NASAL FILTERS FOR RELIEF FROM ATOPIC DERMATITIS CAUSED BY INHALANTS

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Nasal filter is a simple device consisting of a net mounted in a frame made to fit inside the nostrils. These filters thus are not visible from outside. If a person uses the nasal filters, the particulate material from the air that the person breathes gets removed and in case the person is allergic to an inhalant antigen, he stops having the allergic symptoms. We tried nasal filters on two female patients aged 32 and 7 years respectively, having atopic dermatitis since the age of 1 year, caused by an inhalant (indicated by seasonal aggravations, and spontaneous recovery during brief visits to other towns). During a follow-up of $2\frac{1}{2}$ and 2 years respectively, both the patients experienced almost 80-90% relief from the dermatitis and required only minimal treatment.

Key words : Atopic dermatitis, Nasal filters, Treatment.

Atopic dermatitis is generally considered to be an intractable disease because the patient has an enhanced tendency to produce antibodies against a large variety of environmental antigens,[1] and it is not easy to prevent exposures to all such agents. Our experience however indicates that even though a patient may give positive intradermal or other tests to several antigens, the antigen(s) which actually incite the clinical symptoms are generally not all of them. In most allergic individuals, only one or two antigens are actually responsible for the clinical symptoms while several other agents act as non-specific stimulants and aggravating factors. If exposures to the primary antigen are prevented, the non-specific stimulating factors lose their aggravating influence.

Prevention of further exposures to the antigen is usually easy if the antigen is a food, but if it is an inhalant, such as a pollen or dust, the only solution lies in shifting the patient to another town/place where that pollen is not present. The other alternative can be to wear a mask to cover the nose (and the mouth) to filter the air that the individual breathes in. Since, it will be necessary to wear such a mask most of the time, this seems to be an impracticable solution especially when the individual has to go out for work. In 1972, we designed a small device named nasal filters[2] which consisted of a stainless steel wire-gauze mounted in a methyl methacrylate frame made to fit inside the nostrils of the patient. Such a filter was to be worn inside the nostrils one on each side and was thus not visible from outside. In this manner, the patient could filter the inhaled air throughout the day. Follow-up studies revealed a significant improvement in a majority of the patients having diseases such as asthma and allergic rhinitis in whom the symptoms were considered to be caused by an inhalant antigen.[3,4] The filters made in 1972 were hard and had to be made exactly according to the size of the user's nostrils. Thus, the process was time-consuming and patients living in distant towns could not avail this facility. In 1985 therefore, we designed soft nasal filters which are made from unprocessed latex and a nylon net, and are available in 9 ready-made sizes. The patient can select the filters of his size and start using these immediately. We are reporting the experience of two patients with atopic dermatitis who have used the soft nasal filters for adequately long periods.

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Case Reports

Case 1

A 32-year-old lady, born in Indore in 1956, started having itching and papulo-vesicular lesions when she was 6-month-old. The lesions were extremely itchy and rapidly spread to involve the entire body except the scalp and periocular areas, but flexures of the elbows and popliteal spaces were involved more intensely. In 1957, she shifted to Calcutta but the lesions continued to occur all-through the year though these were more severe every May and June. In May 1970, she visited Shimla for 15 days and within 4-5 days the itching stopped completely and the lesions started regressing. On return to Calcutta however, the lesions started recurring in the same intensity. By the age of 14 years, the lesions were confined mainly to the neck, the cubital fossae and the popliteal fossae, but the aggravations continued to occur during May and June and also September and October every year, and a mild form of the disease continued throughout the year. In 1978, she shifted to Kota (Rajasthan) but there was no change in the pattern of her disease. In April 1984, she visited Bombay for about 2 months, and within 15 days after her arrival in Bombay, she noticed an aggravation of her disease which spread to involve the chest, forearms, thighs and lips. On return to Kota in June 1984, the lesions regressed to their original severity. Throughout this period she had been managed with topical corticosteroids, oral antihistamine and antibiotics with a partial relief. Homeopathic medications were tried on two occasions for 8-9 months and 4-5 months respectively with relief as long as the medication was continued, but with recurrence on stopping the same. In November 1985, she was advised to start using the soft nasal filters throughout the day and night alongwith levamisole 150 mg tablets on two consecutive days per week, and fluocinolone-neomycin ointment as and when required. Within a month's time, she was able to use the nasal filters almost throughout the day and night, and during the first two months she felt nearly 80% relieved. During May-June 1986 and September-October 1986, she had a recurrence of the dermatitic lesions by only 10-20%. During the rest of the year, she was almost completely relieved. In May 1987, she visited Khandwa (Madhya Pradesh) and she stopped using the nasal filters for one week. This was followed by a recurrence of the lesions within a week's time. On return to Kota and on using the nasal filters again, the lesions subsided within a week's time. Since June 1987, she had been almost completely free from the lesions except for a very mild recurrence during January 1988 for two weeks when she over-stayed outdoors during her school's annual sports. Between February 1988 and April 1988, she had stopped using the nasal filters and was completely asymptomatic. Levamisole had been continued all-through the 2½ years, but topical corticosteroids were used only occasionally during the aggravations. There have been no other complications. Apart from that, she developed perioral hyperpigmentation which was generally non-itchy and became worse during May and June especially following excessive exposure to sunlight.

