ACUTE SUPPURATIVE PERICARDITIS

With Death from Ruptured Mycotic Aneurysm of the Aorta

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ACUTE suppurative pericarditis is a rare disease, usually resulting from a local cause, or associated with a debilitating illness. The prognosis has been much improved by antibiotics, but treatment is still difficult. The case reported here is one in which suppurative pericarditis was apparently a primary condition; after a protracted illness, the patient died as a result of a complication that has not been previously recorded.

Case Report

The patient, a 52-year-old male pharmacist, was admitted to Sully Hospital on 20.5.61. Six weeks earlier he had noted lassitude and a feeling of vague ill health. Ten days later he developed slight itching in both ears and a dry throat. He was put to bed and was given oxytetracycline 1g./day for five days with some improvement. Eight days later the dry throat and itching in the ears recurred, and were now accompanied by fever and low backache. He was again put to bed and was given benzyl penicillin 1 megaunit/day for seven days, followed by phenethicillin 1g./day and 'virugon'. There was a slight improvement and he was then sent for a chest X-ray which showed a small right pleural effusion. He was therefore admitted to Cardiff Royal Infirmary. Examination there showed the signs of a right pleural effusion, and an enlarged but not tender liver. 200 ml. of blood-stained fluid were removed by pleural aspiration; the fluid contained 99% red cells with 1% neutrophils, and was sterile on culture. The patient was transferred to Sully Hospital for further investigation.

He was a moderately obese man. Though afebrile (T.98°F.), he looked ill and was very distressed and restless. The jugular venous pressure was elevated and showed no pulsation. There was no peripheral oedema. Pulse regular, rate 100/min.; blood pressure 130/90 mm. Hg. A protodiastolic triple rhythm was present; there were no cardiac murmurs and no pericardial friction rub was heard. Examination of the chest showed the signs of a right pleural effusion. The abdomen was very distended and tympanitic; the liver and spleen were not enlarged and bowels sounds were present. The other systems showed no abnormality.

Investigations. Chest X-ray (Fig. 1) showed cardiac enlargement, slight broadening of the mediastinum and a small right pleural effusion. The ECG showed ST-segment changes consistent with pericarditis. Sputum culture gave a profuse growth of *Monilia albicans* together with a coagulase-positive *Staphylococcus aureus* which was sensitive to streptomycin, chloramphenicol and erythromycin. A coagulase negative staphylococcus, almost certainly a contaminant, was

FIG. 1.—Postero-anterior chest X-ray on admission to hospital showing cardiac enlargement, mediastinal broadening, and right pleural effusion.

grown on blood culture. Hb. 9.5 g./100 ml., w.c.c. 24,000/cu. mm. (87% neutrophils). ESR (Westergren) 61 mm./hour. Urine—no glucosuria, but moderate albuminuria with a few hyaline casts but no cells. Blood urea 90 mg./100 ml. Serum electrolytes normal. Serum proteins and electrophoresis—increased gamma-globulin, but otherwise normal. Serum bilirubin 0.5 mg./100 ml. SGOT 75 units. SGPT 100 units. Mantoux reaction—12 mm. induration to 100 T.U. Anti-streptolysin 'o' titre 50 units.

The following were negative: Coomb's test, E.E. cells (x6), virus agglutinations (for influenza, A.P.C., Q. fever, psittacosis, L.G.V., lymphocytic choriomeningitis, and mumps), cold agglutinins, Paul-Bunnell, agglutination reactions for Brucella, and Wasserman and Kahn reactions.

Progress. The patient's distress, the elevated non-pulsating jugular venous pressure, the chest X-ray, and the cardiographic changes all suggested pericardial effusion with tamponade. Aspiration was performed by the subcostal route and 270 ml. of cloudy yellow fluid was withdrawn to the great relief of the patient. Examination of the fluid showed many neutrophils, and on culture there was a pure growth of coagulase positive *Staphylococcus aureus* (phage type 29/52/52A/81), fully sensitive to penicillin, tetracyclines, erythromycin, streptomycin, and chloramphenicol. Treatment had been started with a low salt diet, digoxin and chlorothiazide; in view of the findings in the pericardial fluid, benzylpenicillin 10 megaunits/day and oxytetracycline 2 g./day were also given. The penicillin was continued for 10 days and the oxytetracycline for 21 days.

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FIG. 2.—Postero-anterior chest X-ray after injection of 'Hypaque' showing an intact pericardium with no leakage of the contrast medium.

