Cor pulmonale secondary to talc granulomata in the lungs of a drug addict

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With the increasing non-medical use of psychotogenic and other drugs, unfamiliar pathological lesions may be encountered. This report describes one such type of lesion.

Case history

A 35-year-old Caucasian married woman was known to be addicted to methadone hydrochloride. With the knowledge of the police she was kept supplied through a physician's prescriptions. Her husband discovered her in her bedroom in a collapsed condition and summoned an ambulance. When picked up she was limp, cyanosed and without perceptible pulse. She died on the way to the hospital.

The significant autopsy findings were confined to the heart and lungs. The right ventricle was hypertrophied and the lateral wall of the chamber measured 6 mm. in thickness. This evidence of cor pulmonale was supported by congestion and moderate enlargement of the liver and spleen. Both lungs were congested and felt somewhat indurated.

Stomach contents, blood and liberal tissue samples of the various viscera were submitted for toxicology. Methadone was found in trace amounts in all specimens, and the stomach fluid contained 12.0 mg. per 100 ml. of the drug. Death was attributed to methadone poisoning. The wide distribution of the drug in all the tissues examined and the 15 mg. that was found in the stomach suggested that the total ingested may have exceeded the known fatal dose of 100 mg.[1]

This report is concerned with the lungs, where there were myriads of foreign body granulomata, widely distributed and numbering one to four per low power field. Each granuloma was made up of several multinucleated foreign body giant cells clustered around collections of non-staining, doubly refractile, elongated acicular bodies. The granulomata had developed within or along the alveolar walls. The birefringent particles varied from 10 to 60 microns in length, with an average of 50 microns (Figs. 1 and 2). They resembled microscopically talc particles in form, size and birefringence.

The sections of heart muscle revealed only hypertrophy of the individual muscle fibres in the wall of the right ventricle. The extent and severity of the pathological process in both lungs seemed to explain adequately the chronic cor pulmonale.

Three guinea-pigs were injected with a suspension of talc and the histological features were subsequently examined. The results are tabulated below:

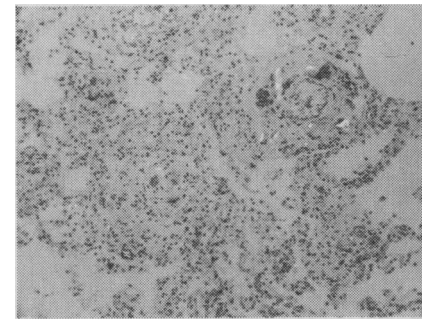

FIG. 1—Foreign-body granulomata of lung. There is a giant cell response to doubly refractile acicular bodies which are compatible in appearance with talc particles. Lesions similar to those in the figure were distributed throughout both lungs and were related to blood vessels and alveolar walls. (Taken with polarized light. Magnification × 100.)

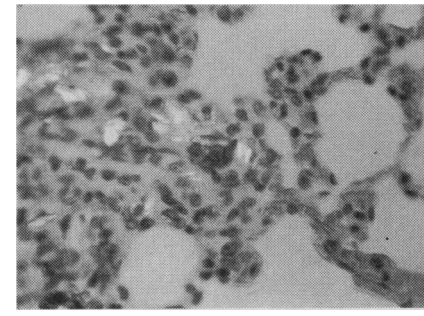

FIG. 2—A section of lung of the 35-year-old woman. The cells making up the granuloma forming about the talc particles are macrophages (or histiocytes) and giant cells exclusively. (Taken with polarized light. Magnification × 400.)

Animal	*Route of injection*	*Interval before sacrifice (days)*	*Birefringent bodies present in alveolar walls*
PA 86	Jugular vein	3	+++
PA 87	Intracardiac	6	+
PA 88	Ear vein	8	++

Discussion

A drug addict may try a variety of drugs, using different, sometimes unconventional, routes of administration. Tablets for oral use may contain unabsorbable material.

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Talc is used in preparing some compressed tablets, serving as a lubricant to prevent them from sticking to punches and dies.[2] It is used for this purpose in the preparation of methadone tablets.[3] Taken intravenously, the unabsorbable talc is filtered out, partly at least, in the pulmonary capillary bed.

