



LATEX ALLERGY: AN OPERATION THEATRE HAZARD

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ABSTRACT

Background: Latex obtained from natural rubber has been used in the operating theatre in various forms and devices for decades. Natural rubber is a known allergen causing Type I and IV hypersensitivity reactions. Latex allergy is now a known occupational hazard amongst health care workers especially those working in the operating theatre and certain high risk categories of patients. The National Institute of health(NIOSH) has laid down guidelines for minimizing latex related health problems.

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INTRODUCTION

Latex obtained from natural rubber has been used in healthcare for over 100 years. Natural latex which is obtained from the rubber plant *Hevea brasiliensis* known to cause allergic reaction in health care workers and those employed in rubber industry(1). After the implementation of the universal precaution by CDC reporting of cases of latex induced allergy have risen (2).

Latex allergy is now a known significant health hazard amongst Operation theatre health care workers. The first case of latex allergy was reported in 1979 by Nutter. Sixteen deaths occurred in association with the use of a latex barium enema tip, leading to the recall of the device in 1991 by the U.S. Food and Drug Administration (FDA)[3]. The current prevalence rate of latex allergy and sensitization amongst health care workers around the world is 9.7% and 12.4% respectively [4]. A study carried out by Pherwam AV *et al* at P.D. Hinduja National Hospital and Medical Research Centre Mumbai, Maharashtra, India found the incidence of latex sensitivity amongst operation theatre personnel as follows Nurses 40 percent, surgeons 28 percent, and anesthetists 13.3 percent [5].

Etiopathogenesis

Natural rubber (cis-1, 4-polyisoprene) is obtained from the sap of rubber tree *Hevea brasiliensis* [6]. The final product contains about 2-3% proteins. Certain additives such as sulphur, accelerants, dyes and antioxidants are added during the process of manufacture.

Hev b proteins(Hev b) proteins present in nature rubber have been implicated as the cause of latex sensitization and allergic reactions. Of the 11 types of Hev b proteins (Hev b 1 to Hev b 11) found Hev b5 is the commonest to produce sensitization(7)(8). Both Type 1 and Type IV reaction are known to occur with latex proteins. Latex protein induce IgE formation and also activate CD4 and Type II CD4 helper cells. Repeated exposure to Hev b proteins promote degranulation of mast cells, basophils(9)(10) and cause a Type I reaction. Type IV reaction presents as a type of contact dermatitis.

Latex sensitization can occur via multiple route. The commonest method in the Operation theatre is while wearing latex gloves via aerosolization and inhalation of latex particles adherent to surgical gloves. Absorption of latex particles through the skin may occur in the presence of disruption of skin barrier with eczema or contact dermatitis. Latex may also be absorbed directly via the mucous membrane when condoms are used. There is a case report of two cases presenting with latex allergy to condoms [11]. A case of contact dermatitis to latex has also been reported following dental surgery [12].

Cross reactivity of latex proteins with certain fruit such as banana, tomato, melons and cherry is well known to have caused anaphylactic reaction in persons known to be latex sensitive. Some possible sources of latex are listed in Table I

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Table 1 Sources of Latex Exposure

Medical Equipment		Household objects
Gloves	vial stoppers	Automobile tires
Urinary catheters	Bulb syringes	Racquet handles
Face masks	Stretcher mattresses	Shoe soles
AMBU bags	Dental dams	Hot water bottles
Endotracheal tubes	Stethoscope and blood	Diapers, sanitary and incontinence pads
Wound drains	pressure cuff tubing	Computer mouse pads
Injection ports	Condoms	Buttons on electronic equipment
Electrode pads	Medication	Elastic on socks and underclothing
	Diaphragms	

Table 2 Latex Allergy: Clinical Features

Latex Allergy: Clinical Features		
Direct skin contact	Localized/generalized urticaria, eczema	Direct skin contact
Mucous membrane	Rhinitis, stomatitis, angioedema	Mucous membrane
Inhalation of airborne particles	Wheezing, bronchospasm, episodes of severe hypoxemia/desaturation	Inhalation of airborne particles
Intravascular absorption	Sudden tachycardia, hypotension, cardiovascular collapse	Intravascular absorption

Table 3 Various Test to detect Latex Allergy

Test	Type	Description
Skin prick	in vivo	Confirms presence of IgE antibodies; correlates with clinical allergy
Skin patch	in vivo	For Type IV reactions; a 1-inch piece of the glove; observe for contact dermatitis after 48 hrs
Radioallergosorbent (RAST)	in vitro	To detect & quantify IgE in patient serum; strong correlation; sensitivity 75-80%
AlaSTAT	in vitro	ELISA test to measure IgE antibodies; sensitivity 94%, specificity 80%

Clinical Features

Latex allergy may have a widely varied presentation from mere latex sensitization without clinical feature to a full blown anaphylactic reaction. Latex sensitization may occur in the presence of IgE antibodies but the patient may not present with any clinical features even with repeated contact with latex. The severity of symptoms may depend upon the route of exposure (Table 2). Certain high risk group for allergic reaction to latex are mentioned below[13].

