Malignant Endocarditis during Pregnancy: with an Illustrative Case.*

By Sir J. Halliday Croom, M.D., F.R.C.P. (Edin.),
Professor of Midwifery, University of Edinburgh.

Malignant endocarditis, under which term I include all cases of severe acute endocarditis whether attended by actual ulceration and loss of substance of the endocardium or not, is unfortunately only too well known in connection with the puerperal state. Puerperal infection is mentioned as a possible cause by all writers since the disease was identified, and a glance at the literature of the subject suffices to show how well founded this statement is. The disease itself is actually about three times as common in the male sex as in the female. But of 49 fatal cases occurring in the female, in the statistics of Kanthack and Kelynack, we find eight put down to puerperal infection—an average of rather more than 16 per cent. On the other hand the occurrence of malignant endocarditis in pregnancy is a rarity. In his Goulstonian lectures on malignant endocarditis, Osler mentions four cases as having occurred in pregnancy. In addition to these, I have been able to find only two more cases, after an extensive, if not exhaustive, search through the literature.

The mode of onset, the symptoms, and the course of malignant endocarditis are all so diverse that it is not possible to draw a clinical picture that will fit every case. Two types are in general recognized —the typhoid type, and the intermittent, septic or pyæmic type. These again are subdivided into cardiac and cerebral varieties, according as the predominant symptoms are cardiac or cerebral. Actually, however, we find cases which link these different types and varieties together by innumerable gradations.

The typhoid type is much the more common. In it we have irregular temperature, sweatings, great prostration with low delirium and somnolence, in short, a typhoid state.

In the pyæmic or septic type, which is that usually found in puerperal cases, we have practically an acute septicæmia, with rigors, high and irregular temperature, and sweatings. Occasionally the temperature curve is exactly like that of a quotidian or tertian ague.

* Read at a meeting of the Edinburgh Obstetrical Society, June 13th, 1906.

In the cardiac group we may find any and every variety of cardiac distress and failure. The symptoms of the cerebral group simulate closely those of meningitis.

Finally, in any of the forms we may have symptoms of embolism occurring—hemiplegia, and infarction of the spleen, kidneys, lungs, etc.

The condition of the heart itself may be misleading. Murmurs may not be present at all. Or they may be heard in any area and of any variety. Systolic murmurs at the apex are perhaps the most common. The heart sounds are of course weak, especially the first, and there may be reduplication of the second. The pulse is usually weak and irregular.

It is obvious therefore that there is a wide field for error in the diagnosis of this condition. In particular the differential diagnosis is from pyæmia, typhoid fever, and acute general tuberculosis.

From the first of these, pyæmia, it is not easy to diagnose the condition. They are more than closely allied. Malignant endocarditis is indeed, as Wilks has said, an "Arterial pyæmia." The occurrence of embolic symptoms of course clears up the diagnosis in any case. While the common irregularity in the temperature and the possible presence of cardiac pain are points to be borne in mind in distinguishing the condition from typhoid.

The following is the record of a case of malignant endocarditis which occurred in my hospital practice last winter.

Mrs. B., aged 23, a primigravida, was admitted to the Royal Maternity Hospital, Edinburgh, on November 16th, 1905; she was suffering from albuminuria and dropsy, and was five weeks from full term.

History. Six years ago she had a severe attack of pneumonia. Since then she had suffered almost constantly from dropsy of her legs, with palpitations and breathlessness. When these symptoms became well marked, her menstrual flow ceased, and under rest and the administration of Blaud's pills, her condition markedly improved. When she became pregnant in March, 1905, she was fairly well, having been at work as a domestic servant for the previous year; but during her pregnancy dropsy of the legs, with palpitation and shortness of breath, began again to trouble her.

On October 5th, when six months pregnant, she had a shivering fit, with intermittent pains in the back and abdomen, and vomiting. For the first time her face and hands became swollen. The attack passed off in a day or two, and since then she was not

confined to bed; but her urine became less in quantity, and gave her pain whilst being passed; she passed urine about six times in twenty-four hours.

