INDIGENOUS PATCH TEST UNIT RESEMBLING FINN CHAMBER

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Indigenous patch test unit made from aluminium discs obtained from the tops of discarded injection vials and adhesive plaster was found suitable after testing 8430 chambers in 471 patients. This patch test unit is cheap and can be easily prepared in a side laboratory. The discs can be reused after washing and drying and disc material has no cross-reactivity with nickel. The large number of antigens (upto 40) can be tested on the upper back in one sitting. The tight occlusion prevents the spread of the reaction beyond the patch test site. Micro-cuts 1-2 in number without subjective discomfort, were produced in upto 5% of the chambers and these healed without medication in 2-3 days. There was no spill-over of petrolatum based antigens. However, with aqueous antigens the spill-over occurred in upto 2% chambers. The above limitations can be minimised by close scrutiny of the chambers for sharp edges before use and by applying measured quantity of the aqueous antigen.

Key words : Indigenous Finn chamber; Patch testing.

Contact dermatitis is quite common in India. Patch testing, a standard technique for investigation of contact dermatitis is carried out with Finn Chamber or Al-test unit.[1] Both the units are expensive, have their drawbacks and are not available in India. To overcome some of the disadvantages, a cheap indigenous patch test unit has been designed for use in India.

Materials and Methods

The patch test unit was made from two items, adhesive tape and aluminium discs. The central discs (Fig. 1) of discarded aluminium vial-tops were collected and discs of uniform 7.0-7.5 mm size were selected. The torn and distorted discs were discarded. These discs were straightened by pressing gently on clean glass table-top with finger-tips and edges were flattened with the rear end of forceps or the handle of Bard-Parker knife. The sharp edges were removed with scissors and filed to smoothen the edges. The discs were thoroughly washed with soap and water and kept overnight in acetone. After drying, the discs were stored in clean, wide-mouthed bottles till further use. The discs were placed with the help of forceps on a piece of adhesive tape (12×5 cm) in two parallel rows of five each. These were placed with concave surface (cup) up and pressed firmly. The distance between the centres of adjacent discs was 2 cm on all sides. Then these were covered with transparent polythene sheets of a slightly larger size (Fig. 2). The patch test

Fig. 1. The central disc of penicillin vial top.

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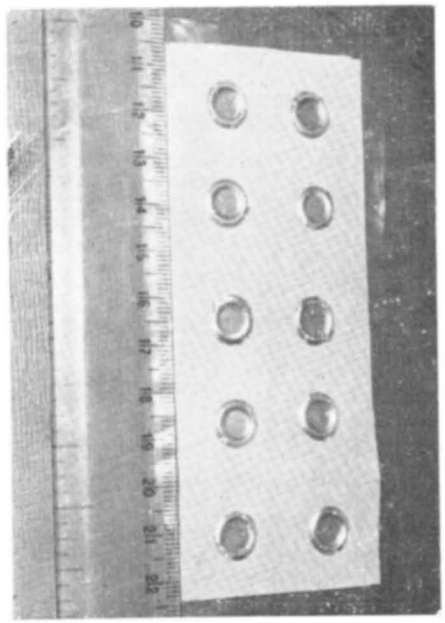

Fig. 2. The prepared indigenous patch test unit resembling Finn chamber.

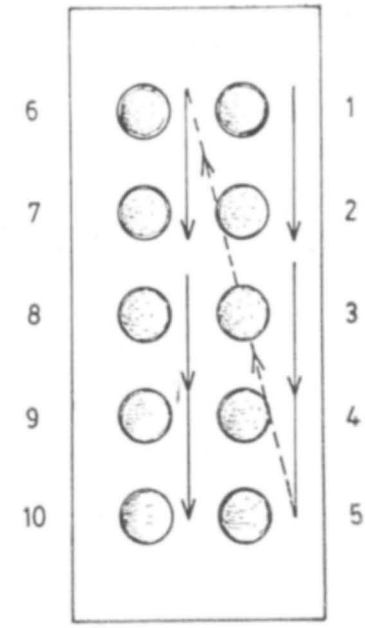

Fig. 3. Sequence and direction of antigen application. Note that first antigen is applied on the top disc on right side.

units were prepared, date marked and stored at room temperature in cardboard boxes. At the time of testing; the polythene covering was removed and petrolatum-based antigens were applied with the help of a glass rod on to the discs. For aqueous antigens, a wisp of cotton wool touched with the antigen was placed in the chamber with a forceps. Excess aqueous antigen was squeezed on a piece of cotton to avoid spilling. The plant leaves were cut into 5 mm squares, moistened with a drop of water and placed on the discs. The antigens were applied on the patch test unit with the first antigen on the top right corner and then downwards on the patch test unit. Later on left top corner downwards, so that at the time of application of patch test unit on the back, the first antigen was on top left corner (Figs. 3 and 4). The prepared units were applied on the upper back and each disc was gently pressed to obtain good occlusion. The readings were taken at 48 hours and 72 hours after application.[2] The patch test sites were marked with a red felt-pen

