

Pollen asthma in the deep

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Respiratory allergy induced by pollen antigens has had a remarkable clinical impact in the industrialized world, and there is evidence that its prevalence is increasing. Our knowledge about the mechanisms governing pollinosis has advanced thanks to immunologic, aerobiologic, epidemiologic, and clinical studies. However, it is difficult to envisage that pollen allergens can be inhaled in the depths of the ocean. We encountered a very unusual case of a scuba diver with bronchial asthma caused by exposure to *Parietaria* pollen allergens who, despite long experience of underwater diving without untoward effects, had a life-threatening asthma attack during a diving expedition.

CASE REPORT

The patient is a 37-year-old man with rhinitis and asthma who has had positive skin test responses and a high concentration of specific serum IgE to *Parietaria* pollen allergen, together with well-related symptoms in the *Parietaria* pollen season (from March to October). His nonspecific bronchial responsiveness is a PD₂₀FEV₁ of 400 µg of methacholine (test performed out of the *Parietaria* pollen season), but the symptoms are well controlled by inhaled steroid therapy (400 µg budesonide twice daily). In September 1998, the patient, an experienced scuba diver, had such a severe asthma attack while diving at 27 m that he had to resurface and be given rescue medication (400 µg of the short-acting β₂-agonist salbutamol administered by means of a metered-dose inhaler and an oral steroid, prednisolone 40 mg). Symptoms were breathlessness, wheezing, and cough, which disappeared 4 hours after treatment. His morning peak expiratory flow was stable during the following week, and he had no respiratory symptoms. He had descended beyond 27 m before this incident without any adverse effects. The incident did not coincide with a change in asthma medication or with a respiratory tract infection. The only factor differentiating this incident from previous dives was that the scuba tanks were refilled (1.5 L at 200 standard atmosphere) in a new area. Upon inspecting the recharging supplier, we found that the compressor was not fitted with an air filter and that the area was rich in *Parietaria* plants.

Consequently, we tested the possibility that the air used to recharge the tanks contained allergens released from these plants. In a closed room, to reduce the risk of contamination by airborne pollen,¹ we linked the tank to a volumetric device (Lanzoni, Hirst-like, pollen trap) through the diver's mouthpiece and emptied the contents into the pollen trap, taking care to prevent leakage of air through the link. With this device, air is drawn into the trap by a pump, and airborne particles are trapped on a sticky surface. The tape used to sample the airborne

pollen was placed on a glass slide, colored with fuchsin, covered, and examined by means of a light microscope. The sample contained several mainly damaged granules of *Parietaria* pollen that could have released specific allergens responsible for the asthma in the diver.

DISCUSSION

Parietaria species, the main allergenic genus of the Urticaceae (nettle) family, is a major cause of allergen-induced respiratory manifestations in the Mediterranean area.^{2,3} *Parietaria* species shed large quantities of small (12 to 16 µm) pollen grains, which reach high levels in the atmosphere. The extraordinarily long persistence in the atmosphere of *Parietaria* pollen in the Mediterranean area is responsible for a multiseasonal symptomatology, which on the whole lasts from March to October, with various degrees of intensity. Bronchial asthma or its equivalent is present in more than 50% of the patients monosensitized to *Parietaria* species in southern Italy.

Even though controlled inhalation challenges with and without air filter using the tank air were not performed, the indirect evidence that the asthma attack in our patient was pollen related is very persuasive. In addition, the regression of respiratory symptoms after administration of anti-asthma agents seems to rule out such other causes of respiratory distress, such as barotrauma and arterial gas embolism. Consequently, physicians should be alert to the risk that diving equipment can be contaminated by plant allergens. Lastly, divers at risk for pollen-induced breathing disorders are advised to check that the air used to recharge their tanks is filtered to prevent the passage of respirable pollen grains, the smallest of which, such as *Parietaria* pollen grains, have a diameter of between 12 and 18 µm. However, it is difficult to prevent the passage of allergen-bearing microparticulates³⁻⁵ that have a diameter between 2 and 5 µm and that are able to reach the peripheral airways with inhaled air, therefore inducing asthma in sensitized subjects. Moreover, oral inhalation, as used in scuba diving, bypasses the nasal filtration, and larger particles can be more easily inhaled into the lower airways.

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