relations and friends. Conversely, insane conduct may be properly testified by a relation, but fail to be displayed when under observation in an institution. The medical evidence then will probably be that of mental deficiency. In such case the witness must balance the relative merits of hearsay statements and personal observation.

Mental defect may be simulated by mental dullness resulting from physical disabilities such as anæmia, chronic intoxications, the sequelæ of debilitating diseases or head injuries, upon bad sex habits, privations, fatigue or too rapid growth. But a physical cause of mental dullness may aggravate mental defectiveness, and a full physical as well as complete mental examination is necessary for accurate diagnosis.

Since the indications of mental deficiency are the negation of those of efficiency, it follows that the intermediate group between the defective and normal, namely, the subnormals, will present symptoms of an indeterminate character. The line of demarcation between the normal and subnormal is of comparatively slight importance forensically, but that between the defective and subnormal is of immediate concern to the psychiatrist. In differentiating between them the medical man must be guided by the definitions of mental defectiveness laid down in the Act of 1927, by his knowledge and experience of normal intelligence, of normal mental capacities and reactions, and of conduct which is normal in the environment from which the subject is drawn.

(To be continued.)

AFTER - RESULTS OF GASSING AND GUNSHOT-WOUND CHEST, ESPECIALLY IN RELATION TO TUBERCULOSIS.¹

By G. BASIL PRICE,

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NEARLY fifteen years have elapsed since the first use of gas as a combatant weapon in warfare took place. The immediate effects of this agency were fully described during the war years and later in the medical history of the war. There is now extensive literature on the subject, but at this more remote period it may be well to review the present condition and later results in "gas" cases, and also in those suffering damage of the chest due to traumatism, particularly when the latter has affected the thoracic contents. It may be possible to draw some conclusions with regard to the post-war incidence of tubercle in these cases.

The earlier impressions expressed indicated a general apprehension that where a man had been gassed acute symptoms would almost inevitably lead on to the incidence of tubercle, whether activated or incurred primarily because of it.

It is generally agreed that mustard gas causes the most severe damage in the upper respiratory tract, while asphyxiating gases affect more largely the alveoli, the lungs and bronchioles, causing red-cell exudate and inflammatory consolidation.

Sergeant's general conclusions were, in 1925 :—

(1) Gassing by itself does not provoke tuberculosis; and with this conclusion statistics and experiment apparently were in accord.

(2) When tuberculosis follows gassing,

¹ Abstract of paper read before the Tuberculosis Association at Cambridge, 1929.

active or latent tubercle must have been present, but aggravated by traumatic lesions of the mucous membrane.

(3) At a later date, if gassing is tardily followed by tubercle, the occurrence is accidental and there may be re-activation by lessened resistance.

In a recent contribution to *La Riforma Medica*, 1929, by M. Brelet (Professor), School of Medicine, Nantes, on the late pulmonary effects following asphyxiating gas, he draws attention to further communications, particularly by Achard, in April, 1927, and Sergent. Many individuals, he said, affected by gas (forty-seven out of 145) showed only a minimal bronchial pulmonary lesion, but they suffered frequent relapses of a slight tracheo-bronchitis and accompanying emphysema; in fact emphysema is an almost persistent factor in these cases. Sputum is not always very abundant and shows climatic variations. X-ray indicates sclerosis of the whole respiratory tree, spreading from the hyla and equivalent to an adeno-mediastinitis of Sergent. Capacity for work diminished 15 to 30 per cent. Tubercle bacilli had not been found in the sputum, though sometimes some of these patients may later become tuberculous.

In eleven (observations of gassed cases) who became tuberculous only 2 per cent. (three out of 145) appear to have any direct relationship.

Achard, on the other hand, has recently recorded a higher figure of tuberculosis, nineteen out of seventy-one, or 26 per cent. (*Clinique Médicale de l'hôpital Beaujon*, 1928). These figures Brelet criticizes in that they were taken from the records of a hospital in which only the more severe cases entered, and he did not consider that these figures should outweigh the general experience already recorded.

Recently a beginning has been made by the Ministry of Pensions to ascertain the later results of gassing in connection with ex-Service men who had received pensions

under that heading, and a preliminary 200 cases were collected for analysis with the probability of extending it to a much larger number. This number was selected from those who had received either final awards or were in receipt of current awards of pensions varying from 20 per cent. disablement to 100 per cent., and an attempt was made to get an equal number of varying grades of disability. As a result of this, it was found that official records of gassing on service were recorded with clinical details in nearly all cases, but in a few it was not clear that gassing had actually been suffered though in the rush of demobilizing men in 1919 claims had been allowed based on the men's statements.

EFFECTS OF GAS IN 200 CASES.