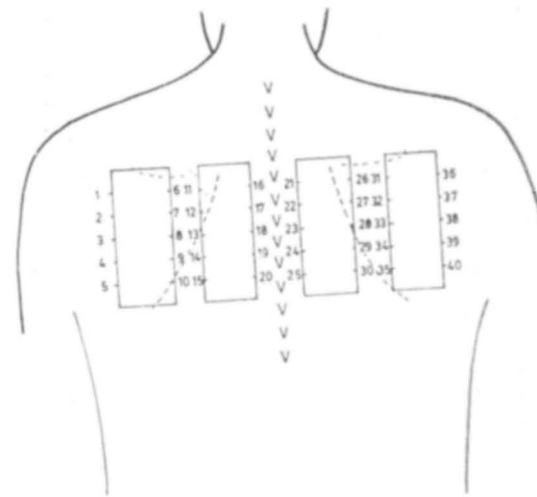

Fig. 4. Numbering of antigens after application of indigenous patch test unit on the back. Note that first antigen comes on top left corner.

and these were marked again if needed, at the time of second reading (72 hours).

The patch test unit was tested initially in two hundred controls with a battery of 26 commercially available antibacterial and antifungal substances. Subsequently, sixty four patients of contact dermatitis of hands were tested with metals, rubber chemicals, medicaments, vegetables and other suspected substances. Two hundred and seven cases suspected to have contact dermatitis to plants were tested with fresh leaves of different plants, potassium dichromate and formaline. The suitability of the patch test unit was studied with petrolatum based antigens ie nickel sulphate, cobalt chloride, cupric sulphate and rubber chemicals, and aqueous antigens like potassium dichromate, ferric chloride, gentian violet and acriflavin.

Results

Approximately one third of the discs had to be discarded after preliminary screening as these were either torn or had variable sizes. The discs obtained from crystalline penicillin vials were of the required size whereas those from gentamicin vials were smaller (5 mm) and from ampicillin vials were larger (8 mm). Majority of the discs required straightening and about a third of them needed filing before use. These discs could be stored upto one year without any deterioration, in screw-capped bottles after washing and drying. In the prepared patch test unit, the polythene covering allowed smooth peeling upto 4-6 weeks, but later it tended to stick to the adhesive tape.

Table I. Prevalance of contact hypersensitivity to common commercial antibacterial and antifungal preparations in 200 controls.

Substance	Concentration	Number of patients		Percent Positive
		Tested	Positive	
1. Control		200	0	0.00
2. Furster oint.	as such	200	15	7.50
3. Neosporin oint.	as such	200	1	0.50
4. Fucidin oint.	as such	200	0	0.00
5. Gentamicin oint.	as such	200	0	0.00
6. Soframycin oint.	as such	200	1	0.50
7. Triple sulfa oint.	as such	200	1	0.50
8. Terramycin oint.	as such	200	5	2.50
9. Paraxin oint.	as such	200	1	0.50
10. Dettol oint.	as such	200	2	1.00
11. Mercurochrome	2% aq.	200	2	1.00
12. Savlon oint.	as such	200	0	0.00
13. Acriflavin	1% aq.	200	3	1.50
14. Econazole oint.	as such	200	1	0.50
15. Gentian violet	1% aq.	200	0	0.00
16. Dermoquinol oint.	4% as such	200	1	0.50
17. Piodine lotion	as such	200	1	0.50
18. Tolnaderm oint.	as such	200	0	0.00
19. Benzoic acid	6% pet	200	13	6.50
20. Micogel oint.	as such	200	0	0.00
21. Nystatin oint.	as such	200	1	0.50
22. Multifungin oint.	as such	200	6	3.00
23. Hamycin lotion.	as such	200	3	1.50
24. Sodium thiosulphate sol.	25% aq.	200	8	4.00
25. Mycocid oint.	as such	200	0	0.00
26. Betadine oint.	as such	200	1	0.50
27. Jadit oint.	as such	200	2	1.00

A total of 8430 ($200\times27+64\times15+207\times10$) chambers have been used in 471 patients (Tables I-III). None of the patients experienced any discomfort or pain with metallic discs. The patch test units stuck well in all the patients. Micro-cuts, 1-2 in number were seen at the periphery in 5% of the chambers tested without subjective discomfort. There was no spilling of the petrolatum based antigens and reactions were confined to the patch test sites. However, with aqueous antigens, in 2% of the chambers spilling was seen because of excess antigen applied. Positive reactions were confined to the patch test sites if there was no antigen spilling with aqueous antigens. The spreading of reaction beyond the chamber was seen in 5% of 4+positive patch tests to *Parthenium hysterophorus*. Nickel sulphate was positive in 26 patients out of 64 tested whereas controls with discs alone were negative.

Table II. Common sensitizers in 64 patients with contact dermatitis of hands.

Substances	Number (%) of patients positive
1. Nickel sulphate	26 (40.66)
2. Cobalt chloride	20 (31.25)
3. Nitrofurazone	18 (28.13)
4. Copper sulphate	16 (25.00)
5. Potassium dichromate	14 (21.88)
6. Vegetables	13 (20.13)
7. Rubber chemicals	12 (18.75)
8. Neomycin sulphate	11 (17.22)
9. Sulfadiazine	8 (12.50)
10. Oxytetracycline	4 (6.25)
11. Ferric chloride	4 (6.25)
12. Plants	3 (4.69)
13. Miscellaneous	15 (23.44)

Table III. Common sensitizers in 207 patients of contact dermatitis to plants in Chandigarh.

