the lung circulation to reach the arteries where they might, in theory, be more likely to contribute to the development of decompression illness.

Second, it is recognized that independent of concerns over diving related illness, an asthma attack in the water may severely compromise the diver’s safety by causing incapacity and an inability to exercise effectively. Indeed, it is hard to argue that difficulty breathing would not be a decided disadvantage if you were caught in a current at the surface that was sweeping you away from your boat.

Third, not only can asthma potentially complicate diving by the above mechanisms, it is a plausible concern that diving itself could precipitate asthma. This may occur in several ways. Asthma can be precipitated by the exercise associated with diving, or the irritant effect of breathing a cold dry gas. It is also recognized that regulators frequently leak a little salt water, and that some of this may be nebulised into a mist during breathing. This mist of very salty water can irritate the airways and precipitate narrowing in vulnerable individuals.

As I intimated earlier, the problem with all of these very plausible concerns is that we have no idea of how truly significant they are. Nobody has ever prospectively followed a large population of carefully defined “asthmatics” to see how they go over a long diving career. There are some data from

This educational article is written with the intention of making balanced information available to all individuals, particularly those involved in diver training or diver safety. You are free to download this information and print copies for wider distribution. If sections of the articles are used in other publications, they should be fully referenced with acknowledgement being given to the NZUA and the author(s) – www.nzunderwater.org.nz

retrospective surveys that are potentially subject to considerable bias. These surveys reveal that many asthmatics (including active asthmatics) do dive, and that data suggest that while their relative risk in diving may be elevated, their absolute risk remains relatively low. What do I mean by this? Well, for example, one survey indicated that an asthmatic is twice as likely to suffer an AGE as a non-asthmatic. Sounds bad? Maybe. But if the risk of AGE for a non-asthmatic is 1 in every 50,000 dives, then the risk for an asthmatic is 1 in 25,000; a clear illustration of the fact that twice stuff-all is still stuff-all. This is the kind of difficulty we face in knowing how to approach diving fitness assessments for asthmatics. There may be increased risk, but the risk may still be quite low, and the question arises as to how high a risk has to be before it is unacceptable? Obviously, there is no clear answer.

Assessing suitability of asthmatics for diving?

In this day and age of nobody wanting to take responsibility for their own actions the most sensible thing for a diving doctor to do when an “asthmatic” walks into their surgery is to say “bog-off you’re unfit”. This happens frequently, and who can blame the doctors? However, while it might be defensive medicine, it is not necessarily good medicine. Indeed, such unobjective pronouncements will often motivate the candidate to go to another doctor and lie about their asthma, or whatever other condition prompted their rejection. I, and increasing numbers of like-minded colleagues recognise this. Moreover, as someone who has gained an awful lot from diving I cannot bring myself to reject an enthusiastic potential diver without at least some attempt at objective analysis of their risk in diving, and possibly offering them the opportunity to proceed with diving on an informed consent basis.

What do I mean by an informed consent basis? Fundamentally, this means that I would clearly and comprehensively explain the risks of diving to the candidate, and let them make an informed choice about whether to proceed. However, there are some important provisos.

Most critically, I would never use such an approach with a candidate who had what I would consider to be a significant risk in diving. In the context of asthma, most diving physicians would agree that the more active the asthma, the greater the risk in diving. Those candidates who suffer serious “attacks”, wheeze relatively often, or use reliever medications regularly cannot be considered for diving, even on an informed consent basis because rightly or wrongly, the risks are perceived to be too high. On the other hand, the previous asthmatics and milder cases may be subject to little extra risk, and it is reasonable to let them, as intelligent adults, to make up their own mind on the matter.

Every day of our lives we make decisions that inherently involve weighing risk against benefit. As motor vehicle drivers, we all know that higher speed increases both the risk and consequences of an accident, but none of us drive along motorways at 50km. Why is this? It is because we perform a mental analysis that tells us that the benefit of traveling faster outweighs the potential risk of doing so. We choose to get on planes, we choose to play rugby, we choose to ride bicycles on busy roads, all because we decide that the benefit outweighs the risk. There is no reason why diving should be any different in this regard, although diving candidates are much less well informed about the inherent risks than they are about these other intuitively obvious risk situations. It is the diving doctor’s role in this setting to educate the candidates sufficiently so that they can make an informed choice.

My approach to the “asthmatic” diving candidate is to first take a detailed history of their problem.

The obvious asthmatics are told they cannot dive, and the reasons are clearly explained. It is then their choice whether they go and lie about it to another doctor, but at least if they do this they know what they are getting into. Please note that I discourage this course of action! The previous asthmatics that have not experienced even subtle symptoms of asthma or used medication for years are usually able to dive without any special investigations, although I do counsel them about the remote possibility of a latent asthmatic tendency to putting them at slightly increased risk in diving.

This educational article is written with the intention of making balanced information available to all individuals, particularly those involved in diver training or diver safety. You are free to download this information and print copies for wider distribution. If sections of the articles are used in other publications, they should be fully referenced with acknowledgement being given to the NZUA and the author(s) – www.nzunderwater.org.nz

The most problematic are the mild asthmatics: the candidates who wheeze once or twice a year when they have colds; or who wheeze a little only in Spring when there are certain pollens around, and other similar stories. I lead a long discussion about the potential risks in diving implied by their asthmatic history, and if they wish to continue we usually proceed with tests to check that neither exercise nor the breathing of nebulised salt water (at the same concentration as the sea) provoke airway narrowing. If these tests are negative and the patient exhibits a clear understanding of the issues and wishes to proceed, I am usually happy for them to dive. Unfortunately, to conduct and document this process properly is a time consuming and expensive process, but at least it is better than unselectively being told to bog-off!

For more information on these issues, divers should consult a doctor with training in diving medicine. A list of doctors in New Zealand and Australia who have appropriate qualifications in diving medicine can be found elsewhere in this magazine, or can be downloaded from the website of the South Pacific Underwater Medicine Society at www.spums.org.au. The same list can be obtained by contacting the New Zealand Underwater Association on (09) 623 3252 or via a link from their website www.nzunderwater.org.nz