Accepted later as pulmonary tuberculosis	
due to gassing	...
Chronic bronchitis and sequelæ	14
Cardiac conditions	...
Neurasthenia	...
Other conditions	16
Gassing a part I.D. no disablement	10

With regard to the nine cases of pulmonary tuberculosis, T.B. were present in six; the remaining three cases showed evidence of chronic bronchitis, with some signs of localized fibrosis, and though originally diagnosed as tuberculosis, this infection had not subsequently been actually demonstrated. In only two cases did the tuberculous infection appear to be directly activated by "gassing" within a reasonable period.

A comparison of this result with the medical history of another twenty cases suggests even more strikingly that gassing has little to do with the incidence of tuberculosis. In these twenty cases there was history previous to the gassing of pleurisy, pulmonary conditions, or wounds of the chest, but no reactivation of pulmonary tubercle developed:—

Pleurisy, one or two attacks pre-gassing ...	9
Bronchitis on more than one occasion ...	5

Pleurisy, pneumonia, P.U.O., hæmoptysis, or tuberculous suspect, but no continuous medical history	3
(One of these died three years later of abdominal tuberculosis.)	
Pulmonary tuberculosis definitely known pre-gassing	1
Gunshot wound chest, pre-gassing ...	2

It may therefore be premised that even when gassing effects were severe, the after-incidence or re-activation of tuberculosis has been exceptional, and when eventuating in men subject for years to chronic bronchitis originally induced by gassing, the incidence does not exceed probably that amongst chronic bronchitics generally, not starting with a primary gassing.

At the Cambridge Conference, 1926, Sir Humphry Rolleston suggested that the condition of chronic bronchitis and bronchorrhœa might even have a protective value against tuberculosis.

I.—TRAUMA OF THE CHEST IN RELATION TO INCIDENCE OF PULMONARY TUBERCULOSIS.

Referring to the second part of my subject, viz., sequelæ of gunshot wounds of the chest, especially in relation to tuberculosis. Obviously direct infection of the body with tuberculosis by injury rarely occurs except in the cases of cutaneous infection in those dealing with tuberculous meat or suffering laboratory or post-mortem infection.

It is to be recognized that when tuberculosis supervenes in connection with traumatic injuries of the thoracic contents, the infection has in most cases been a latent one re-activated, though the relationship may be so close as to warrant for practical purposes a term of attributability.

I have analysed fifty cases of chest injury who during the last twelve months have been claiming pulmonary tuberculosis as due to chest wounds. Of these 37 (74 per cent.) had proved tuberculosis, one of whom subsequently died, and thirteen were regarded as still showing non-tuberculous conditions.

Of these thirty-seven cases T.B. were repeatedly demonstrated in the sputum of thirty. In five, sputum so far had been negative, but the diagnosis was substantiated on the clinical and X-ray data. In two the clinical and other features left no doubt as regards the diagnosis, though sputum records were not available; and in all thirty-seven cases the diagnosis had passed the gamut of medical criticism by both the Ministry of Pensions and Public Health Authorities. In eight, however, the clinical history and notes indicate that tuberculosis should be regarded as a concurrent disability with the original traumatism and not having a definite relation to the injury beyond aggravation at the time. The short period elapsing between the date of the injuries and the early symptoms and signs of tuberculosis bring one to this conclusion.

In the present series of cases seventeen had F.B.'s in the chest; four, penetrating wounds and temporarily retained F.B.'s; eight had T and T. wounds, no F.B.'s. retained in the chest; one had extra-thoracic F.B.; six cases suffered from other forms of trauma injury, rib injury, or from extensive suppurating chest wounds involving pleura, and in some cases resection of ribs. One of these cases had the lung penetrated by fragments of wood from the gunstock, which also carried into the lung portions of the clothing.

Deducting those in which tuberculosis was coincident and apparently independent of the injuries, twenty-nine remain in which the injuries sustained and retained F.B.'s appear to have been potent factors in the post-development of tuberculosis.

The factors common to these cases are :—

(1) Penetration of the lung, though not necessarily the retention of the F.B. which, however, when retained enhanced the aggravating factor of the injury.

(2) In no one of these cases it will be noted were there extensive surface injuries, nor any case of surface trauma only.

(3) In all of these twenty-nine cases tuber-

culosis was either confined to the injured side or, if bilateral, it was extensive and there were reasonable grounds for assuming that it had started in and progressed further in the affected side; there was one exception to this statement, namely, one case in which there was a chronic localized tuberculous deposit located in the base of the injured lung, where the organ had been damaged and the tuberculosis had spread to the opposite lung, where it had become more active and extensive.

(4) X-ray prints of Case 17, in which both lungs were penetrated, are of some interest as, though no F.B. was retained, there is some indication to suggest a track of fibrosis, which has been assumed by a competent X-ray specialist to be the track of the bullet, and this also apparently passes through the present site of the tuberculous disease.