The patient had had no disturbances of vision or hearing, and no fainting. She occasionally had headache and vomiting, a so-called "bilious attack."

On admission, it was noted that the patient was a well-developed woman, of ruddy complexion, and well nourished. Her breathing was easy when she lay at rest, but became embarrassed on slight exertion. Her pulse was 78, regular, of good volume and moderate tension, and the arterial wall was just palpable. Her temperature was 98·4°F. There was slight dropsy of the lower limbs, but none of the rest of the body. Her urine contained 2·2 grs. of albumen and 7 grs. of urea per oz. The specific gravity was 1017; no casts were found.

There was a blowing systolic murmur at the base of the heart well heard also in the tricuspid area; no murmur was audible in the mitral area.

The abdomen presented the appearance of an eight months' pregnancy, and the fœtal heart was heard distinctly.

Patient was comfortable and quite free from pain.

November 17th. In the morning, the patient had slight sickness and headache. During the day her temperature rose from 99°F. to 103°F. Her pulse was 126, but continued regular and of good amplitude. No change in the cardiac murmurs could be made out. The œdema became very marked, so that the outlines of the face were scarcely recognizable; there was fluid in the abdomen with œdema of the whole subcutaneous tissues; 28 fl. oz. of urine were passed during 24 hours. There was scarcely any perspiration although the patient was surrounded with hot bottles. She complained of nothing except slight headache.

November 18th. The dropsy was slightly less in the morning, and gradually diminished during the day. The morning temperature was 101·5°F., the evening 102·5°F. There was a painful, tender, erythematous patch on the upper part of the right thigh. The urine was about 30 fl. ozs. per diem, and the analysis was as follows:—acid, specific gravity 1027, albumen 24·0 grs., and urea 8 grs. per fl. oz., a little blood and a few epithelial casts. There was still very little sweating.

Examination of the heart and lungs showed no change. The percussion note over the abdomen was tympanitic as low down as midway between the umbilicus and the symphysis pubis.

Early labour-pains began in the afternoon, and gradually increased in severity.

November 19th. Patient slept fairly well. She vomited at 6 a.m. and at 10 a.m. The vomit was for the first time chocolate coloured and contained blood; 30 fl. ozs. of urine were passed in 24 hours, containing 10½ grs. urea per fl. oz.; on being boiled the urine became solid with albumen. The temperature fell to 101°F.; the pulse was 106, regular, and of good volume and tension. The dropsy had practically gone, and except for the labour-pains, patient was quite comfortable.

At 12-30 p.m., patient was examined; the os uteri was fully dilated, the head presenting. Chloroform was given, the membranes were ruptured, the forceps was applied, and labour was completed in half an hour. The child was small, and stillborn; the placenta showed infarcts. The mother took the anæsthetic well, was sensible, and had a good pulse after labour. Pulse 96, temperature 100·4°F.

During the day patient was restless, but had no pain. She was frequently sick, and vomited: the vomit contained no blood. Her temperature rose to 102°F. in the evening; and her pulse (130) became irregular especially in amplitude. She slept occasionally during the night, and the vomiting ceased; but the temperature rose, the pulse became more irregular, and dropsy became very marked. At 9 a.m. the pulse became imperceptible at the wrist, and at 10 a.m. the patient died in a state of extreme cyanosis.

The treatment was directed mainly to obtaining free diaphoresis, diuresis, and movement of the bowels, to allaying the sickness, accelerating the labour, and in the later stages stimulating the heart.

Summary of post mortem report. "Septic endocarditis of aortic and mitral valves, which were the seat of a chronic endocarditis. Acute myocarditis, chronic adherent pericarditis. Acute toxic changes in all the organs. No evidence of septic infection of the uterus."

