ABSTRACTS

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INDUSTRIAL TOXICOLOGY

Drug Protection against the Lethal Action of Parathion.


Several cases of poisoning by the insecticide parathion (p-nitrophenyldiethyl thiophosphate), which is a potent inhibitor of cholinesterase, have been reported. In view of the effects of eserine, neostigmine, atropine, and magnesium and calcium salts in poisoning with di-iso-propylfluorophosphonate it was decided to investigate their possible prophylactic effects on parathion toxicity. Given by intraperitoneal injection in propylene glycol, this substance (93% pure) has an LD50 of about 5 mg. per kg. body weight in mice, rats, and cats. Previous injection of atropine or eserine increased the LD50 of parathion 8 times in mice and 4 times in cats. Atropine and neostigmine together gave better protection than atropine alone but neostigmine alone was ineffective in tolerated doses. In mice, magnesium and calcium salts did not give similar protection, but did delay death. They were, however, tested in animals given twice the LD50 of parathion and might have been more effective against smaller doses. Like neostigmine, magnesium sulphate increased the protective action of atropine. If eserine were given after parathion the two drugs acted synergistically as lethal agents.

The degree of protection afforded by eserine appears to be determined by the amount of cholinesterase reversibly bound by the drug before exposure to parathion and serving as a reservoir of enzyme whereby cholinesterase—acetylcholine action can be maintained in the presence of parathion. Survival is possible provided this amount represents 10% or more of the total. The cause of death in atropinized animals eventually succumbing to parathion poisoning is respiratory paralysis, probably due to the unopposed nicotinic action of acetylcholine on skeletal muscle. The fact that neostigmine itself has a strong nicotinic action may be the reason for its being less effective than eserine in prophylaxis against parathion poisoning.

Derek R. Wood.


In the investigation described samples of urine from 23 workmen employed in a fluoride plant were examined for fluorides, and radiographs of all the bones of 16 of them were obtained. Positive X-ray findings in the form of abnormally dense bones were found in 5 cases. Changes were present in the pelvis and spine in each of these, and in some the extremities were also affected. There was a definite correlation between the urinary fluoride content and the occurrence of bone changes. Such changes may be expected if the concentration of fluoride exceeds 10 mg. per litre of urine.

None of the men with positive findings complained of any disability, nor did they show any X-ray evidence of hyperplastic changes in the spine like those described by Roholm and Shortt in Danish and Indian workers with fluorosis. The suggestion is made that the increase in bone density may make coincidental changes due to osteoarthritis more apparent and that in consequence the part played by fluorides in causing limitation of mobility of the spine has been over-estimated by these workers.

J. A. Shiers.


A case of chronic carbon-disulphide poisoning is described in a man of 54 who had worked as a spinner in a viscose rayon factory for 2 years. He was found to have weakness of the middle, ring, and fifth fingers of the left hand, most marked in the muscles supplied by the ulnar nerve. There were no sensory changes at this stage. A year later hypotonia of the flexor and extensor muscles of the left hand and diminished tendon reflexes in the left forearm were noted. By this time all forms of sensation in the distribution of the left ulnar nerve had nearly disappeared. A diagnosis of carbon-disulphide polyneuritis was made. Two years
ABSTRACTS

INDUSTRIAL LUNG DISEASE


In steel foundries there is a high incidence of silicosis and tuberculosis, due largely to the quantity of dust present in the air when castings have to be freed from the mould. It is often necessary to use pneumatic tools to complete this process. Over 13,000 workers were studied, these being employed in 33 different works. Attempts were made to determine the incidence of silicosis and tuberculosis and to discover which processes were the most dangerous. The value of x-ray examinations was also assessed.

Various kinds of material are used to make moulds, many having a high proportion of silica. If the parts to be made are small, as in chain works, the fragments of the moulds, as they are detached, fall through a grill on to a conveyer by which they are returned to the moulding shop. Much dust forms in this way. Larger castings can be freed from the moulding mould only by attacking the latter with heavy hammers. Hollow castings may often require scraping of the interior with small tools. Sometimes abrasive wheels are needed to clean and polish a casting and free it from adherent material. The mixing of the mould material does not involve much dust hazard, as it generally occurs in the open and the material may be wet. In general the methods of dust prevention are inadequate and the increasing use of pneumatic tools to clean the castings, though apparently unavoidable, much augments the risks.

In investigating the x-ray findings the authors used Vigilani’s classification. Silicotic lungs were divided into five groups, a sixth showing concomitant tuberculosis. Cases of tuberculosis were divided into four groups of increasing severity. The workmen were put in one of the thirteen occupational groups, some of which are very much exposed to dust, others little exposed. The statistical estimation of the group incidence is made difficult by the changes of occupation within the industry. As was expected, the morbidity from silicosis and tuberculosis rose with length of employment. Radiographs were obtained in many cases from the industrial clinic or from the compensation office. Of 6,098 workers employed in the less hazardous jobs 493 had lung reticulation, 59 nodular silicosis, and 15 massive silicosis. Of the remaining 3,346 workers in more dangerous employment 414 had reticulation, nodular silicosis appeared in 140, massive silicosis in 62, and silico-tuberculosis in 22.