(5) Surface injuries, unless involving the thoracic cage and its contents, appear to be relatively unimportant in their relationship to the incidence of tubercle. In connection with this statement a case may be quoted in which a claim for entitlement for tuberculosis as due to war injuries was preferred on the ground that a superficial but suppurating wound of the left chest, penetrating the pectoral muscle and anterior fold of the axilla, bore a direct relationship to the incidence of tubercle at a considerable period later in the opposite lung. Though the original wound was slow to heal there was no interference with the functional capacity of the chest, and there was no evidence to indicate any possible connection with the after-development of tubercle, particularly as this occurred in the opposite lung with a lapse of years between, and no connecting history.

The connection, therefore, of intrathoracic injury and tuberculosis appears to be close in these cases, and of sufficient importance to regard the tuberculosis from the pensioner's standpoint as an attributable in-

fection, though, as previously explained, this does not imply more than a very direct but important activation of a pre-existing and latent infection. The series to which reference has been made indicates that this apparent relationship is present in 78 per cent. of those in whom tuberculosis was definitely present, or in 58 per cent. of the total series of fifty who were claiming tuberculosis.

II.—COMPLICATIONS OCCURRING WITH THE ORIGINAL INJURIES AND DEGREE OF PERMANENT IMPAIRMENT IN FUNCTION PERSISTING; WHAT RELATION THESE BEAR TO THE INCIDENCE OF TUBERCULOSIS?

In no one case can it be said there was entire freedom from complications; in four only were the conditions requiring treatment of a non-serious character.

The main features of these penetrating gunshot-wound cases were the occurrence of hæmothorax, hæmoptysis, pleural effusion, date with collapsing lung. Certain cases developed, in addition, empyema, which required operation, septic pneumonia, surgical emphysema and pneumothorax (five). In three cases both lungs were equally affected, otherwise the injuries were confined to the right and left lungs in equal numbers.

In thirty-three out of thirty-seven cases there was a persisting degree of incapacity and loss of function, which can only be graded in comparative terms, slight to serious incapacity, but as a rule symptoms persisted.

Six cases gave a continuous medical history of chest symptoms, but the majority (twenty-four cases) showed considerable gaps in their history, so usual a feature in tuberculous infections. The more common symptoms noted year by year were dyspnoea on exertion, pains in the chest, particularly of restrictive character, a tendency to catarrh (bronchitis), occasional staining of the

sputum if not actual hæmoptysis, and the physical signs indicated usually localized fibrosis with, in several cases, an occasional pleural friction and varying degrees of bronchitis. There was considerable difficulty in recognizing the advent of the tuberculous change, owing to the already existing abnormal physical signs and the absence of T.B. in the sputum, even when an apparently late stage of the disease was reached. For this reason considerable periods of time elapsed before tuberculosis became overt and diagnosed. In the light of after-histories, greater stress should probably have been placed upon the increasing exhaustion and dyspnœa on exertion or the more pronounced type of hæmoptysis, particularly when there was any loss of weight, but other factors might at the time seem to give sufficient explanation for some of these symptoms.

On the ground, therefore, of (1) location of disease and its association with the seat of injury; (2) the permanent impairment of loss of function involved, accompanied by a tissue change which, owing to the nature of the organ in which it was taking place, allowed no complete physiological rest; (3) often the retention of a foreign body, which necessarily was an irritating focus; it seems impossible to resist the conclusion that these conditions were factors of direct character in the development of active tuberculosis when eventually present.

III.—PERIODS OF TIME ELAPSING BEFORE TUBERCULOSIS WAS DIAGNOSED.

In the cases analysed the average period of years elapsing between the date of injury and the recognition of definite tuberculosis was eleven years. The maximum period in any one case was thirteen years. In many of the cases tuberculosis had been suspected at earlier stages, and many reports from tuberculosis officers for different periods in the progress of the cases are available for reference, but, owing to the persisting traumatic pathology of the conditions

present, the tuberculosis was not susceptible of earlier recognition in the absence of T.B. in the sputum or extension to the other lung.

SURGICAL RESURRECTIONS—VII.

SEVERAL of the cases already recounted dealt with recovery either from severe hæmorrhage or extreme toxæmia; the present case was brought to the verge of death first from one and then from the other cause.

A man, aged 32, consulted me on December 1, 1928, with a complaint of abdominal pain and loss of weight. The pain had been troublesome for over a year, during which time he had lost 26 lb. in weight. Recently he had been troubled with attacks of diarrhœa and bouts of vomiting. He looked pale and ill. Examination of the abdomen revealed a tender mass of irregular shape in the right iliac fossa. Borborygmi could be heard and felt in the region of the lump. An X-ray examination which had been carried out showed no lesion in the stomach or duodenum, but great dilatation of the end of the ileum. There was obvious obstruction of the end of the small gut, but the nature of the swelling could not be determined certainly, though it appeared to rest between a new growth, tuberculous disease, or a chronic appendicular inflammatory mass. Though his condition was urgent, it was thought that he could wait a short time until a bed would be vacant at the hospital. Five days later, and before he was sent for to enter hospital, an urgent message arrived saying that the man had been vomiting continuously and was very much worse. His admission to hospital was immediately arranged. On admission he appeared moribund. His face was ashen, the pupils were