Safety issues of latex products

Key words: Allergic reactions, anaphylaxis, glove powders, latex gloves, latex proteins.

Recently, the healthcare industry, the U.S. Food and Drug Administration, and the general public have focused new attention on the relative safety of medical devices of all types. Problems caused by latex medical devices such as bite blocks, rubber dams, anesthesia masks, intubation tubes, catheters, and gloves have come under especially close scrutiny because of reports of allergic reactions ranging from contact urticaria to systemic anaphylaxis.¹

The problems caused by latex sensitivity are of special concern in today’s clinical environment where latex products are not only proliferating, but also serve as the first line of defense against the transmission of most pathogens including the human immunodeficiency virus and hepatitis B virus.²

For years, dermatologists have known that some latex products could induce a delayed hypersensitivity reaction in the form of eczematous contact dermatitis. Although other immunologic systemic allergic responses have probably always existed, only recently has the issue emerged as an important medical problem.³

As the use of latex gloves by physicians, nurses, and dentists escalated, so did the rate of sensitization. Today 7.9% of surgeons, 10% of operating room nurses, and 13.4% of the dental community exhibit some signs of latex sensitivity.⁴

The allergic manifestations caused by latex allergies are either (1) delayed-type allergy (Type IV), or (2) immediate-type allergy (Type I). Unlike the delayed hypersensitivity reactions, which are usually local in nature, immediate reactions are more dangerous because they involve not only the skin but also the mucosal surfaces. Patients and personnel subject to immediate reactions risk severe and sometimes fatal consequences if the hypersensitivity goes unrecognized during medical or dental examinations or surgical intervention.⁵

Delayed versus immediate hypersensitivity

Contact eczematous dermatitis is the most common form of occupational skin disease in healthcare workers. Delayed type hypersensitivity is a form of cell mediated immunity activated by macrophages. The reaction may be elicited by soluble protein antigens or by chemically active hapten. Usually this form of dermatitis is not caused by latex but rather by the chemicals added to some gloves during the manufacturing process (Figures 1 and 2). The most common allergenic accelerators are thiurams and mercaptobenzothiazole. A recent study by Heese and associates attributed 75% of all occupationally related glove allergies to these two additives.⁶

Immediate latex hypersensitivity has a differ-
ent immunologic mechanism. Mediated by immunoglobulin M and immunoglobulin E, contact with the latex antigen elicits massive release of histamine and arachidonic acid metabolites. In turn, an increase in vasodilation and vascular exudation of plasma occurs in vascular beds throughout the body. The decrease in vascular tone and leakage of plasma leads to a fall in blood pressure or progressive shock that may be fatal.

While less than 1% of the general public exhibits sensitivity to latex products, healthcare workers who frequently don gloves are at increased risk of acquired sensitivity. Occupational exposure occurs through one of these anatomic absorption pathways: the stratum corneum, sweat ducts, the pilosebaceous apparatus, or by inhalation. With latex gloves, most absorption takes place through the skin. When gloves are donned, they tend to increase skin temperature and water content through confinement. Wet, warm skin increases the likelihood of absorption.

As with all skin disease and systemic allergies, there is a wide variation in the capacity of individuals to withstand various irritants and sensitizers. A personal multiallergen atopic history appears to increase the risk of specific latex hypersensitivity. The risk of allergy is enhanced by genetic and environmental factors, temperature, type of causative agent, and duration of worker exposure.

Latex sensitivity may also affect specific patient populations such as spina bifida patients. An allergy history with this group may not always reveal prior latex reactions other than mild facial or periorbital swelling, urticaria, or rhinorrhea. Because of the potential danger, breathing bags, anesthesia masks, compression bandages, gloves, and catheters which directly contact skin and/or mucous membranes, should be latex free. Other items including: armboard covers, table pads, intravenous latex access ports, and tourniquets should either be latex free or should be covered with an impervious material to prevent skin contact.

While many of the sensitivity reactions are caused by chemical additives in gloves, a significant number of reactions are caused by natural proteins found in glove powder lubricants and within the latex itself. The water soluble proteins found in latex are of particular concern because the human body is water-based and perspiration or other body fluids can extract these allergens from gloves. Unless steps are taken to remove them, they may become a source of allergic reactions. Additionally, protein molecules can bind to starch powders used as lubricants on some latex gloves. When this powder becomes airborne, it may elicit symptoms of conjunctivitis, rhinitis, or asthma.

Although researchers have yet to identify specific offending proteins or the threshold levels of protein necessary to cause severe reactions, some glove manufacturing companies have taken proactive risk reduction measures to minimize levels of water-extractable proteins in their products. These companies are using numerous washing, rinsing, and leaching steps to extract water soluble proteins. Another risk reduction measure is the use of powder-free gloves which have no starch powder for protein to bind to. These products eliminate the risk associated with airborne powder/protein particulate released during glove donning.
Diagnosis and treatment

The diagnostic approaches to occupational dermatitis are shown in Figure 3. To determine the cause of allergy, healthcare workers exhibiting sensitivity should have a careful physical examination by a dermatologist. The chief complaint, duration of problem, symptoms, pattern of irritation, and onset should be carefully documented. The morphology of the primary lesions, the type of reaction, skin eruption pattern, and distribution of the rash will usually confirm a diagnosis of irritant or contact dermatitis from glove chemicals of lubricating powders.

Figure 3
Managing professionals with a history of glove allergy

In cases of allergic dermatitis, the allergens should be identified and eliminated. Offending agents other than gloves may include defatting or degreasing agents, solvents, disinfectants, soaps or detergents, acrylics, and certain metals (alloys of copper or silver) can serve as primary irritants.

The use of unscented soap, which is free of color, chemicals, antiseptics, deodorants, vitamins, or tar products, usually is advocated by dermatologists. Additionally, during the period of reactivity, contact with harsh chemicals should be avoided. The use of white cotton glove liners and/or powder-free hypoallergenic gloves will usually minimize symptoms.

Latex allergies concern anesthesia personnel because they cause a wide spectrum of immunologic responses, from delayed allergic contact dermatitis to immediate systemic reactions. Worker and patient populations are both at risk; therefore, any individual with a history of hypersensitivity should undergo a skin-prick test before undergoing medical, surgical, or dental procedures in which latex products are employed.

REFERENCES:


AUTHOR

Margaret Furay Fay, RN, PhD, is the medical affairs director, Regent Hospital Products, Ltd, Greenville, South Carolina. She received a diploma in Nursing from St. Catherine’s Hospital, Creighton University, Omaha; a bachelor of arts degree in Business Administration from Columbia University, New York City; a master’s degree in Clinical Psychology from Columbia Pacific University, San Francisco; and a doctorate in Psychology from the University of Minnesota at Minneapolis.