The post mortem examination was made 24 hours after death, by Dr. Lyon. The body was in a condition of general "rigor mortis," and presented a degree of universal anasarca, such as one rarely sees in the post mortem room. On incising the skin and subcutaneous tissues clear serous fluid welled freely from the sodden, œdematous tissues. The abdomen was very much distended and the peritoneal cavity contained about 300 fl. ozs. of clear serous fluid. The presence of this quantity of fluid in the peritoneal cavity exerted a degree of compression sufficient to cause collapse of the whole extent of the small intestine; the stomach, on the other hand, was enormously

distended with flatus and fluid, being in a condition of acute dilatation, a condition which one may regard as the result of the compression and collapse of the small intestine, inasmuch as the free outflow of the stomach contents into the duodenum and small intestine was thereby prevented or at least hindered.

Examination of thorax and contents. The anterior border of the left lung was firmly adherent to the anterior surface of the pericardial sac. The pericardial sac was completely obliterated, a condition of general adherent pericarditis being present. The pericardium was bound to the posterior surface of the sternum by firm, fibrous adhesions.

Both pleural cavities were completely filled with clear, straw-coloured, serous fluid. There were no fibrous adhesions between the pleural surfaces, and there was no evidence of recent pleurisy.

The bronchi were not enlarged, and there were no tuberculous foci. The apices and anterior borders of both lungs were emphysematous, and the lower lobes were in a condition of recent collapse. The other lobes were extremely œdematous and congested, but no pneumonic consolidation could be anywhere detected. There were no areas of infarction. The bronchi were filled with watery mucus, and the mucous membrane showed a condition of chronic venous congestion.

The congestion of the pericardial sac has already been noted. The right cavities were dilated and filled with a mixture of post mortem and yellow gelatinous agony-clot. The left cavities, especially the left ventricle, were also dilated and contained a less amount of a similar clot. The endocardium of all the cavities and the intima of the blood vessels were deeply blood-stained. The pulmonary and aortic valves were competent, but the mitral and tricuspid orifices were slightly dilated. The cusps of the aortic and mitral valves showed a slight degree of fibrous thickening, and both were the seat of an acute endocarditis, the vegetations on the mitral cusps being larger and more numerous than those on the aortic cusps. The left ventricle was much dilated, and its wall was thin, pale, and flabby, being evidently in a condition of acute myocarditis.

Abdominal organs. The liver was extremely soft and friable, and presented a uniformly pale yellow colour; the appearance indicating the presence of a very diffuse necrosis rather than fatty degeneration.

The spleen was much enlarged and was very soft. On section it appeared exactly like a mass of recent blood-clot. There were no areas of infarction, recent or old.

To the naked eye the kidneys presented the picture of a very acute nephritis. The superficial and deep cortex was enormously swollen and of a pale yellow colour. The capsule stripped freely, the branches of the renal artery were not thickened, and there was no macroscopic evidence of any chronic change. There were no infarcts.

The stomach was acutely dilated. There were no areas of infarction, but there were numerous petechial hæmorrhages in the mucous membrane. The intestines showed nothing abnormal beyond collapse, and pallor of their coats.

The supra-renal gland showed numerous hæmorrhages in the medulla.

The mucous membrane of the bladder was healthy. There was no evidence of cystitis.

The fundus of the uterus lay in the inter tubercular plane, and its wall felt soft and flabby. On incising the organ the cavity was found to contain a small amount of recent blood-clot, and the lining membrane, after removal of blood-clot, presented a healthy appearance with the exception of several small areas in the placental site, which, to the naked eye, appeared necrotic. The areas were removed for microscopic and bacteriological examination. The odour of the uterine contents was not offensive. From the naked eye appearances one would say that the uterus had not been the seat of a septic infection. There was no laceration of the cervix. Some of the veins in the broad ligament contained a recent thrombus.

Bacteriological and microscopic examination of the tissues. Sections of the affected valve segments of the heart show the presence of numerous staphylococci in the adherent vegetations and in the tissues of the segments.

The muscle fibres of the heart wall show cloudy swelling and in places fragmentation. There is œdema of the interstitial tissue, with here and there aggregations of lymphocytes.

The liver shows a very diffuse necrosis of its cells, throughout the whole extent of the lobules. There is very little fatty degeneration. There has been a pre-existing fine cirrhosis, but the portal spaces are not infiltrated with leucocytes.