Talcosis or talc pneumoconiosis has been reported on several occasions as an industrial hazard for people employed in the manufacture of talc (magnesium silicate).[4] The lesions produced by aspiration of talc have certain differences from those which follow its injection. The particles of inhaled talc that reach the alveolar spaces are 5 to 10 microns in length,[5] whereas those found in the granulomata of our case were five to ten times this length. Pleural adhesions develop when the talc particles are inhaled[4] but were not present in our case. The granulomata are most prominent in the lower lobes when the talc is aspirated but are evenly distributed throughout the lungs

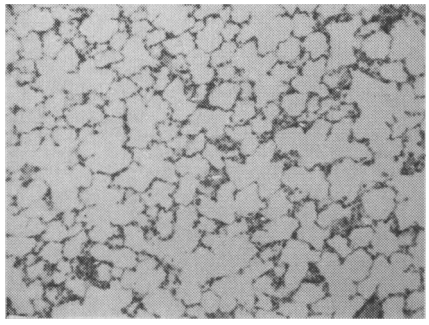

FIG. 3—A section of guinea-pig (PA 85) lung eight days after injection of a suspension of talc particles. The doubly refractile particles are related to alveolar walls and outside the capillaries where a few macrophages have collected around them. (Taken with polarized light. Magnification × 100.)

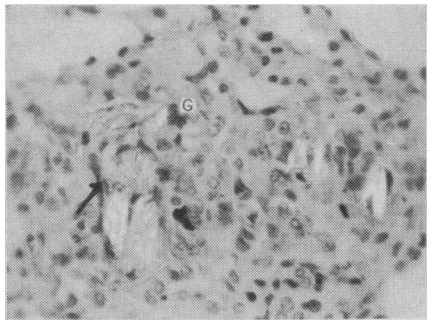

FIG. 4—A section of guinea-pig (PA 86) lung three days after injection of a suspension of talc particles. The particles of talc have been isolated from a capillary lumen (arrow) by endothelial cells. The lumen is narrowed. Only macrophages have responded to the stimulus but already giant cells (G) have formed from the latter. (Taken with polarized light. Magnification × 400.)

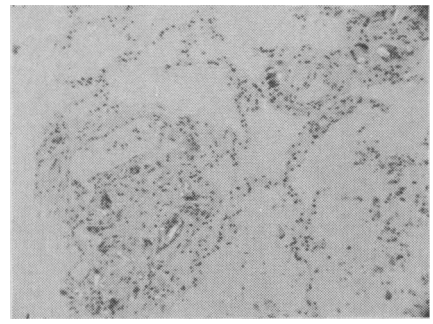

FIG. 5—A section of the lung of a 35-year-old woman showing, on the left, a vessel which is surrounded by foreign-body giant cells which are responding to talc particles that are close to the vessel. The vessel may have been narrowed somewhat by the foreign-body granuloma contributing to the pulmonary hypertension. This woman had hypertrophy of the right cardiac ventricle. (Taken with polarized light. Magnification × 100.)

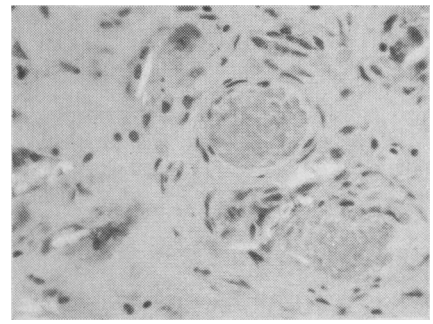

FIG. 6—Talc particles near vessels in the lung of the 35-year-old woman. (Taken with polarized light. Magnification × 400).

when they reach this site by way of a vein.

The talcosis which develops in talc manufacturers is produced most often by tremolite, with the formula $Ca_2\ Mg_5\ H_2\ (SiO_3)_8$.[6] The purified talc which we used experimentally for intravenous injection of guinea-pigs was obtained from the hospital pharmacy and had the formula $Mg_3\ Si_4\ O_{11}.\ H_2O$.

The lesions in the lungs of the guinea-pigs were relatively bland (Fig. 3). Only histiocytes responded to the talc emboli. In three days some of the talc particles had escaped from the capillaries and were gathered in groups surrounded by macrophages. Giant cells had developed in that short interval. The macrophages seemed to come from capillaries. Endothelial cells had isolated the talc emboli from the capillary lumen and in the process had caused narrowing of the capillary (Fig. 4). A similar process in the lungs of the patient here reported could account for the pulmonary hypertension (Figs. 5 and 6). The development of angiothrombotic pulmonary hypertension has previously been reported.[7, 9]

Foreign material, including talc, has also been found in the liver of a drug addict who chose the intravenous route.[8] The liver sample was obtained by needle biopsy, and the foreign particles probably reached the liver after having passed through the pulmonary capillary bed.

This case is reported, firstly, to describe the uncommon pulmonary lesion produced when a talc-containing preparation is injected intravenously and, secondly, to point out a possible cause of cor pulmonale in a drug addict. There may be a significant increase in the number of such cases with the present widespread non-medical use of drugs.

References

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