

Allergy to Oxygen Mask

Wg Cdr AK Malik*, Lt Col N Chakrabarty**, Wg Cdr JK Gupta+,

A 29 year old Transport pilot developed itchy rash on the centre of face, over the area covered by oxygen mask, after 2 weeks of flying a fighter aircraft during FIS course. He gave history of allergy to oxygen mask 8 years earlier. The diagnosis was confirmed by patch testing with rubber of his oxygen mask. His skin lesions cleared completely with a course of topical steroids. The diagnosis and management of the case are discussed.

KEY WORDS : Rubber allergy, Allergy contact dermatitis, aircrew discomfort

Introduction

Allergic contact dermatitis to oxygen mask is not a very common problem and exact incidence is not known. In case of face masks, allergens belonging to various groups of chemicals that are used with raw rubber as curing agents, accelerators and anti oxidants are documented, but again the exact incidents are not recorded. Recently, we had a case of Allergic contact Dermatitis to rubber of oxygen mask in an aircrew. History, diagnosis and management of this case is reported and discussed.

Case History

Flt Lt NKL, a 29 year old Transport pilot with 8 years of service, was detailed to undergo flying instructor course in July 89. After about a fortnight of flying on HJT-16 (Kiran) aircraft, where in he had to use a P/Q type oxygen mask, he observed a red raised itchy patch over the centre of the face, on the area exactly covered by the oxygen mask. Itching and redness gradually increased as he continued flying, though he used to feel better during weekends when he was off flying. He tried, on his own, four different masks of the same make, but his complaints persisted. He finally reported to the Medical Officer as he was unable to continue flying because of itching and discomfort.

He gave past history of allergy to oxygen mask. Eight years back, as a trainee, he had a

similar problem during last 10 hrs of flying on Kiran aircraft. Since then, he had been flying only transport aircrafts and remained asymptomatic before the occurrence of the present episode. He also gave history of allergy to rubber chin piece of a driving helmet strap about a year back, the complaints subsiding after the rubber piece was removed from the strap.

Examination revealed a well margined erythematous plaque over malar regions, nasal bridge and chin, exactly conforming to the configuration of an oxygen mask. He was diagnosed clinically as Allergic Contact Dermatitis to rubber of oxygen mask. The diagnosis was confirmed by a positive patch testing of skin with rubber of the oxygen mask. However, patch tests with some of the common chemicals used in the manufacturing of rubber products with high sensitization potential viz 1% Mercapto-benzothiazole, 1% Tetramethyl thiuram disulphide and 1% paraphenylenediamine, were negative.

He was treated with topical steroids and lesions subsided within a week. However, he was not considered fit to resume the course.

Discussion

Rubber is an organic substance obtained from natural sources or synthesized artificially. Raw rubber has few commercial applications. It needs modification by use of vulcanizing (curing) agents, accelerators and anti-oxidants. More than 1000 chemicals are used for this purpose in rubber industry. These chemicals have a high sensitization potential ranging from 5-10% in different studies. In rubber allergy, it is not the rubbers, but these chemicals which tend to sensitize¹. The North American Contact Dermatitis Group recommends that with the exception of Mercapto-benzothiazole, patch-test screening for rubber allergy should be performed

* Classified Specialist (Derm & Ven); ** Professor and Head, Dept of Derm & Ven, Command Hospital, Air Force, Bangalore - 560 007; + Professor and Head, Dept of Acceleration Physiology, Institute of Aerospace medicine, IAF, Vimanapura, Bangalore - 560 017.

with "mixes" of rubber chemicals rather than a single substance². The usefulness of mixes lies in one patch covering several test substances.

Natural rubber and silicone rubber are commonly employed in the manufacture of oxygen masks. It is important that sensitizing properties of any rubber mixture used in masks, should be as low as possible and the body secretions should not adversely affect the rubber. In case of allergy to face mask, the documented allergens belong to Mercaptobenzothiazole(MBT), piperidinium pentamethylene dithiocarbamate (PPD) and phenyl-beta-naphthylamine (PBN) groups³, but the exact incidence is not recorded. However, the identification of the allergen in a case of rubber allergy needs specialized kits and laboratory facilities.

Allergic contact dermatitis is a delayed hypersensitivity reaction mediated by T-lymphocytes, and sensitization once developed usually stays a life time. Specific desensitization has not been found to be generally useful in cases of allergic contact dermatitis.⁴ Immunoglobulins have also not been found useful in contact dermatitis. Immuno-suppressives are not considered in a localized problem like allergy to oxygen mask due to their side effects and adverse effects on flying.

Stitching of a thin lining of chamois leather along the infold of the mask, which would prevent direct contact of the rubber with skin, can be tried under supervision making sure that there is no

leakage of oxygen from the mask. Alternatively, trials could be attempted with masks of different makes, though these may not always be practical and could be time consuming.

Conclusion

Allergic contact dermatitis to oxygen mask is an uncommon problem, and the exact incidence is not known. The diagnosis is generally obvious from the clinical presentation and can be confirmed by patch testing of skin with the patient's mask, which should be usually positive. Detection of the exact allergen needs specialized facilities. The patient will generally respond satisfactorily to topical steroids, but problem in an aircrew will remain regarding continuation of flying with the same or a similar mask. The apparent solutions are, trials with face masks of different makes or interposing a thin lining of chamois leather or some other hypo-allergenic materials along the infold of the mask to prevent direct contact of skin with the allergen.

REFERENCES

1. Cronin E : Rubber In : Contact Dermatitis. Editor : Cronin E. New York, Churchill Livingstone, 1980, P 714.
2. Runder EJ : Epidemiology of Contact Dermatitis in North America, Arch Dermatol 1972, 108 : 537.
3. Fisher AA : Contact Dermatitis, Philadelphia, Lea and Febiger, 1986, P 639.
4. Lowney ED : Dermatologic implications of immunological unresponsiveness, J of Invest Dermatol 1970; 54,355-364.