Contact Urticaria from Rubber Gloves: An Occupational Skin Disorder for Health Care Workers

CHUCHAI TANGLERTSAMPAN, M.D.*,
SIRIWAT PATRAKARN, M.D.*,
EAM-ORN VASSANSIRI, M.D.*

Abstract

Rubber allergy is an important occupational health problem for an increasing number of patients. It may produce a type I urticarial reaction, or more commonly, a type IV delayed eczematous dermatitis. The risk groups include health care workers, rubber industry workers, and children with spina bifida (meningomyelocele) and urogenital abnormalities. In this report, we describe a physician with a relevant history who was found to have type I hypersensitivity to rubber by prick test and use test. Our aim is to increase awareness among physicians, discuss diagnosis and management, and review the literature.

Natural rubber latex protein sensitivity is a crucial and frequent problem, especially in health care workers(1). The rapid increase in rubber demand has been due to "universal precautions". Production of latex gloves and their use have increased exponentially since 1985 in parallel with the increased barrier requirements of the acquired immunodeficiency syndrome (AIDS) epidemic(2). Rubber allergy may produce a type I urticarial reaction, or more commonly, a type IV delayed eczematous dermatitis. Type I hypersensitivity reactions is an IgE mediated immediate reaction to natural rubber latex (NRL) proteins with clinical manifestations ranging from contact urticaria to anaphylaxis. Type IV hypersensitivity reactions to rubber product, typically associated with chemicals added to rubber during processing, consist of localized dermatitis. Latex allergy occurs for the most part in well defined risk groups. These include health care workers, rubber industry workers, and children with spina bifida (meningomyelocele) and urogenital abnormalities(3).

A CASE REPORT

In June 1996, a 28-year-old obstetrics and gynecology resident presented with a 10 month history of urticarial eruptions on the hands that developed within 1 to 2 hours of wearing rubber gloves. She had no systemic symptoms. She was in good health and had no history of atopy. Physical examination revealed excoriated dermatitis on both hands.

* Division of Dermatology, Department of Medicine, Pramonkutklao Hospital, Bangkok 10400, Thailand.

METHOD

The following materials were used in the diagnostic work-up (Table 1):

1. Sterile rubber gloves used in the operating room (Glove 1)
2. Examination rubber gloves (previous used gloves which had been cleaned and processed; Glove 2)
3. Vinyl gloves (Allerderm®)
4. Glove powder (Hospital Central Supply)
5. Histamine = histamine phosphate (Histatrol®) 2.75 mg/ml (histamine base 1 mg/ml) in glycerin 50 per cent vol/vol (Center Laboratories, Port Washington, New York, U.S.A.)

Wear or Use Test[2,4-6]

A wear or use test was carried out with fingers cut from the suspected gloves and applied to a dampened finger of the patient. The appearance of one or more hives at 30 minutes was considered positive. If the one-finger test result was negative, the entire glove was donned for 30 minutes. A vinyl glove served as a negative control.

Prick Test[2,4-6]

Since standardized test materials are not available, a "home-made" test allergen was prepared. The prick test allergen was made by incubating 1 g of small pieces of a known high allergenic glove with 5 ml of normal saline (1:5 w/V). One drop of this solution was placed on the volar forearm and the skin was gently pierced with a sterile disposible needle. Histamine and normal saline were used as positive and negative controls, respectively. The wheal was measured in the two largest perpendicular axes and the sum was halved. Positive reactions at 30 minutes were graded as 2+ (half the histamine reaction), 3+ (equal to the histamine reaction), or 4+ (greater than the histamine reaction).

Patch Test

The patient was patch tested using the European standard series. Allergen patches were removed after 48 hours and read. The reactions were also read at 72 hours.

RESULTS

The results of use and prick tests are summarized in Table 1. The patient also had a positive patch test result to nickel.

Table 1. Summary of use and prick tests.

	Use test		Prick test
	Finger	Hand	mm.
Glove 1	NR	+++	5.25 (4+)
Glove 2	NR	+	NR
Vinyl glove	-	NR	-
Glove powder	-	-	NR
NSS	-	-	NR
Histamine	-	-	3

NR = No reaction

DISCUSSION

Maibach and Johnson defined contact urticaria syndrome as a biologic entity in 1975[7]. Subsequently, especially in the last decade, it has attracted increasing interest in clinical medicine and biology. Numerous cases and extensive reviews have been published by von Krogh and Maibach, Lahti and Maibach, and Tanglertsampan and Maibach[1,8,9]. In 1979, Nutter reported latex allergy manifested as contact urticaria after exposure to rubber gloves[10]. The condition presents as a spectrum that includes contact urticaria, generalized urticaria, allergic rhinitis, allergic conjunctivitis, angioedema, asthma, and anaphylaxis--all classic signs of a type I immediate hypersensitivity reaction. In this report, we describe a female physician who developed contact urticaria after exposure to rubber gloves without systemic manifestations. The allergy was proven by use and prick tests. Some patients develop both type IV hypersenstivity to rubber additives and type I hypersensitivity to NRL. Here, a positive patch test to nickel probably related to jewelry.

