

Editorial.

WAR NEPHRITIS.

IN the Great War of 1914-18 very large numbers of the troops engaged in trench warfare suffered from acute nephritis. The disease appeared in the early months of 1915, there being few cases before February of that year, and steadily increased in the following months. In July there were 50 cases per 100,000 troops, and the maximum of a little over 100 per 100,000 was reached in December, 1916. The disease was not necessarily associated with cold weather; it occurred specially amongst men in the trenches, though a few occurred at the base among men who had not been in the trenches. Very few cases occurred among officers, and Dunn and McNee failed to find cases among the civil population in areas where the disease was prevalent amongst the troops.

The disease appeared in the Austrian and German armies about the same time as in the British troops, and presented much the same features. In the French Army the disease appeared later and was not so prevalent; in the Belgian Army the cases were even fewer. There were no cases among the Indian troops although the disease was occurring amongst British troops in the same division. When a division in which cases were occurring shifted its position the incidence remained much the same in the new locality; further a division in which cases were rare did not show any marked increase in taking over an area in which it had been common.

Nephritis does not seem to have attracted much notice in previous wars, except in the American Civil War, when, as in France, it occurred on the establishment of trench warfare and was not confined to the winter months; on the contrary it reached its maximum in the summer months.

The patients in France were young men. When divisions went out to France usually two or three months elapsed before the disease appeared among them. Rose Bradford met with few examples of the disease in men who had been less than a month at the front. The onset was usually rapid with albuminuria, often pyrexia, cedema of the face and so on; dyspnoea was a common symptom and occurred at an earlier stage and was more severe than in civil life. In the great majority of cases the disease was mild and recovery occurred rapidly under hospital conditions. Relapses were not uncommon and some cases passed into the stage of subacute nephritis. Deaths in the early stages were of rare occurrence, but there were a few fatal cases which supplied the facts as to the essential lesion of the kidney.

Shaw, Dunn, and McNee examined the kidneys from thirty-five fatal cases, death occurring in each within a fortnight, the shortest duration

being within forty-eight hours. In cases of short duration the changes in the kidney visible to the naked eye are very slight. Usually the kidneys are of normal size but occasionally some enlargement is present. The capsules are non-adherent and when stripped leave a smooth and usually pale surface. The cortex is generally pale and presents a contrast to the medullary pyramids which are congested. On examination with a hand lens the glomeruli are seen to project from the cut surface as pale translucent globules, this appearance indicating their enlarged and relatively anæmic condition.

While the primary and essential lesion is in the glomerular capillaries, evidence of damage soon appears in the other structure of the kidneys. Such extension of lesion is usually manifest where death has occurred after four weeks and there follow the usual changes found in subacute glomerulonephritis. The kidneys present varying degrees of enlargement, pallor and mottling of the cortex leading to a "large pale kidney." In a proportion of cases a hæmorrhagic condition appears before death and this is likely to occur in various "septic conditions," severe bronchopneumonia, or influenza. The general conclusion is that in the kidneys the primary lesion is in the capillaries of the glomeruli and is characterized by proliferation and swelling of the endothelium; it may be called an intercapillary glomerulitis. Such a lesion is in no way peculiar to trench nephritis; it is recognized as the earliest occurrence in glomerulonephritis. It is met with especially in diseases where streptococci are present. It is to be interpreted as the result of the secretion of toxic substances and not produced by the actual presence of micro-organisms. The kidneys in war nephritis have been carefully searched for bacteria with negative result, as also has been the case in glomerulonephritis in civil life. The lesion is of a general kind, all the glomeruli being affected, though some to a greater degree than others. It is to be noted that the lesions described are those which occur in severe fatal cases. In the ordinary type of case with recovery the lesions must be of slighter degree, and it is conceivable that the condition of the endothelium may pass off and complete restoration to normal result.

There does not appear to be any special feature in the urine of war nephritis as compared with other forms. Albumin is usually abundant. Mackenzie Wallis found the proteins to be the usual serum albumin and serum globulin as in other kidney cases, and he also found the presence of a considerable number of polymorphonuclear leucocytes in the urine to be a marked feature in war nephritis as it is in scarlatinal nephritis. Retention of chlorides is usually distinct in the acute stage and the amount of urea in the urine is diminished in accordance with the nitrogen retention. The amount of urea in the blood may be increased. Mackenzie Wallis found that in acute cases the normal 20-50 mgm. per 100 c.c. of blood rose to 100 or to 150 mgm. According to MacLean and De Wesselow there is generally some retention of urea in early acute cases, whilst in severe cases as much as 600 mgm. of urea per 100 c.c. of blood may be present. A fatal result was

observed in every case when the amount exceeded 300 mgm. They consider the estimation of urea in the blood affords valuable information as to prognosis.

