The Effect of Diphenylcyclopropenone Immunotherapy on Molluscum Contagiosum

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Background: **Contact immunotherapy using diphenylcyclopropenone (DPCP) has been used in the treatment of alopecia and warts. DPCP seemed to be a promising agent for viral disease including molluscum contagiosum (MC).**

Objective: **The purpose of this study was to evaluate the effect of DPCP immunotherapy on MC in children.**

Methods: **Twenty three patients with multiple lesion of MC were treated with DPCP immunotherapy.**

Results: **Twelve patients (52.2%) showed cure, and eleven patients (47.8%) showed treatment failure. No severe side effects were seen.**

Conclusion: **DPCP immunotherapy may be an effective treatment in children with MC without serious side effects. (Ann Dermatol 5:(2) 79–82, 1993)**

Key Words: Diphenylcyclopropenone, Immunotherapy, Molluscum contagiosum

Molluscum contagiosm (MC) is caused by poxvirus and the lesions of MC can be spread by autoinoculation and skin contact[1, 2]. The disease itself may sometimes cause pruritus and often occurs in patients with atopic dermatitis. So multiple lesions are usually encountered chiefly among children. The best treatment for MC has been described to be curettage[1, 2]. But the curettage is not always easy for children because the lesions are usually numerous and pain is associated with curettage.

Recently contact immunotherapy of resistant warts by DPCP was reported[3]. DPCP seemed a promising agent for other of viral disease including MC, and there was in fact a case report of MC treated with DPCP in Korea[4]. So we performed a clinical study to evaluate the effect of DPCP immunotherapy on MC in children.

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MATERALS AND METHODS

Twenty three patients with multiple lesions of MC seen in the pediatric dermatologic clinic of Seoul National University Hospital were treated with DPCP immunotherapy. These patients comprised 11 boys and 12 girls, and their ages varied from 2 to 8 years. Some of them had atopic dermatitis. The onset of MC in all patients was between 2 weeks and 5 weeks.

First, patients were sensitized with 0.2ml Of a 0.1% DPCP solution in acetone applied to the medial surface of the upper arm. Patients were instructed to keep the area dry for 24 hours and to do wet dressing with 1:40 Burow solution and/or a topical steroid if the site of sensitization showed severe reaction. Any visible erythema and/or vesicles at the site of application was regarded as being sensitized. patients were seen after 2 weeks. If no sensitization had occurred, a second or third application of 0.1% DPCP solution was tried every 2 weeks.

After sensitization had occurred, a 0.01% DPCP solution was applied once a day to induce a low-grade inflammatory reaction directly to the lesions

with a thin stick. After 2 weeks, if the single application was tolerated, a second application was applied after allowing the first one to dry. A weaker concentration of 0.01% was used when severe reactions were noted in each lesion. All applications were carried out at home. DPCP solutions were dispensed to the patients in glass bottles covered with aluminium foil and stored in a refrigerator. Patients were followed up at intervals of 1 or 2 weeks.

A cure was defined when clinically no lesions were observed 20 weeks after therapy. However, the cases whose parents considered DPCP immunotherapy not effective and the cases which were not followed up long enough to be evaluated were regarded as treatment failure. Side effects appearing on the individual molluscum lesions after applying DPCP were evaluated subjectively by the patients or observed objectively by us as positive or negative for pruritus, erythema and vesicles.

RESULTS

1. Sensitization

All 23 patients were sensitized by 0.1% DPCP. Sensitization was easily confirmed by the appearance of erythema or vesicles on the site. One patient was sensitized 3 days after the 2nd application and another patient 7 days after the 4th application. In 7 patients who were sensitized by the 1st application the duration until sensitization occurred could be clearly defined: average duration until sensitization was 4.7 days (range 1 day-10 days).

2. Effect of DPCP Immunotherapy *(Table 1)*

Twelve patients (52.2%) showed cure. Among them 9 patients (39.1%) were cured within 6 weeks of therapy. In these patients an initial response was noted mostly within 2 weeks after applying DPCP directly to the lesions. In 2 patients even sensitization itself induced clearance of the lesions.

In 11 patients (47.8%) the effect of DPCP was regarded as treatment falure. These patients showed a very low compliance rate and we could follow them only for a short period.

3. Side effects *(Table 1)*

There were some side effects such as erythema, prurtus, and vesicle. Erythema was noted in 8 patients (34.8%), pruritus in 6 patients (26.1%) and vesicle in 2 patents (8.7%).

Side effects were mild and there were no cases in which DPCP immunotherapy was discontinued due to the side effects even in cases regarded as treatment failure.