The risk groups of latex allergy include health care workers, rubber industry workers, and children with spina bifida (meningomyelocele) and urogenital abnormalities[3]. In a Finnish teaching hospital, 7.4 per cent of surgeons and 5.6 per cent of surgical nurses had allergic reaction to NRL gloves[11]. The study of Cormio et al comes closest to determining a prevalence number for a given group (5.2% latex allergy) when 77 of a total of 78 operating room (OR) personnel at a surgical department were studied[12]. In a recent survey of the U.S. Army Dental Corps, 13.7 per cent of the respondents reported signs and symptoms of NRL allergy. Even if the nonrespondents of this study

were considered allergy free, the prevalence of symtoms would still have been 8.8 per cent[13]. The prevalence of NRL sensitivity is higher among females than males. Individuals with atopy, especially those with hand eczema, also appear to be at risk for developing sensitivity to NRL[6].

Evaluating NRL hypersensitivity begins with a pertinent history. Then, the patient is evaluated by use tests, skin prick tests or latex RAST (Radioallergosorbent test). Skin prick testing has proven to be very useful for diagnosing NRL allergy[4,5]. Since standard test allergens are not available, "home -made" preparations for prick tests are routinely used[2,4-6]. Resuscitation equipment that contains no NRL compounds should always be available in the event of anaphylaxis. In our patient, a relevant patient history and occupation along with positive use and prick tests confirmed NRL allergy. The latex RAST is not available in Thailand (Maj. Sudhichai Chokekijchai, M.D., personal communication).

The use test with latex gloves should be started with a one finger test because whole hand exposure risks anaphylaxis, especially if performed on eczematous skin. The use or wear test may be diagnostic of latex allergy in many patients and is especially useful when there is a discrepancy between skin prick test results and the clinical history[4]. The latex RAST measures specific IgE antibodies to NRL but is not useful for screening because it lack sensitivity[5,14]. However, most patients with previous anaphylaxis are RAST positive[15].

Different sources and purification methods for natural rubber latex protein contribute to a wide array of antigens found in NRL[2]. Turjanmaa found that prick test positivity in 40 NRL allergic persons varied from 8 per cent to 87 per cent when tested with 19 brands of natural rubber latex gloves[16]. Leynadier found that leaching and steam sterilization reduced prick test positivity of NRL extracts[17]. In our patient, the negative prick and reduced use test results after challenge with "Glove 2" may relate to different glove brands or sterilization processes.

The immediate allergy to NRL is becoming an important health problem. Persons with a positive IgE-specific RAST, prick test, or use test are treated with complete natural rubber latex avoidance. Vinyl, choloropene, nitrile, or Tactyl (Smart Practice, Phoenix, Arizona, U.S.A.) alternatives should be substituted for individuals with diagnosed natural rubber latex protein hypersensitivity. The term "hypoallergenic", used in conjunction with rubber gloves, initially referred only to natural rubber latex gloves with a reduced type IV antigen content. Health care workers that become sensitized to NRL must use non-rubber gloves. Non-rubber gloves are not available in Thailand (except thin polyethylene gloves). We performed a "double use test" in this patient (latex gloves over vinyl gloves; latex gloves over polyethylene gloves) for 30 minutes. There was no reaction, implying a practical solution. Therefore, we suggested our patient to use latex gloves over vinyl gloves in operative rooms and latex gloves over polyethylene gloves in examination rooms. Accordingly, we also recommended that she avoid rubber devices.

There are many challenging issues related to latex allergy: a) identification and purification of major NRL allergens; b) approval by the FDA of a standardized NRL skin test antigen; c) improving the latex RAST; d) re-labeling NRL products and redefining the term "hypoallergenic"; e) refining manufacturing methods to reduce or prevent sensitization to NRL; and, f) educating physicians, allied health workers and other high-risk groups. In this report, we aimed to heighten awareness of NRL allergy among physicians, discuss diagnosis and management, and review the topic.

ACKNOWLEDGEMENTS

The authors wish to thank Maj. Sudhichai Chokekijchai, M.D., Maj. Douglas S. Walsh, M.D. and Podjanee Praditsuwan, M.D. for their comments. Dr. Podjanee Praditsuwan kindly provided the vinyl gloves for testing.