The kidneys show a very intense acute catarrhal nephritis. There is no evidence of precedent kidney change. No micro-organisms can be discovered in any of the organs. In the necrotic-looking pieces of tissue removed from the uterus no micro-organisms can be discovered, the tissues being infiltrated with altered blood pigment.

That the infection in this case took place before delivery was rendered clear no less by the clinical history than by the post mortem examination. The patient was eminently susceptible to such an infection, for two conditions were present which markedly predispose to malignant endocarditis. She had chronic valvular disease of the heart, a condition present in more than 75 per cent. of cases of this disease. There was a well-marked history of chlorosis, an important predisposing factor, and this was no doubt aggravated by the physiological anæmia of pregnancy.

The course of the disease was excessively short. The disease was of the "cardiac" type, which usually runs a course of weeks or months. The attack of October 5th was perhaps only nephritic, for the patient was tolerably well in the interval, and her temperature was normal for fully 24 hours after her admission to hospital. At the same time we must not overlook the possibility of its marking the first onset of the acute endocarditis. A study of the course of a number of such cases shows many instances in which were long periods of complete latency of all symptoms. Thus Dreschfeld (*Brit. Med. Journal*, for 1887, vol. ii., p. 998) records a case where for five months the only symptom was a slight occasional rise of temperature. This was followed ultimately by two successive hemiplegic seizures from embolism, and death. The autopsy showed the presence of an acute septic but non-ulcerative endocarditis, evidently dating from the time when the temperature began to rise.

The disease, as far as could be determined, however, lasted only for four days. This rapidity, of course, is the rule in cases occurring in pregnancy; and usually abortion occurs before the end. In this case there were three reasons, in particular, for its early termination. First, there was the repeated strain thrown upon the enfeebled heart by the frequent attacks of nausea and vomiting. Secondly, there was the malnutrition consequent upon the peculiar condition of the stomach and intestines. The increased intra-abdominal pressure appeared to have caused collapse of the intestine, with secondary acute dilatation of the stomach. Probably this condition began on the day after the patient's admission to hospital. The abdomen was then distended not only by the accumulation of dropsical fluid, but by the presence within it of the pregnant uterus. The acute distension of the stomach would thus account for the persistent sickness, and for the excessive abdominal tympanites observed on the 18th of November. Inanition, lasting for three days, must have hastened the end. Thirdly, the strain thrown upon the heart by labour was followed by a rapid increase in

the severity of the symptoms. For the 24 hours before labour the temperature, pulse, and general condition of the patient improved; after labour they steadily became worse, and within 24 hours death ensued from acute cardiac failure.

It is worthy of note that the typical symptoms of the disease were not present. There were no rigors or sweatings—indeed, there was a distinct diminution of perspiration; there were no cerebral symptoms; there was no pain in the joints; there was no dyspnœa or palpitation; and there were no embolic phenomena. The absence of these does not appear to be associated with the fact that the woman was pregnant, for some cases are recorded in which for the first few days no indication of the disease was present except an elevated and irregular temperature; thereafter symptoms developed, and it is probable they would very soon have done so in this patient but for her sudden death.

For purposes of diagnosis the cardiac murmurs were as usual not of the first importance, for slight changes were obscured by the œdema of the chest wall, the respiratory embarrassment, and the adherent pericardium.

The infection was staphylococcal. Frequently the mode of entrance of the organism is obscure; in this case it may have been through a small ulcer on the inner side of the right thigh, or it may have been one of those rare cases of primary idiopathic endocarditis—so called, doubtless, merely because the mode of entrance of the organisms is unknown.

Let me now glance very briefly at some of the other recorded cases of malignant endocarditis in pregnancy.

In the *Charité Annalen* (Berlin), 1878, Litten records a case of ulcerative endocarditis in pregnancy. The patient had previously had acute rheumatism and had acquired chronic endocarditis. In the eighth month of her sixth pregnancy she had an apoplectic seizure, and was paralysed over the entire left side. When Litten saw her, 17 days later, the right side of the heart, and the spleen were enlarged. Albuminuria and retinal hæmorrhages were present. On the following day she was spontaneously delivered of a living child. There was moderate bleeding. This was followed by the sudden onset of paralysis of the right side, and death.

