

## ENDOCARDITIS LENTA.

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THE most important recent advance in the investigation of the many conditions to which the term malignant endocarditis is applicable consists in the recognition of the fact that there is a special type of that disease which is caused by a specific organism, and recognisable, both by its clinical manifestations and by its pathology, as an independent morbid entity.

In pre-bacterial days the only classification of malignant endocarditis that was possible was based either on the clinical symptoms that predominated, or on the rapidity with which the symptoms developed and proceeded to a fatal termination. Septic typhoid, cerebral, and cardiac types were recognised on the one hand; acute, subacute, and chronic varieties on the other. As soon, however, as bacteriological examination of the blood and, in fatal cases, of the diseased cardiac valves became general, it was found that many of the pathogenic microorganisms were capable of setting up an endocarditis of malignant type. In consequence, staphylococcal, streptococcal, gonococcal, influenzal, &c., varieties were dis-

tinguished, but until lately it was not recognised that the exact type of symptoms and pathological lesion produced might vary with the actual organism present. Indeed, as far as general knowledge goes, it is probable that many different organisms are capable of producing the ulcerated valves and general symptoms that are met with in the hyperacute and acute varieties of the disease.

Through the researches of Schottmuller, Lippmann, and others it has now, however, clearly been demonstrated that the type of malignant endocarditis, to which the term subacute is properly applied, is caused by an organism which is specific for the infection, and that the symptoms and pathological lesions present are special to this infection. It is this variety of malignant endocarditis that has been named "endocarditis lenta" or "subacute infective endocarditis."

The organism that causes it was first described by Schottmuller in 1903, and was named by him the streptococcus viridans. It is now suggested that a more appropriate name would be the "endocarditis coccus." Its former name was given to it, from the fact that it grows on blood-agar with the production of a distinct green pigment. By some bacteriologists it is regarded as a modified pneumococcus, but it more probably occupies a position midway between the pneumococcus and the streptococcus pyogenes. In pathogenic properties it is much less virulent than the streptococcus pyogenes. It is a small, Gram-positive coccus, which has no capsule, which produces fairly long chains when grown artificially, and which does not ferment inulin. Its further characteristics will be mentioned in describing the organism isolated from the case, which forms the subject of this short communi-

cation. The normal habitat of the streptococcus viridans is probably the intestinal tract.

The clinical symptoms of endocarditis lenta as described by Lippmann, Major and others are as follows : In almost all cases there is a previous history of rheumatic fever ; at times the cases, even when well developed, may resemble subacute rheumatism. The onset is very insidious with lassitude, dyspnoea, and vague pains ; mild intermittent pain is constantly present ; the spleen is enlarged and painful, due to the presence of infarctions ; muscular pains and joint pains with swellings are often present ; painful cutaneous erythematous nodules may occur, and petechiæ in the skin are frequently met with ; there is almost always more or less pronounced anæmia, and usually a moderate leucocytosis ; albuminuria is constant, and hæmaturia also is generally present ; sweating, vomiting, and diarrhoea may occur ; and occasionally emboli occur in the brain. The disease is a very serious one, almost all cases ending fatally, the average duration from the beginning of symptoms being about six months. Recently, Lippmann has brought forward evidence to show that some cases may, at any rate, temporarily recover, but as a rule serious renal lesions persist and ultimately prove fatal.

The pathological changes found in the heart are characteristic of the disease. The mitral valve is the one most frequently involved. Ulceration of this valve is rare, but yellowish vegetations are abundant, and extend up to the wall of the auricle and down along the chordæ tendineæ—the latter being occasionally ruptured. The lesions of the aortic valve are more variable, sometimes ulceration being found, and sometimes large masses of greenish or yellowish vegetations. Extensions from the aortic valve to the ventricular wall, and to the ventricular aspect of the

mitral cusp are frequent. A beautiful series of hearts illustrating the various stages of the process was shown at the recent International Congress of Medicine in London.

The condition of the kidneys is regarded as a characteristic feature of the disease, and is produced by small bacterial emboli lodging in the capillaries of the glomerular loops. In the earliest stage, swelling of the epithelial cells in some of the glomeruli is met with; necrosis of these cells follows, and still later hyaline transformation. Healthy glomeruli are always to be met with side by side with the diseased ones. Parenchymatous degeneration of the tubular epithelium may also be present, as a result of the general toxæmia. Microscopically, the kidney is enlarged, and the surface presents a flea-bitten appearance. The condition may properly be defined as embolic glomerular nephritis. A typical kidney of this sort occurred in a case of mine a couple of years ago, and was shown to the pathological section of the Academy. The case in every way corresponded with the case of endocarditis which I am about to describe, but blood cultures during life were negative, and it was only *post-mortem* that cocci were found in the diseased cardiac valves. On the other hand, in a recent case of hyperacute gonorrhœal endocarditis the kidney lesions were of quite another description. In addition to the changes produced in the kidneys by small capillary emboli, infarctions, which seldom suppurate, may be met with in other organs, more especially the spleen.

