

Hazards of Powdered Gloves

Historically, powder has been used as a lubricant in the manufacture of medical gloves in order to facilitate donning and to avoid sticking of the glove together. At present, the more widely used dusting powders are cornstarch, and calcium carbonate (CaCO₃).

Exposure to starch powder from both surgical and examination gloves can cause a number of undesirable reactions, which vary from well known allergy symptoms and upper respiratory-tract disorders to pleuritis, myocarditis, irritation of the central nervous system or even carcinoma or tuberculosis misdiagnosis.^{1,2}



Using powdered gloves deposits in excess of 2kg powder in your operating theatre per year.

A well documented consequence of the use of starch powder in gloves is its capacity to bind with natural rubber latex (NRL) protein antigens. These allergen/protein coated powder particles can be released into the air when the gloves are donned or removed, thus contaminating the hospital environment. Inhalation or ingestion of these powders can lead to the sensitisation and diverse allergic reactions to NRL (i.e. upper respiratory tract symptoms or eye irritation). It is estimated that the use of powdered gloves within an operating theatre will deposit in excess of 2kg of glove powder within the environment per year. The amount of these aero-allergens in areas where powdered gloves are worn can increase by 5-10 fold when compared to those where only powder free gloves are used.² However, glove powder can act not only as a vehicle for latex antigens but also for opportunistic and pathogenic micro-organisms, which increase the occupational risks to both healthcare workers and patients.

Another common problem that can arise from the use of starch glove powder is the development of adhesions, that probably occur after most surgical procedures, and granulomas.³ These effects have been very well documented concerning the peritoneal cavity, but they have also been reported in almost every anatomical site such as the eyes, oral region, cranial cavity, middle ear, thorax, bladder and scrotum among others.

Glove powder can enter the body during surgery, despite glove washing⁴, which may trigger an inflammatory response by the immune system, leading to the formation of fibrous bands and post-operative adhesions. Adhesions are the major cause of post-operative intestinal obstruction (more than 40 per cent of all causes with 60-70 per cent of cases involving the small bowel).³ Uterine and fallopian tube adhesions, resulting from glove powder, are a significant risk of female infertility, clinical papers advise that powder free gloves should be used even for routine vaginal examination.³ Analysis of patients with adhesions, between 69-93 per cent, proved to be due to foreign microbodies, which includes starch powder.⁵

Researchers have also shown powdered gloves to be a risk factor for post-operative wound infections. As with most foreign bodies, glove powder decreases the inoculum of bacteria required to produce abscesses, in this case being reduced by a factor of at least 10 fold.⁶ In addition, powder also delays wound healing and alters the normal reparative process while at the same time increases the wounds inflammatory response.^{5,7}

The presence of glove powder can result in many other undesirable effects, such as interference in laboratory testing causing false results (i.e. PCR – Polymerase Chain Reaction, enzyme immunoassay or some HIV tests) and powder granulomas being misdiagnosed as metastatic carcinoma.⁸ Starch particle contamination of catheters, perfused donor kidneys and cosmetic dentistry materials (crowns, prostheses) among others has been widely reported.¹

All these issues can be easily avoided by switching from a powdered to a powder free environment. This may have additional cost-savings in both reduced healthcare, personnel sickness and post-operative complications. Also, it must be stated that the cost of washing the powdered gloves prior to use, has been reported as being at least seven times higher than the cost of using powder free gloves² while at the same time being inefficient in removing totally the glove powder.⁹

References:

1. Moriber-Katz, S. et al. Contamination of perfused donor kidneys by starch from surgical gloves. *Am J Clin Pathol.* 1998; Jul90(1): 81-84.
2. Edelstam, J. et al. Glove powder in the hospital environment – consequences for healthcare workers. *Int. Arch. Environ. Health* 2002; vol. 75: 267-271.
3. Sjosten, A.C.E. et al. Post-operative consequences of glove powder used pre-operatively in the vagina in the rabbit model. *Human Reproduction.* 2000; vol. 15: 1573-1577.
4. Hunt, T.K. et al. Starch powder contamination of surgical wounds. *Arch. Surg.* 1994; vol 129(8): 825-827.
5. Duron, J.J. et al. Post-operative peritoneal adhesions and foreign bodies. *Eur. J. Surg. Suppl.* 1997; vol. 579: 15-16.
6. Emerson, M. Chairman's conclusions. *Eur J Surg.* 1997.
7. Odum, B.C. et al. Influence of absorbable dusting powders on wound infection. *J. Emerg. Med.* 1998; vol. 16(6): 875-9.
8. Giercksky, K.E. Misdiagnosis of cancer due to multiple glove powder granulomas. *Eur. J. Surg. Suppl.* 1997; vol. 579:11-14.
9. Field, E.A. The use of powdered gloves in dental practice: a cause for concern? *J. Dent.* 1997; vol. 25: 209-214.