Estimation of the chlorides in the plasma in war nephritis have been made by MacLean and De Wesselow, and by Keith and Thomson. The former found very slight changes in the chlorides of the plasma, while some distinct variations were observed by the latter. Trevan found the chlorides in the blood to be above the normal in four cases examined.

The diastase test has been applied to the urine, and in fifty cases Mackenzie Wallis found marked diminution or absence in thirty-one; eight of these had no diastase in the urine at all. On the other hand those with normal output were all convalescent. He noted that where low values persisted the patients showed a tendency to relapse. MacLean and De Wesselow found that a low diastatic value was associated with nitrogen retention. Patients in the early stage of the disease with a low diastatic value did not as a rule do well. Adler employed the diastase test along with phenylsulphone-phthalein test and found them of great value in prognosis. The two tests were generally in agreement, but sometimes the latter was more helpful, showing the approach of uræmia in the absence of clinical symptoms.

Some œdema is usually present in the early stages, but cases occur without any œdema. Ameuille and Parisot put these latter cases in a separate class which they call pure azotæmic cases. They are more severe and hæmaturia may be present.

MacLean and De Wesselow found that in the early stages all the functions of the kidney are more or less affected; cases occur to which they apply the terms azolæmic and hydræmic. In the former there is nitrogen retention in the blood with a low concentration of urea in the urine and low diastatic value, and there is evidence of involvement of the cardiovascular system. There is no œdema and albuminuria is small in amount. In the latter type œdema is present and there is retention of chlorides and a large amount of protein in the urine. There is no nitrogen retention, the diastatic value is high, and there is no affection of the cardiovascular system.

Acidosis is present in some cases and is closely related to impaired renal function, and appears to depend on the degree of damage to the kidneys. There is no evidence that the marked dyspnœa which has been evident in war nephritis cases, even in the early stage, is due to acidosis.

According to Langdon Brown the blood-pressure is variable, but usually raised, and the most favourable condition is a moderately raised pressure at the outset falling fairly quickly to normal. Most writers agree that the blood-pressure falls as the œdema disappears, and is usually followed by a subnormal value.

All the important results of kidney insufficiency and the associated functional disturbances recognized as occurring in the acute nephritis of civil life have been found to be present in war nephritis.

Lesions in other organs were found by Shaw, Dunn and McNee. In the

lungs a change was often present in the infundibula and small bronchioles. These were dilated and had lost their epithelial lining, their walls were swollen and hyaline-looking, and were covered with material resembling fibrin. In many of the capillaries of the damaged infundibula hyaline thrombi were present. This lesion did not correspond with any usual type of bronchitis and rather resembled that produced by an irritant gas such as chlorine, though the action of gas could be excluded in most instances. The change was comparatively common, being well marked in eight out of twenty-three cases and in a less degree in eight others. If nephritis is due to infection it may indicate the entrance of the infecting agent; in any case it may be related to the dyspnoea which is so marked a feature in the disease. Capillary hæmorrhages were found in two out of twelve cases and were confined to the white matter of the cerebrum. Herxheimer records a case which in the third week of the disease had difficulty in breathing, followed by coma and death. In the roof of the fourth ventricle there were numerous capillary hæmorrhages suggesting some toxic change in the blood-vessels.

The real cause of war nephritis has not been discovered. Exposure to cold and wet might cause the disease, but the established facts do not support the view that exposure is concerned in the origin. The disease is common only in the late winter months and steadily increases through the summer. A similar occurrence was noted in the American Civil War. In other wars, too, there was equal exposure without its occurrence. Langdon Brown obtained a history of exposure in only twenty out of fifty-eight cases, and the experience of most observers with the English and French armies corresponded with this; apart from this there is no evidence that glomerulo-nephritis can be produced by exposure alone.

There was no evidence that water supply was in any way related to the disease.

Considerable importance has been attached to the food supply. McLeod and Ameuille consider that excess of protein diet, along with deficiency of fresh vegetables brings about a sort of scorbutic or fragile condition of the kidneys with albuminuria, and this passes into a nephritis of mild degree. They found that the excretion of urea by English soldiers was much higher than by the French soldier, and albuminuria was more common in the former; nephritis appeared later and was less severe in the French than in the English armies. It might be admitted that an excess of protein would make the kidneys less resistant to any toxic or infectious condition, but it was pointed out that the officers had as much protein in their diet as the men, and in the later stages of war the proportion of protein in the diet was much diminished.