Case 2

The second patient was a 7-year-old girl from Jammu who started having itching and papulo-vesicular lesions when she was 1-year-old. The lesions were extremely itchy and involved the face and trunk. Her lesions would aggravate during March-April and September-October every year and improve with oral and topical corticosteroids. She had visited a couple of places within her neighbourhood, but this had had no effect on her disease. In April 1986, she was advised to use the soft nasal filters, and also given levamisole 50 mg on two consecutive days per week. Within a week's time, her itching disappeared almost completely, there were no new lesions and the old lesions

started regressing. During the usual period of her seasonal aggravations, there were very few lesions which could be managed by topical corticosteroids alone. In March, 1988 however, she had a severer aggravation requiring a brief treatment with 0.5 mg betamethasone per day. Otherwise, she was almost 80-90% relieved with the nasal filters.

Comments

These two patients illustrate that patients whose symptoms are caused by inhalants, can obtain significant relief by wearing the nasal filters and preventing the entry of the causative agents. If a person can prevent the entry of the agent completely, he can obtain complete relief, but sometimes the patient can breathe through the mouth and allow some amount of the antigen to enter. Moreover, the net used for the nasal filters does allow a small proportion of the antigen (especially when the pollen size is very small) to pass through, and thus a few recurrences usually of a milder intensity, are likely to occur. Nevertheless, even if the patient gets partial relief i.e. when the severity of the dermatitis is significantly reduced, the quality of life improves. The patient can manage with a little of topical therapy or require only brief periods of systemic therapy.

The filters are easy to wear, and since these are not visible from outside, the patient can wear them even outdoors and on social occasions. During the first few days, the filters do cause a foreign body sensation in the nostrils, so it helps to ask the patient to use them for interrupted periods of $\frac{1}{2}$ hour each at intervals of $\frac{1}{2}$ hours on the first day, and progressively increase the duration of use during the first week. In case the patient gets increased nasal secretions, oral antihistamines even in a high dose during the first week, help to dry up the nose. Thereafter, these drugs can be withdrawn. There is generally no respiratory distress while the patient is sitting or doing light physical exertion, but the patient may become breathless during hard physical stress such as climbing stairs, fast walking, running or outdoor games. The patient may not use these filters during this period and also during bathing and eating if it is uncomfortable. The degree of protection however would depend upon the duration of use. Long-term side effects have been found to be nil because some asthma and allergic rhinitis patients have already been using the hard nasal filters for more than 10 years with significant relief and no side effects.

The pore size of the net used in the nasal filters is 33 μ, but since the mechanism of filtration consists of interference in the path of flying particles, even smaller particles which strike the wires of the net are deflected and removed. Experiments in the laboratory have shown effective filtration of a variety of pollen and moulds of variable sizes,[5] lyophilized *Staphylococcus aureus* (1 μ size) and silica particles (0.4—0.6 μ size) to an extent of 75%, 86.9%, 89.0 and 90.0% in four different experiments.[4] Moreover, since the net tends to filter out all types of particles in the inhaled air, it is not necessary to detect the exact inhalant responsible for the symptoms. If the patient has seasonal attacks, or shows improvement (or even worsening) on changing the place of residence or going to a different town, or shows improvement on breathing through a cloth mask for at least 2 days continuously the causative antigen is likely to be an inhalant and the filters are likely to be useful.

Levamisole is a well known immuno-modulant which can help control the allergic symptoms, but this generally occurs over prolonged periods of use.

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