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Editorial

TALCUM POWDER—A GRAVE SURGICAL HAZARD

APPROXIMATELY two-thirds of a century has elapsed since the surgical world first learned of the dangers incident to the use of insoluble dusting powders; and yet surgeons have proceeded merrily in the use of these harmful substances. The reason for this seeming unconcern is not far to seek and lies in the fact that up to fairly recent times, dusting powders were used comparatively occasionally. With the advent of the use of dry gloves, talcum came into much more general use. It has been estimated that 1,000,000 pounds of it are used yearly in the United States.

The dusting powder most commonly used in surgery is talcum, a mixture of elements consisting largely of magnesium silicate. In the past, lycopodium, derived from the spores of club moss, was much more commonly used than it is today. The important factors involved in the use of both these substances is their almost complete insolubility, their tendency to set up a reactionary inflammation in whatever body tissues they find lodgment, and the consequent development of inflammatory granulomas leading to ultimate fibrosis. Such a process, set up in the peritoneal cavity, results, almost inevitably, in the development of adhesions of a firm and resisting type that, in some cases, leads to eventual intestinal obstruction. Viewed

both grossly and microscopically the lesions caused by talcum may create much confusion and uncertainty. Grossly the similarity to tuberculosis may be most baffling and not infrequently the resultant granulomas are confused with malignant growths.

Nor is the peritoneal cavity the only region in mammalian anatomy that is compromised by the effects of contact with talcum powder. The brain, uterus, rectum, cervix uteri, eye, muscle, connective tissues, healing wounds and possibly other organs and tissues show equally unfavorable reactions. It has been suggested by Kronenberg that the preparation of rubber gloves with talcum, by nurses, for surgical use, be construed as a hazardous occupation and that the State of Illinois authorities take steps to control and remove the danger.

Such being the facts, we are confronted with the unusual situation that surgeons nevertheless have persisted in continuing the use of such a vicious substance as talcum powder. There has been no lack of discussion of the topic, as will be appreciated by a glance at the bibliographic references appended to the recent article by Seelig, Verda and Kidd, in the *Journal of the American Medical Association* for December 11, 1943. These authors outline in detail the history of this chapter in

surgery and furnish additional surgical proof of the pressing necessity for the issuance by the surgical fraternity of a "cease and desist" order that will ban talcum powder from operating rooms, wards, dressing rooms and dispensaries. Their work seems to rest on a very solid foundation of experimental data, well supporting the plea for discontinuing such a universal irritant as are the insoluble dusting powders.

It seems to be fatuous to hope that through team work, or through the practice of any reasonable precautionary measures, the evils of talcum may be side tracked. It is practically impossible to rinse it off the surface of rubber gloves and it is almost equally impossible to prevent an excess of talcum from gravitating into the finger tips of the gloves. Very careful studies have shown that gloves are inevitably torn in approximately 75 per cent of all operations, and that approximately 25 per cent of all gloves used show rents or tears.

A most interesting fact that bears on the detection of talcum in the tissues has been emphasized by German, of Cincinnati, who showed that by examining sections under polarized light the highly refractal talc crystals are detected very readily. Under ordinary illumination, these crystals may

be very elusive. German was able to show that talcum crystals were present in 84 per cent of the abdominal cavities of a series of patients who had been subjected to laparotomy.

Seelig and his co-workers have found that potassium bitartrate, properly used, serves as a fairly satisfactory substitute for talcum and they furnish their reasons for this recommendation. Reading between the lines of their first contribution to the subject, one gathers that the problem is not yet solved with complete satisfaction; but that the search has not yet ended. Studies are continuing with a specially prepared starch. This new starch does not gel on boiling or autoclaving, is ideal in its physical properties, and is attacked by the diastase in the body fluids with such astounding rapidity that within a few hours it is completely absorbed from the body cavities and from the body tissues. More important than all this is the fact that it is a bland powder that the body tolerates with no perceptible tissue reaction. This powder is not yet on the market because of manufacturing restrictions imposed by the war. But the scene is all set for the final undoing of talcum, with the consequent release of surgeons from fear of postoperative complications due to its use.