1. Health care workers: 7.5% for physicians, 5.6% for nurses.
2. Patients of spina bifida, congenital urogenital abnormalities, 18-40% incidence (routine exposure to urinary catheters).
3. Rubber industry workers: 10% incidence
4. Patients with a history of atopy: 35-75% incidence.

Health care workers who use gloves regularly may develop Type IV contact dermatitis which is the commonest clinical presentation. At least 50% of individuals who are sensitive to latex have a history of atopy[14]. Aerosolization of latex particles inside the operation theatre have been reported to cause asthma in operating theatre staff[15][16]. Type I reaction causing cardiovascular collapse and death has also been reported in susceptible patients.

Diagnosis

A complete medical and occupational history should be obtained initially. Individuals employed in the rubber industry and operating theatres who present with aggravation of respiratory symptoms have a high index of suspicion of latex

allergy. Patients who fall into the high risk category should be specifically asked about reaction to the use of latex products. A number of in-vivo and in-vitro blood tests are available for diagnosis of latex allergy. Measuring the levels of B-tryptase stored in correlates well with the severity of anaphylactic reactions. Level of B-tryptase above 13ng/ml is specific for Type-I reaction. Some of the blood tests available for diagnosis of latex sensitization are depicted in Table3(17).

A useful test available is the skin prick test using a drop of latex protein liquid. Itching and redness at the site of test indicates a positive reaction. This test however be carried out at centres equipped to manage severe anaphylactic reactions.

MANAGEMENT

Contact dermatitis being the commonest clinical presentation will usually respond to stoppage of the use of latex containing products. Severe cases usually respond to antihistaminics and topical steroids. Refractory cases may require the use of systemic glucocorticoid administration [18]. All cases of latex allergy should undergo counseling regarding the cause and advice regarding use of latex products. Immunotherapy in the form of desensitization has been tried but not routinely recommended [19]. Recombinant Hev b5 protein and anti-IgE monoclonal antibodies are under consideration for their role in management of latex allergy[20][21].

Patients who present with a Type I reaction should be treated with 100% oxygen and hemodynamic support with IV crystalloids (25-30ml/kg). IN case of a severe anaphylactic reaction with cardiovascular collapse subcutaneous Adrenaline 0.2-0.5ml (1:1000) should be administered. In patients who are anaesthetized intravenous route is preferred. Patients who develop intractable hypotension may need pressor support using Nor adrenaline or Vasopressin.

For patients undergoing surgery or procedures in Operation theatre a history of latex sensitivity should be obtained during pre-anaesthetic evaluation. In case of a known sensitivity a latex free environment should be provided. All latex products should be replaced with non-latex products wherever possible. Gloves made of non-latex products such as Neoprene, Styrene-butadiene, Nitrile or Polyvinyl chloride should be used. Finger probes and cuffs in monitoring equipment should be non-latex. Drugs stored on glass ampoule should be used wherever possible.

In patients who need administration of anaesthetic all face masks, endotracheal tube, circuits should be made of polyvinyl chloride or non latex material. During surgery it is preferable to use non powdered gloves. H2blockers or steroids may be added to premedication to prevent a severe Type I reaction(22).

It is also recommended that doctors and paramedics working in OT should wear either latex free gloves or non powdered gloves with minimal latex protein content to prevent sensitization of health care workers and patients. Currently there is no cure for latex allergy hence prevention of sensitization is the only strategy.

Recommendations for the prevention of latex allergy

The National Institute for Occupational Safety and Health (NIOSH) has laid down guidelines for minimizing the latex related health problem [23].

For the employers

1. All workers to be provided with non latex gloves while handling non infectious material
2. While handling infectious material workers to be provided with reduced/protein free gloves.
3. Workplace to be free of latex dust
4. Awareness and education about latex allergy for workers
5. Periodic screening of high risk workers

For the workers

1. Use of non latex gloves in the workplace
2. Use of barrier protection while handling infectious material(CDC 1987)
3. Use good work practices to reduce chance of reaction to latex. Avoid use of oil based cream and lotions.
4. Learn from education provided by employer. Become familiar with procedures to prevent latex allergy. Learn to recognize symptoms of latex allergy.
5. Consult a doctor if features of latex allergy develop.

CONCLUSION

Health workers in the operation theatre are being exposed to latex. Most cases of latex sensitivity are minor and go unreported but some may result in life threatening complications. Hence creating awareness about latex sensitivity and following guidelines for individuals and organization will help in prevention of latex allergy.

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