(Received for publication on September 16, 1996)

REFERENCES

1. Tanglertsampan C, Maibach HI. Contact urticaria. In : Hogan DJ, ed. Occupational skin disorders : Igaku-Shoin, 1994: 81-8.
2. Hamann CP. Natural rubber latex protein sensitivity in review. Am J Contact Dermatitis 1993; 4: 4-21.
3. Slater JE. Latex allergy. J Allergy Clin Immunol 1994; 94: 139-49.
4. Taylor JS, Praditsuwan P. Latex allergy. Arch Dermatol 1996; 132: 265-71.
5. Turjanmaa K. Update on occupational natural rubber latex allergy. Dermatol Clinic 1994; 12 : 561-7.
6. Hamann CP, Kick SA. Diagnosis- driven management of natural rubber latex glove sensitive. In: Maibach HI, Mullstrom G, Wahlberg JE, eds. Protective gloves for occupational use : Boca Raton, CRC Press Inc; 1994: 131-56.
7. Maibach HI, Johnson HL. Contact urticaria. Arch Dermatol 1975; 111: 726-30.
8. von Krogh G, Maibach HI. The contact urticaria syndrome-an update review. J Am Acad Dermatol 1981; 5: 328-42.
9. Lahti A, Maibach HI. Immediate contact reactions: contact urticaria and contact urticaria syndrome. In : Marzulli FN, Maibach HI, eds. Dermatotoxicology: Hemisphere, 1991: 473-95.
10. Nutter AF. Contact urticaria to rubber. Br J Dermatol 1979; 101: 597-8.
11. Turjanmma K. Incidence of immediate allergy to latex gloves in hospital personnel. Contact Dermatitis 1987; 17: 270-5.
12. Cormio L, Turjanmma K, Talja M, et al. Toxicity and immediate allergenicity of latex gloves. Clin Exp Allergy 1993; 23: 618-23.
13. Berley ZT, Luciano WJ, James WD. Latex glove allergy: a survey of the U.S. Army dental corp. J Am Med Asso 1992; 268: 2695-7.
14. Levy DA, Charpin D, Pecquet C, et al. Allergy to latex. Allergy 1992; 47: 579-87.
15. Turjanmaa K. Contact urticaria to rubber gloves. In : Maibach HI, Mullstrom G, Wahlberg JE, eds. Protective gloves for occupational use : Boca Raton, CRC Press Inc 1994: 241-54.
16. Turjanmaa K, Laureta K, Makinen-Kiljunen S, et al. Rubber contact urticaria : Allergenic properties of 19 brands of gloves. Contact Dermatitis 1988; 19: 362-7.
17. Leynadier F. Shared reduction of prick test positivity from both increased leaching and steam sterilization. Allergy 1991; 46: 619-25.

ลมพิษสัมผัสจากถุงมือยาง : ปัญหาชีวอนามัยสำหรับบุคลากรทางการแพทย์

ชูชัย ตั้งเลิศสัมพันธ์, พ.บ., อว. (ตจวิทยา),*

สิริวัฒน์ ภัทรากาญจน์, พ.บ., เอมอร วาสนสิริ, พ.บ., ว.ว. (ตจวิทยา)**

การแพ้ยางเป็นปัญหาทางแพทย์ด้านชีวอนามัยที่สำคัญเพราะมีการเพิ่มขึ้นของจำนวนผู้ป่วยมากขึ้นเรื่อยๆ ลักษณะที่แพ้อาจทำให้เกิดปฏิกิริยาการแพ้แบบที่ 1 หรือ 4 ผู้ป่วยที่อยู่ในกลุ่มเสี่ยงได้แก่ บุคลากรทางการแพทย์, บุคลากรในโรงงานยาง, ผู้ป่วยเด็กที่เป็น spina bifida (meningomyelocele) และความผิดปกติของ ระบบขับถ่าย และสืบพันธุ์ ผู้ป่วยในรายงานนี้เป็นแพทย์ที่แพ้ถุงมือยางแบบการแพ้ แบบที่ 1 คือโรคลมพิษสัมผัสโดยการทดสอบโดยใช้เข็มสะกิดผิวหนังและการใช้ (Prick and use tests) ที่ให้ผลบวกต่อถุงมือยางพร้อมทั้งรวบรวมสรุปรายงานก่อน ๆ และแนวทางในการวินิจฉัยและการรักษา

* แผนกอายุรกรรมผิวหนัง, กองอายุรกรรม, โรงพยาบาลพระมงกุฎเกล้า, กรุงเทพ ฯ 10400