Five patients were selected for more detailed consideration; these were all men exposed to little dust. They had worked from 18 to 33 years in foundries. In 4 of them reticulation was evident and varied in degree; the bronchi showed up not by their translucency but rather because they were surrounded by opaque material. Three cases were complicated by tuberculosis. In one case the development of this complication seemed to accelerate the silicotic process in a second group of 6 persons more exposed to dust the x-ray findings varied considerably. In the first 3, silicotic changes progressed


Poisoning by yellow phosphorus has virtually disappeared in Britain with the introduction of less dangerous rodenticides. Puerto-Ricans, on the contrary, find it a cheap and useful suicidal agent; no fewer than 56 cases were admitted to one hospital in San Juan in a recent 34-year period, 27 deaths ensuing. The only significant factors were the patient’s age, the amount taken, and the vehicle, about 1 g. constituting a minimum lethal threshold, and a fluid vehicle (especially if alcoholic) increasing the mortality. Early vomiting or a washout within the first 5 hours much improved the prognosis.

Of the 56 patients 41 developed hepatomegaly, a dangerous early sign, within 24 hours; both this and early jaundice were directly related to the quantity of phosphorus absorbed. Circulatory collapse, haemoconcentration, oliguria, delirium, toxic psychoses, and azotaemia (developing in two-thirds of the cases) also occurred. The majority of deaths took place before the Hangar (cephalin-cholesterol) flocculation reaction became positive; liver function tests proved of little use. Hyperphosphataemia was noted in 8 cases without a fall in serum calcium level, indicating “tissue fixation of absorbed phosphorus”. BAL was given to 24 patients “with poor results”; a routine 1 : 1,000 potassium permanganate washout, together with the administration of mineral oil, was most effective in treatment. Early deaths, up to 48 hours, were from circulatory collapse ascribed to direct myocardial damage; later deaths, mostly within a week, were from a hepatorenal syndrome with jaundice and azotaemia. Keith Simpson.


John Pemberton.

The later he had complete left hemi-anaesthesia and voluntary movements were no longer obtainable in the left hand and wrist, which were held in the main d'accoucheur position. There were frank hysterical manifestations by this time, including bouts of apnoea, followed by hyperpnoea.

The author emphasizes the difficulty of distinguishing signs of organic nervous changes from the hysterical features which are known to occur in this condition. He attaches importance to chronaxie measurements which were carried out on three occasions during this patient’s illness. These showed lower values than the normal for the flexors of the left hand and fingers, and values above normal for the extensors. The differences were not markedly consistent, however. An electroencephalogram revealed no abnormality. The author concludes that although carbon-disulphide poisoning predisposes to hysterical nervous conditions, it can also give rise to a progressive polyneuritis, possibly due to the retention of carbon disulphide, or its products, in the body. He considers that chronaxie determinations are useful in detecting these organic changes.

Keith Simpson.
steady but were much less rapid in development when less dusty work was begun. The next 2 persons had associated tuberculosis in active form. The last patient also had tuberculosis with silicosis but radiographic appearances changed little over a period of 3 years.

Preventive measures should include better ventilation and the separation of dusty from clean processes. Ventilating fans are often useful. All equipment in use should be put away and water-spraying of floors and other parts should be carried out freely. Cleaning and spraying should be done outside ordinary working hours. Totally enclosed machines could be more often used in mixing materials for the moulds and the use of silicate should be cut down or stopped. Ventilation downwards is often preferable to upward aspiration. If this is associated with the free introduction of fresh air from above, the hazards are much reduced. There is much advantage in waiting until it has sufficiently cooled before removing a mould under a copious water spray, though this makes the process more lengthy and difficult, especially if pneumatic tools are used. In some works the mould is removed entirely by the use of water jets under high pressure (100 to 120 atmospheres). Pneumatic tools should have an attachment whereby the stream of dust is directed away from the operator by a rubber tube attached to the exhaust. When a furnace has to be demolished the dust hazard is very great and it is desirable to draw as much as possible downwards. Regular x-ray examination of personnel is needed and tuberculous subjects should be isolated. Of all persons examined 10.52% had reticulation and silicosis and 0.21% had associated tuberculosis. Tuberculous lesions were seen in 2.75%.

G. C. Pether.

Tuberculosis among Native North African Workers Employed in the Industrial Fringe of Paris. DELFON-

In this article the authors discuss the medical and social factors contributing to the high incidence of tuberculosis among North African workers in Paris, and the clinical appearances and prognosis of the disease in these patients. In the Paris district the number of North Africans who are employed in local industries, is estimated at 5% of the total population. The authors give no figures for the incidence of tuberculosis among them, but state that in one hospital one-quarter to one-third of the beds in the male tuberculosis wards are occupied by North Africans. Two main types of tuberculosis occur among these patients. One is an acute infection of the serous membranes—of the peritoneum as often as of the pleurae—and of hilar and cervical lymph nodes. The other is an ulcero-caseous pulmonary tuberculosis remarkable for the extent and gravity of the lesions. In some cases the diagnosis is uncertain, owing to negative sputum findings and inconclusive radiographs, but when such patients are kept at rest and under observation for a few months, the diagnosis of tuberculosis usually becomes more certain. The authors state that there is no racial tendency towards tuberculosis among these patients, all of whom are young men and 80% of whom are Berbers, but that the reasons for this high incidence of tuberculosis are mainly social. These North Africans, who are attracted to Paris by the prospect of high wages, are exposed to a colder climate than that to which they are accustomed, live in squalid conditions, eat insufficient food, work at heavy, unskilled labour, and send most of their wages home. They are often affected by amoebiasis and malaria.