To sum up, "endocarditis lenta" is a subacute variety of bacterial endocarditis, caused by the streptococcus viridans. Pathologically, it is characterised by special endocarditic lesions, and by a special form of embolic nephritis; clinically, by the group of symptoms that have

already been detailed. The following case, which recently came under our notice, and in which the streptococcus viridans was isolated during life, further illustrates the character of the disease :—

CASE.—L. S., aged twenty-five, married, was admitted to hospital complaining of pains in her joints. During the previous four months she had felt out of sorts, and had suffered from frequent attacks of faintness. Three days before admission the pains in her joints had set in acutely. She had suffered from rheumatic fever when sixteen years of age, and had had at least three other attacks prior to her present illness.

On admission, her left ankle and knee were swollen and tender, and she complained of pain on movement of the shoulder and elbow joints. The heart was enlarged, and a typical mitral systolic murmur was present. There was some hypostatic congestion of the bases of both lungs; the liver was slightly enlarged, the spleen just palpable and tender, and there was a moderate cloud of albumen in the urine with a very few hyaline casts. Her colour was bad, tongue furred, teeth septic, motions normal, mental condition extremely dull, temperature 101° F.

She was at first regarded as a case of subacute rheumatic fever, and salicylates were prescribed with the result that her temperature fell, and the pains and swellings in her joints disappeared; but a day or two subsequently her temperature again rose, and, as her aspect suggested the existence of bacteriæmia, Dr. Stokes was requested to make a blood culture. He reported that streptococci of the type known as streptococcus viridans were present in the blood in large numbers.

Pending the preparation of a vaccine, 10 c.c. of polyvalent antistreptococcic serum were injected on the eleventh day of her stay in hospital, and on the next day 25 c.c. of the same serum were given. A streptococcic vaccine was then started, an initial dose of 6,000,000 cocci being given. This dose was repeated at intervals of two days for three doses; the dose was then increased to 12,000,000, and later to 18,000,000. In all, fifteen injections of vaccine were given, but neither

serum nor vaccine seemed to exert the slightest influence on the progress of the disease. The patient died on the forty-sixth day after admission to hospital.

Her symptoms during the progress of the case remained much the same as at the time of admission, but the following additional points may be noted. The temperature throughout, until the last week of her illness, was of a septic type, being usually subnormal in the morning, and from  $101^{\circ}$  to  $102^{\circ}$  at night. During the fourth week, a loud double aortic murmur developed, in addition to the mitral systolic murmur, and persisted. The albumen in the urine increased enormously, reaching as high as 12 parts per 1,000, and on several occasions blood appeared for a couple of days, and again cleared off. At no time were casts abundant. Blood counts showed moderate leucocytosis, the highest count recorded being 17,000 white cells per c.mm., but more frequently the number was between 12 and 13 thousand. The red cells numbered 3,000,000 about the middle of her illness, and the hæmoglobin 60 per cent. The differential count of white cells was normal. The spleen increased in size as the illness progressed. Numerous small petechiæ, resembling flea-bites, occurred all over the body. Her mental state showed the most typical euphoria I have ever encountered.

Dr. Stokes, who examined the blood, and made the subsequent *post-mortem* examination, reported as follows:—

Ten c.c. of blood were withdrawn from a superficial vein into sterile citrate solution; this was immediately added to fluid agar, and plates were made. There were innumerable colonies on the next day in a series of six plates. They showed a typical grass-green halo round each colony. The cocci were Gram-positive, and grew in long chains. Subcultured on the surface of blood-agar they produced the characteristic green colour, and grew quite freely in moist, rather sticky colonies. The sugar reactions were as follows:—Cane sugar, glucose, lactose, inulin, and salicin were fermented, while mannite and raffinose were not, and milk was rapidly clotted.

These are the reactions specific for the typical streptococcus viridans, but differ in the fermentation of inulin. The coccus did not, however, cause precipitation of His's inulin

serum medium, thus separating it from the pneumococcus. The cocci were somewhat elongated and lanceolate in shape.

A second culture was taken a few days later: 1 cc. of blood accurately measured produced 201 colonies of the streptococcus in two days. There was no opportunity for the cocci to multiply before they were plated out, because the plates were made at the bedside. The *post-mortem* cultures from the heart-blood yielded the same organism: a positive result also was obtained from plating out the urine, but cultures from the spleen and kidney were negative.

*Post-mortem Examination.*—There was a small amount of fluid in the pericardium. The heart was small and soft; there was no pericarditis. Typical chronic mitral endocarditis was present with ulcerative endocarditis superadded. Vegetations extended up into the auricular wall. The aortic valves showed massive vegetations, which were distinctly green in colour, and no old endocarditis. The lungs were quite normal, the liver somewhat congested; the kidneys were large and pale, with many small hæmorrhagic patches in the cortex; microscopically, they showed extensive glomerular degeneration, and fibrosis with hyaline degeneration of the tubules. The spleen presented several massive white infarcts, and small smaller ones. Sections of the heart valves showed innumerable chains of cocci.

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THE PRESIDENT thanked Dr. Moorhead for his contribution, as he considered it a distinct acquisition to know that this definite type of endocarditis had a definite coccus as its recognised cause. A point which came into his mind was that when a case came into hospital with an old cardiac lesion one was prone to assume that the patient was tired from the effects of his old disease, whereas he might have a new endocarditis.

SIR JOHN MOORE and DRs. NESBITT, CROFTON, and O'KELLY discussed the condition.