Antigen	Number of patients		
	Tested	Positive	Percent positive
Plants and trees			
1. *Parthenium hysterophorus* (Carrot weed)	207	126	60.87
2. *Calotropis procera* (Aak)	207	32	15.46
3. *Eucalyptus spp.* (Safeda)	207	32	15.46
4. *Mangifera indica* (Aam)	207	25	12.08
5. *Ficus religiosa* (Peepal)	207	14	6.76
6. *Nerium indicum* (Kaner)	55	13	23.64
7. *Azadirachta indica* (Neem)	55	3	5.45
8. *Dalbergia latifolia* (Shisham)	55	1	1.82
9. *Lantana camara* (Lantana)	55	1	1.82
Others			
10. Potassium dichromate 0.50% aq.	207	50	24.15
11. Formaline 2.0% aq.	207	58	28.02

Comments

Numerous patch test units have been designed,[3,4] only Finn chamber and Al-test unit have stood the test of time. Al-test was developed at the University of Lund in Sweden.[5] It consists of an aluminium foil covered with polythene onto which round discs of paper are welded by heating without use of glue. Slits in the aluminium foil separate fields of 2.4×2.4 cm from each other. The Al-test units are fixed by 5 cm wide adhesive tape. The unit has been used by International Contact Dermatitis Group in a large number of patients and has been found satisfactory as regards occlusion and purity. The drawbacks are high cost, non-availability in India and the possibility of discs slipping off the aluminium foil. Polythene covering the aluminium foil may produce a reaction due to heat or ozone oxidising polythene during fixation. This reaction is more common during hot and humid weather and it tends to spread beyond the patch test site.[1]

Finn chamber devised by Pirila[6] is epicutaneous test cover and provides good occlusion. The chamber is made of stiff aluminium and has a diameter of 8 mm, depth of 0.5 mm and volume capacity of 25 microlitres. The test area measures 50 sq mm. The chambers are ready mounted on a rectangular strip of scanpore tape in two rows of five each with a protecting paper which can be easily released. Whatman filter paper 3MM discs, 8 mm in diameter are available for testing with solutions. The advan-

tages are tight apposition to the skin which is apparent from the indented ring on the skin surface when the unit is removed. Since the chamber is occlusive, porous tape can be used. As the reactions are limited by the disc to the test site, a large number of antigens can be tested simultaneously. The disadvantages are high cost and non-availability in India.

An indigenous patch test method was described by Pasricha.[7] The unit consists of a 4-cm square piece of adhesive plaster, at the centre of which 4-8 layers of 2.5 cm square piece of ordinary clean cotton gauze is stuck. One cm square piece of cotton or filter paper is placed in the centre of the gauze. Allergen is soaked into or placed on the central piece before placing the unit on the patient's skin. It is cheap and simple to make, out of easily available materials but the preparation is time-consuming and it occupies a large surface area, hence not ideal for testing more than 25 substances at one sitting. Severe reactions may spread beyond the patch test site, because of lack of a limiting device.

The antigen-impregnated-discs described by Pasricha[8] can be used for patch testing by the patch test unit described by the same author or with the Indigenous Finn chamber. Antigen-containing-saucers[8] have the same principle as Finn chamber, but these already contain the antigen in the required amount. Each saucer is an independant unit which can be used with Pasricha's patch test unit. Antigen-impregnated-discs and antigen-containing-saucers have recently been used at 16 centres in India during a national project. We, however, have no personal experience with antigen-containing-saucers.

The patch test unit under description is cheap, simple and can be easily prepared in any hospital or laboratory. The discs can be washed and reused. The unit has all the advantages of Finn chamber. It has been tested in 471 patients and found suitable. A control with the disc alone was applied in all the patients which gave negative results. The disc mostly consists of aluminium. The other trace elements incorporated are under analysis. There is no cross reactivity of disc material with nickel as shown by positive patch tests to nickel sulphate in 26 out of 64 patients with contact dermatitis of hands but a negative control.

The micro-cuts are produced in a small number of chambers (5%). They do not produce any subjective discomfort and disappear in 2-3 days after removal of the patches. Spill-over seen with liquid antigens can be minimised by reducing the quantity of the antigen applied. Spreading of the reaction beyond the patch test site was seen only with the strongly positive patch test reactions to parthenium. It was probably due to relatively larger amount of the antigen in fresh leaves. The extract of parthenium plant and standard concentration in petrolatum should remove the above disadvantage. In the meantime, still smaller piece of parthenium leave was used.

The patch test unit has to be prepared when required from discs and adhesive tape. However, the quality of polythene allows the smooth removal up to 4-6 weeks. So a week or fortnight's supplies can be made and kept ready. The change over from polythene to butter paper did not prolong the shelf life of the prepared patch test unit.

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