DISCUSSION

Contact immunotherapy using various kinds of potent sensitizing agents has been used in the treatment of some dermatologic disorders including alopecia areata and warts[5-7]. Compounds such as dinitrochlorobenzene (DNCB), diphenylcyclopropenone (DPCP), and squaric acid dibutyl ester (SADE) have been used for contact immunotherapy[3]. Stability is a problem with both of the latter two. SADE needs refrigeration and special solvents and additives to maintain potency. DPCP must be stored in dark glass in a dark place. DNCB is stable and the most economic, but reported to be mutagenic[8].

In 1988 Naylor et al.[3] reported the effectiveness of DPCP in the treatment of resistant warts and suggested that DPCP may be a promising new agent for contact immunotherapy for various viral diseases. They also suggested that contact immunotherapy may work mainly by the induction of a type IV hypersensitivity response in papilloma virus-infected tissue, leading to wart destruction. So we hypothesized that a non virus-antigen-specific, cell-mediated process triggered by DPCP might come into play against MC virus. More recently Kim et al.[4] reported a case of MC in a 3-year-old boy that was resistant to other therapeutic modalities but effectively treated by DPCP immunotherapy. In our study DPCP immunotherapy was shown to be quite effective in the treatment of MC in children. Twelve patients were cured. Among them 9 patients (39.1%) showed complete cure within 6 weeks of topical application of DPCP and the remaining 3 patients (13.0%) showed cure after between 8 weeks and 20 weeks.

Table 1. Summary of patients, effect of DPCP immunotherapy and side effects

Sex/Age	Initial Response[a]	Effect	Side Effect[b]	Follow up
M/3Y11M	OW[c]	cleared affer 2W	—	6W
M/5Y6M	OW[c]	cleared affer 2W	—	6W
F/4Y2M	1W	cleared affer 2W	—	12W
F/6Y5M	1W	cleared affer 3W	E	14W
M/8Y7M	2W	cleared affer 4W	E	14W
F/2Y10M	?	cleared affer 4W	—	14W
F/5Y10M	2W	cleared affer 4W	E	14W
M/2Y	?	cleared affer 6W	E, P	16W
F/4Y	2W	cleared affer 6W	E, P	16W
M/5Y11M	6W	cleared affer 8W	E, P, V	18W
M/5Y9M	4W	cleared affer 16W	—	18W
F/5Y10M	?	cleared affer 20W	—	20W
M/2Y8M	—	curettage at local clinic affer 6W	—	6W
M/3Y4M	—	—	P	4W
M/4M	—	—	—	2W
M/4Y6M	2W	decreased lesion after 6W	—	6W
M/5Y4M	2W	—	—	4W
F/2Y8M	—	—	E,P,V	4W
F/3Y10M	—	—	—	12W
F/3Y11M	—	curettage at local clinic after 6W	—	6W
F/4Y1M	12W	—	—	12W
F/5Y5M	—	curettage at local clinic affer 4W	—	4W
F/8Y	—	—	—	22W

[a]The time when decrease in the size or number of lesions was first noted by parents after lesional application of DPCP.
[b]Side Effects; E: Erythema, P: Pruritus, V: Vesicle
[c]The cases cured after sensitization itself.
*Y: Year, M: Month, W: Week

In the other 11 patients regarded as treatment faifure we could not be sure that DPCP immunotherapy was totally ineffective for this group because some parents of this group reported a beneficial response during the early follow-up period and the entire follow-up periods of these patients were quite limited. We assumed that the earlier the sensitization occurs, the more effective DPCP immunotherapy may be, but this assumption was seemingly not true in our study. Also the relationships between the effectiveness of DPCP immunotherapy and sex or age of the patients or side effects did not seem to exist.

Spontaneous cure may occur between 6 months and 3 years after occurrence[1, 2]. Steffen and Markman[9] reported a case of spontaneous disappearance of MC and said that the MC papules did not involute simultaneously, but became inflamed and disappeared individually over a period of months. So the possibility of spontaneous regression in our cases, especially those cured after 8 weeks of therapy, could not be exluded completely. But the onset of MC in all of our patients was less than 5 weeks, 2 patients showed cure only after sensitization, and the effect was noted usually within several weeks of DPCP therapy. Considering these points, we think DPCP immunotherapy can be safely said to be effective in the treatment of MC.

MC is a very common disorder in children and the conventional treatment of choice is by curettage of individual lesions. But curettage is always associated with painful sensations, and this is a big problem especially in children with multiple MC lesions. DPCP Immunotherapy for MC may be an effective alternative for pain-causing other

therapeutic modalities. Further immunological or histopathological studies associated with DPCP immunotherapy will be needed to elucidate the pathomechanism of this treatment.

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