Although the initial response to treatment, even with rest only, is good, the long-term prognosis is bad because the average North African has insufficient self-discipline and patience to continue the treatment. As long as he feels ill and is receiving active treatment, such as injections, he will remain in hospital, but as soon as he feels better he wants to leave. Many patients either take their own discharge against medical advice or have to be discharged for reasons of ward discipline. The same psychological factor operates with collapse therapy, for the North African cannot be relied upon to attend regularly for refills. Another factor is the long waiting list for sanatorium treatment; usually the delay is of several months. During this period the North African, improved by his stay in hospital, considers himself cured and either resumes work or goes back to North Africa, where he loses the benefits of the French Social Security system, and especially those benefits applying to diseases which need long-term treatment.

A. G. S. Heathcote.


A study was made at the United Cardiff Hospitals of the degree of right ventricular hypertrophy to be found post mortem in 50 unselected cases of coal miner's pneumoconiosis. Left and right ventricles were separated by dissection, weighed, and the ratio between them (LV/RV ratio) obtained. A significant reduction below the normal value of this ratio was found in 38 cases, indicating a high degree of right ventricular hypertrophy, the mean for the whole series being 1.61 (normal range 1.46 to 2.14). The lowest values to occur in cases in which there were massive pulmonary fibrotic lesions. In cases of massive emphysema with focal dust lesions there was much less tendency toward right ventricular hypertrophy and failure. It is suggested that the LV/RV ratio must be less than 1.00 before the electrocardiographic (ECG) pattern of right ventricular hypertrophy can be expected.

A total of 146 subjects, including 44 normal men of whom 16 were miners, were also studied with regard to the ECG changes to be found in right ventricular hypertrophy due to pulmonary disease. It is stated that reduction in amplitude of R and increase in amplitude of S in lead V6 are the most prominent changes in such cases. Claim is also made for the value of a chest lead in the 3rd interspace just above V2 in indicating early hypertrophy of the right ventricular outflow tract. Cardiographic studies of respiratory variation following an exertion test are described. It is concluded that ECG
evidence of right ventricular hypertrophy is not common in coal miner’s pneumoconiosis until the disease has advanced to the stage of massive fibrosis, with infection, emphysema, and distortion.

L. W. Hale.

ACCOLDS and ORTHOPAEDIC SURGERY


Supraspinatus tendinitis, a synonym for subacromial or subdeltoid bursitis, is described as a primary degenerative process associated with a chronic inflammatory reaction involving one or more components of the tendon-capsule cuff. The authors discuss the pathogenesis and diagnosis of this incapacitating lesion and refer to the very extensive literature. An analysis is made of 300 consecutive cases treated by x-ray therapy. Males and females were equally affected, the average age being 50 years. The effects of x-ray therapy are considered to be mainly due to the induced hyperaemia, increased blood and lymph flow resulting in resorption of toxic materials, and the mobilization of antibodies. The normal course of treatment was 150 r (air) daily for 4 days, using a 10 × 10 cm. port at 50 cm. focus skin distance and 200-kV x rays filtered by 0.5 mm. Cu and 1 mm. Al. In acute cases some initial exacerbation of symptoms was not uncommon. An effort was made to classify the response to treatment and the authors claim either complete or almost complete remission of symptoms and signs in 83.6% of cases. The duration of these remissions is not stated, and a 39% recurrence rate is admitted after one course of treatment. No significant difference in response was noted in cases having a definite history of injury, nor was there any significant difference in those having radiological evidence of calcium deposits. One sub-group of patients, in whom previous therapy of various types had been employed, responded less favourably to x-ray therapy than the remainder of the series.

E. C. Easson.

ENVIRONMENT


The average duration of useful consciousness at simulated altitude was determined by the senior author’s method in 9 young adults whose pulmonary ventilation was recorded photokymographically. At a simulated altitude of 30,000 feet (9,140 m.; 226 mm. Hg) average duration of useful consciousness increased from 88 seconds to 163 seconds when a mixture containing 21% oxygen, 14% carbon dioxide, and 65% nitrogen was substituted for atmospheric air. At 35,000 feet (10,670 m.; 179 mm. Hg) a similar increase occurred, but was less pronounced when a mixture containing 21% oxygen, 19% carbon dioxide, 60% nitrogen was substituted for air. In both cases the prolongation of useful consciousness was attributable to increased ventilation.

J. E. Cotes.