At the autopsy septic emboli were found in both sides of the brain, affecting the motor areas. Fresh and old infarcts were found in the spleen and kidneys. The uterus and annexa were normal.

Another case is reported in the *Bulletin de la Société Anatomique de Paris*, in 1879, by Guyot. Patient was 37 years old and had not

had rheumatism or any other disease which would predispose to endocarditis. She was in the fifth month of her first pregnancy. She complained of feverish attacks and rigors followed by sweating. The only objective sign was a double murmur audible in the præcordia, lasting through the period of the whole cardiac cycle, and Guyot was unable to determine whether it was endocardial or pericardial in origin. Quinine was given in large doses, and after two days the patient was delivered of a five months' fœtus. The abortion was attended with considerable hæmorrhage, and the patient gradually sank and died a week later.

The autopsy showed a large recent vegetation on the mitral valve. The spleen and kidneys showed infarcts at least a month old, corresponding to a time when there were no subjective symptoms. The condition of the uterus and annexa is not specified.

Guyot considered that the disease "originated under the influence of pregnancy."

In the *Lancet*, January 20th, 1894, p. 155, Dr. Burgess records a case of malignant endocarditis in a maried woman aged 30 years, who was six months pregnant. The chief interest lay in the obscurity of the case from the first, and in the fact that it differed in its symptoms from the description of recorded cases. The prominent symptoms were pains of a lightning character, shooting in paroxysms from the inside of the knee to the base of the abdomen, and a fixed pain at the symphysis pubis. There was also after a time paralysis of the bladder. The temperature was 101°F., and a murmur was apparent from the first in the mitral area, substitutive in character. Miscarriage took place on the 7th day, but as the sequelæ gave rise to no fresh symptoms, it was not regarded as a complication. On the 12th day embolism of the left cerebral artery occurred, followed by rapidly increasing coma and death on the 20th day. The remarkable points were:—

(1) The murmur which was present from the first, without any previous history of rheumatism.

(2) The nervous phenomena, which were the distinct features.

(3) The temperature, which was of the continuous type.

(4) The difference from the ordinary forms of pyæmia, cerebral, cardiac, or septic.

(5) No occurrence of emboli took place till the 12th day, and there were no signs of renal or splenic embolism the whole time.

(6) The peculiar absence of perspiration.

In the *Medical Chronicle* (Manchester) for 1896, p. 14, Kelynack records a case of a woman, aged 29, who was brought to hospital with

severe cardiac dyspnœa, and died shortly after admission. The autopsy showed pericardial adhesions; sclerosis of the mitral valve; ulceration of the valves and chordæ tendineæ, which were also covered with coarse vegetations. The uterus contained a 5–6 months' fœtus. Placenta and uterine walls were normal. Vagina contained considerable leucorrhœal discharge.

The mere recording of these cases is sufficient to show the wide variety of symptoms that may be presented. Dr. Burgess's case has the one point in common with my own case, namely, the "peculiar absence of perspiration." This is distinctly an odd circumstance, for, as Osler says, "sweating is a very frequent symptom, and is worthy of special notice, from the peculiarly drenching character, second only to ague, and usually far beyond the average mark of phthisis or pyæmia." What the explanation of such lack of sweating is, it is not possible to say.

One cannot agree with Guyot that the disease originates under the influence of pregnancy, unless that statement is to be taken in a very limited sense. Pregnancy may no doubt act as a predisposing factor in virtue of the slight anæmia which it induces, of the increased impurity of the blood owing to the oxidation products of the fœtal metabolism circulating in it, and of the general strain thrown upon the whole maternal organism. But except to this limited extent, pregnancy cannot be looked upon as a factor in the production of endocarditis, and the occurrence of this disease is to be regarded in the light of a rare and accidental complication.