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THE TALCUM POWDER EVIL*

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THE talcum powder chapter is a long one, dating back more than sixty years. It was not, however, until 1942 that any extensive work was done with the aim of developing a substitute to use in place of talc. By that time the complications reported in the literature as caused by talc became so numerous that workers in the Barnard Free Skin and Cancer Hospital, St. Louis, Mo., spent the better part of five years systematically studying the effects of some thirty-five different powders on laboratory animals. These experiments led to the conclusion that potassium bitartrate made a desirable substitute for talcum. However, as time passed it developed that unless gloves powdered with potassium bitartrate were sterilized with meticulous care the powder tended to caramelize. We also thought at that time that potassium bitartrate shortened the life of rubber gloves. On this latter point we were probably in error because the Wilson Rubber Company, on their own initiative, instituted a series of careful experiments which showed that potassium bitartrate neither shortened the life of the gloves nor lessened the tensile strength of the rubber. (From a personal communication to the author.) Despite this we received so many personal reports concerning the difficulties encountered with sterilization that we decided to reopen the problem in order to continue our search for a more suitable powder. It is interesting to note that at about this time the Mayo Clinic substituted potassium bitartrate for talcum and reported later that they had been using it for two years.

Our later studies developed the fact that corn starch would serve as an ideal powder were it not for the fact that it gelatinized when subjected to steam auto-

claving. Thanks to the Corn Products Refining Company we learned that by subjecting starch to formaldehyde or to other aldehydes it could be robbed of its gelatinizing properties. But here again we ran into difficulty in that one must remove very completely all traces of the aldehyde radical in order to avoid an irritating dermatitis of the hands of some surgeons. Another difficulty was that the sterilized starch powder did not have complete freeness of flow. This problem of free flow, however, I do not regard as of too great importance. I believe that the best operating room technic calls for use of the powder in the form of sachets rather than from shaker cans. When sachets are used, the question of free flow loses much of its significance.

In the March, 1948 issue of *The American Journal of Surgery*—there appeared an article by workers of the Johnson & Johnson Laboratories, of New Brunswick, N. J. This report is a bit confusing because although they seem to recommend a modified starch, they do not say how it is modified nor do they call it starch. They refer to it as “a mixture of amylose and amylopectin derived from corn starch.” I had always been of the opinion that corn starch was a mixture of amylose and amylopectin and starch chemists assure me that such is the fact. In a specimen of their powder that the Johnson & Johnson workers very kindly sent me I found evidence of the presence of aldehyde of some sort upon testing with Schiff’s reagent. Chemists who repeated the test for me also reported the presence of aldehydes.

Another statement in the report of the Johnson & Johnson workers that causes me genuine concern is that their powder

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contains 1 per cent magnesium oxide in order to furnish a freer flow to the powder. In the work that I already referred to which was done at the Barnard Free Skin and Cancer Hospital magnesium oxide was one of the many powders that were tried. It was found to cause granuloma and plaque formation and was therefore discarded. We did think that it was somewhat better taken care of than was talcum, but it took a varying period of time before it was disposed of. During that time interval it could cause a great deal of harm. The situation is much like that which pertains to calcium carbonate. In their studies of noxious dusts workers in the United States Bureau of Mines reported that the only innocuous dust they found was calcium carbonate, in that although it did set up a reactionary inflammation in the tissues it was finally disposed of.

There is no doubt about the correctness of the observation of the Johnson & Johnson workers that magnesium oxide will increase the flow of starch. The manufacturers of table salt have known for a long while that by adding a little magnesium oxide they could prevent clumping

and furnish freer flow to the salt. The fact that it will increase the flow of starch, however, does not warrant the use of magnesium oxide in a surgical dusting powder. This statement is valid, I believe, even if it is present in a 1 per cent dilution. I am strongly inclined to believe that the presence of insoluble dusting powders in the tissues and particularly in the peritoneal cavity may cause damage totally out of proportion to the quantity of the material. In some instances a very small amount of an offending powder may set up an almost incredibly progressive chronic type of fibrosis. I have come to the conclusion, therefore, that when we are contemplating the harmfulness of non-absorbable surgical dusting powders, there is as little justification of talking or thinking in terms of "just a little bit" as there is of speaking of "a touch of pneumonia" or of a "little bit pregnant."

It is a hopeful sign that such an outstanding manufacturer as Johnson & Johnson has interested themselves in the surgical dusting powder problem, but that does not relieve surgeons of their duty to know just what they are using and how assuredly safe it is.

