INCIDENCE OF CONTACT HYPERSENSITIVITY AND CROSS-SENSITIVITY OF NEOMYCIN GROUP OF ANTIBIOTICS

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One hundred consecutive patients suspected to have contact dermatitis due to topical medicaments were patch tested with 20% neomycin, framycetin, gentamicin as well as other commercially available antibacterial agents. Neomycin sensitivity was observed in 16.0% cases, while framycetin and gentamicin sensitivity was seen in 11.0% and 4.2% respectively. Fifty percent neomycin hypersensitive cases cross-reacted with framycetin and 22.0% cross-reactivity was observed with gentamicin.

Key words : Hypersensitivity, Cross-sensitivity, Neomycin, Framycetin, Gentamicin.

Neomycin is one of the most commonly used antibacterial agents for treating various infective conditions of the skin. It is used either as such or in combination with a corticosteroid depending upon the pathology of the disease. Neomycin is a known potent contact sensitizer.[1] There are also various reports about cross-reactivity within the neomycin group of drugs.[1-3] Such reports are hardly available in the Indian literature. The present study deals with neomycin hypersensitivity and its cross-sensitivity.

Materials and Methods

One hundred consecutive patients suspected to have contact dermatitis due to topical medicaments were included in this study which extended over a period of one year. Patch tests were carried out with neomycin, framycetin and gentamicin (each 20% in plastobase), along with other commercially available antibacterial agents. The readings were taken after 48 hours and in majority of the cases after 96 hours as well. Patients were further advised to report immediately in case any reaction developed at the patch test site.

Results

Out of the total 100 patients, 43 were negative to all the agents tested, while in the remaining cases sensitivity was observed to one or more drugs. Sensitivity to neomycin group of drugs is shown in table I. Neomycin produced hypersensitivity in 16 (16.0%) out of 100 cases, while framycetin and gentamicin produced hypersensitivity in 11 (11.0%) out of 100 and 2 (4.2%) out of 48 patients respectively.

Cross-sensitivity was observed within the neomycin group of antibiotics. Out of 16 patients showing hypersensitivity to neomycin, eight (50.0%) patients reacted to framycetin also. Gentamicin could be tested only in 48 cases and out of these, nine were sensitive to neomycin and two to gentamicin. Both the gentamicin sensitive cases showed positivity to neomycin.

The clinical diagnoses of neomycin, framycetin and gentamicin sensitive cases were as follows; ulcers 9, dermatitis 7 and miscellaneous 3.

Comments

Neomycin was first isolated in 1949 from *Streptomyces fradiae*. It consists of two active components, neomycin B (78-88 percent) and neomycin C (10-16 percent). The third component, present only in small amounts (2-5 percent) is the degradation product neamine (neomycin A). Both neomyci B and C have two components, a deaminohexose (neosamine B or C) linked to d-ribose and a deaminohexose

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linked to 2-deoxystreptamine. Framycetin consists of neomycin B (99 percent), neomycin C (1 percent) and neamine (0.2 percent). Gentamicin is produced by *Micromonospore purpura* and belongs to the same group of antibiotics.[4]

First single cases of neomycin hypersensitivity were reported from USA[5,6] in the year 1952. Later on in 1958, Calnan and Sarkany[7] reported 14 cases of neomycin sensitivity from UK. Ever since, there have been a number of reports of neomycin hypersensitivity from various countries. Forstrom and Pirila[1] reported from Finland a peak incidence of 19.0% neomycin contact hypersensitivity in the year 1968 which came down to 10.6% in later years. Carruthers and Cronin[3] tested 450 consecutive patients with neomycin and framycetin. Twenty three (5.1%) patients were sensitive to neomycin and 17 (3.4%) to framycetin. Cross-sensitivity was observed in 13 (56.9%) patients. There were 10 patients sensitive to neomycin alone and four to framycetin alone.

Angelini et al[8] from Italy in their series of 306 patients with leg ulcers reported 16.3% incidence of neomycin sensitivity. They did not observe a single patient sensitive to gentamicin out of the 100 cases tested with it. Kirton and Munro-Ashman[2] reported 70 patients sensitive to neomycin or framycetin. Sixty patients were sensitive to neomycin and 55 to framycetin. Cross-sensitivity was observed in 45 (75.0%) cases. From India, Pasricha and Guru[9] reported an incidence of 40, 19 and 19 percent for neomycin, framycetin and gentamicin respectively.

In the present series, the incidence (16.0%) of neomycin sensitivity is higher as compared to other reports.[1,3] This can be explained on the basis that the neomycin group of antibiotics were tested in a select group of patients and not as a routine in all the patients attending contact dermatitis clinic. Similarly, Angelini et al[8] tested neomycin sensitivity in patients with leg ulcers (a select group) and reported almost the same incidence (16.3%). The incidence of contact hypersensitivity reported by Pasricha and Guru[9] is very high as compared to the present study. This is due to the fact that the incidence is based on only positive cases and does not include the ones who were negative to all the drugs. It could also be due to a genuinely high incidence of contact hypersensitivity to these antigens in that part of the country.

Table I. Contact hypersensitivity to neomycin group of antibiotics.

Name of antigen	Number of cases		Percentage
	Tested	Positive	
Neomycin	100	16	16.0
Framycetin	100	11	11.0
Gentamicin	48	2	4.2

The incidence of cross-reactivity with framycetin in the present series is 50% which compares well with those reported by Carruthers and Cronin[3] (56.9%) as well as Kirton and Munro-Ashman[2] (75.0%). Pirila and Pirila[10] have shown that neomycin contains two different chemical groupings possessing sensitizing capacity. It may be that patients sensitive to neomycin alone are actually sensitive to neomycin A or C, those sensitive to both neomycin and framycetin are sensitive to neomycin B and those sensitive to framycetin alone to some other unidentified impurity.

Twenty two percent neomycin sensitive cases in our series cross-reacted with gentamicin. Forstrom and Pirila[1] and Pirila et al[11] observed an incidence of 35.8% and 40.0% respectively, while Angelini et al[9] did not observe a single case sensitive to gentamicin. It seems there is a wide variation in the cross-reactivity of gentamicin and neomycin in different parts of the world.

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