In connexion with the existence of albuminuria MacLean found a similar frequency in men under training, a little over 5 per cent in 50,000 men examined. It showed no tendency to increase on service or to be followed by injurious effect on the kidneys, and he concluded that war nephritis

was not due to training but to some cause chiefly operative in the fighting area. Several German writers laid stress on the importance of diet in connexion with war nephritis. Mackenzie Wallis found on examination of the urine no evidence of intestinal toxæmia in war nephritis; there was no increase in the ethereal sulphates as a whole, and indican was not found in more than normal traces. The urobilinuria so often associated with intestinal putrefaction was not observed.

As the war proceeded and cases increased, the theory that war nephritis was due to an infection received more and more support. The examination of catheter specimens of urine has not revealed the common presence of any pathogenic organism. The urine is usually sterile. Blood cultures have also failed to reveal any bacterial growth in war nephritis.

Rose Bradford found that bronchitis was present in 30 per cent of the cases of war nephritis and was the only frequent illness prior to the onset of dropsy. It is possible that the unknown virus may enter by the respiratory passages, and it either tends to cause bronchitis or is aided in gaining a foothold by the presence of bronchitis. This is pure speculation, but the peculiar lesion observed in the infundibula of the lung by Shaw, Dunn and McNee may be of considerable importance in this connexion.

The suggestion that war nephritis is suppressed scarlatina was put forward at a comparatively early period, but for this there was no support; there was no characteristic throat lesion or desquamation. Kayser speaks of the disease as scarlatinoid nephritis and considers it is an independent infective disease probably louse-borne.

On inquiry Shaw, Dunn and McNee could find no evidence of the occurrence of war nephritis among the civil population, though the troops mixed freely with them. Some cases occurred amongst orderlies at the base, and this would suggest that if it is an infection it must be carried in some special manner obtaining among the troops, possibly that it is vermin-borne in a manner analogous to trench fever, but of this there is no definite evidence.

In reviewing the evidence bearing on the ætiology of war nephritis Dr. Robert Muir concludes that two main possibilities emerge. The first is that the disease is the result of concomitant factors—bronchitis or other bacterial infections aided by the diet, exposure, and so on. The second is that it is the result of a specific infection of unknown nature and origin, though possibly a filter-passing virus. It is difficult to regard the first as satisfactory when all the facts regarding war nephritis in relation to nephritis in general are considered. The second would accord better with the definite clinical symptoms, the incidence of the disease, and the early lesions in the kidneys, but cannot be regarded as much more than a probability.

In his article on Nephritis in Diseases of the War, Sir John Rose Bradford pointed out that the number of cases steadily increased throughout the year 1915, the highest incidence occurred in November and December, but the rate was also high in June, July, and August. In 1916 the highest rates were observed in the winter months. The rates were especially high from

December, 1916, to March, 1917, but during this period respiratory diseases were very prevalent, especially bronchitis and lobular pneumonia. Rose Bradford stated that from MacLean's observations it was evident that in the great majority of cases nephritis occurred in men whose urine was known to be free from albumin a short time before the onset of disease, and that it could not be regarded as an exacerbation of a previously existing chronic lesion. Further, the previous existence of albuminuria cannot be regarded as an ætiological factor of importance. Sir John wrote that perhaps the most striking fact in the ætiology of the disease was the immunity of the native Indian troops. Nephritis was practically unknown among these troops in France in 1915; although large numbers of Indian sick in three large hospitals were under his observation he saw no case of the disease amongst them. These troops suffered severely from the hardships of the campaign in 1914-15; more especially from maladies due to exposure to wet and cold, such as bronchitis, lobular pneumonia, and trench foot. Notwithstanding the severity of the respiratory disease, especially bronchitis and pneumonia, nephritis did not occur. This immunity of the native troops is most difficult of explanation, since the only difference between them and British troops, putting aside the question of race, is that their diet and clothing were different, yet there was no evidence to support the view that the disease had a dietetic origin in the British troops. On the other hand the absence of the malady amongst the Indians is undoubtedly an argument against the disease being due to an infection, probable as this is on other grounds; at the present time no satisfactory explanation of the immunity of the Indian troops is available. The case of these troops also throws some doubt on the view that nephritis was the result of some respiratory infection, since, as mentioned above, respiratory affections were prevalent amongst the Indians.