There was a slow improvement with diuresis and loss of weight, but the venous pressure remained elevated. Distress and restlessness recurred quickly and during the next 20 days seven pericardial aspirations were required, and a total of three litres of purulent fluid was removed. The staphylococcus persisted throughout, and by the tenth day of treatment, sensitivity to penicillin had been lost. Methicillin 6 g/day was then substituted, and streptomycin 1 g./day with I.N.A.H. 300 mg./day were also given lest the condition be primarily tuberculous. By 22nd June, despite apparently adequate chemotherapy, the staphylococcus was sensitive only to methicillin. At this stage, in an attempt to exclude tracking of infection from an extrapericardial source, 35 ml. of 'Hypaque 70' at 37° C. were injected into the pericardium; subsequent X-rays (Fig. 2) showed an intact pericardium. As anxiety was still felt about the diagnosis and the course of the illness which did not seem to be like that of a pyogenic pericarditis, bronchoscopy was carried out on 22.6.61. The right lower lobe bronchus was seen to be compressed, but no other abnormality was observed.

Right thoracotomy (Mr. H. R. S. Harley) was performed immediately after bronchoscopy. The whole mediastinum from the apex of the heart to the azygos vein was densely hard and infiltrated with fibrous tissue. The superior vena cava was dilated and tense and did not deflate when the pericardium was opened. The pericardial sac contained two litres of yellow fluid. The heart was normal in size. The appearances were thought to be suggestive of malignant disease. In view of the necessity for repeated pericardial aspirations, a window was made from the pericardium into the right pleural sac. A biopsy taken from the mediastinum showed organising pericarditis and mediastinitis only.

Post-operative course was uneventful, and no further paracentesis was necessary. On the eighth post-

FIG. 3.—The heart and great vessels. The very severe fibrinous pericarditis is clearly seen. The ruptured false aneurysm is shown by the arrow.

FIG. 4.—Superficial myocardium, epicardium and pericardium (low power, H. and E.). Inflammatory changes involving the superficial parts of the myocardium, thickening of the epicardium, and fibrosis thickening and chronic inflammation of the pericardium.

operative day, the patient suddenly collapsed and died within thirty minutes. There was marked pallor suggesting blood loss. Vigorous attempts at resuscitation were unsuccessful.

Autopsy (Dr. R. M. E. Seal). The pericardium was greatly thickened and showed signs of inflammation; the mediastinum was much indurated. In the right side of the superior mediastinum, there was a fluctuant hæmorrhagic mass, which had ruptured into the pleural cavity above the azygos vein, filling the right pleural

sac with blood. Dissection showed a mycotic aneurysm of the aorta at the junction of the ascending part and the arch. A defect in the aortic wall led to a false aneurysmal sac 3 cm. in diameter, and it was this false aneurysm which had ruptured into the pleura (Fig. 3). The heart was normal apart from the pericarditis. Apart from congestion of the liver, there was no other abnormality; in particular there was no primary source of infection, and there were no metastatic abscesses. Histological examination (Fig. 4) confirmed the presence of an organising mediastino-pericarditis. Numerous Gram positive cocci were present in the sections. There was no evidence of any other disease.

Discussion

The striking signs in this patient were those of cardiac tamponade and not those of an acute pyogenic infection. In the 425 cases of suppurative pericarditis reviewed by Boyle (1961) local or general predisposing factors were present in all, and signs of acute infection were common, though the presence of pericarditis was sometimes unsuspected. In the present case, no source of infection could be identified and there was no local or general predisposing factor. The exact nature of the prodromal illness is not clear; it may have been a staphylococcal infection which was modified but not cured by antibiotic treatment. Septicæmia with pericardial localization may have occurred at this stage though the illness was apparently mild. The presence of a staphylococcus in the sputum on admission lends support to the suggestion of a widely disseminated staphylococcal infection. Throughout the whole illness the signs of infection were inconspicuous, perhaps as a result of partially effective antibiotic treatment.

The absence of striking signs of infection suggested that his pericarditis must have some other primary cause. The findings on bronchoscopy could have been due to carcinoma of the lung and therefore thoracotomy was carried out. Even at operation the infiltration of the mediastinum was so severe as to suggest malignant disease. Pericardial drainage into the pleura was carried out as a symptomatic measure. The pleura was drained by an intercostal drain which was removed after 72 hours. There was no subsequent accumulation of pleural fluid, and there was a marked improvement in the general condition of the patient once drainage had been established.

The loss of sensitivity of the infecting organism was disturbing. It is difficult to offer a complete explanation. The organism was initially fully sensitive and the antibiotics were given in what should have been effective doses; penicillin and streptomycin were given by injection, and though blood levels were not measured it seems likely that effective concentrations were obtained. Apart from a fall of the white cell count to 7,000/cu.mm. there was no suggestion of response clinically and the accumulation of fluid continued rapidly. The growth of the organisms from the pericardial fluid was not affected by treatment. The likely explanation is that the antibiotics were reaching the pericardial cavity in ineffective concentration, and this has been reported with penicillin (Florey, 1952),

and may also apply to other antibiotics although streptomycin penetrates adequately in tuberculous pericarditis. The failure to establish drainage early enough was probably also a significant factor. The combination of penicillin and tetracyclines may have reduced the effectiveness of therapy initially but compared with the other factors this was probably not of great significance, and applied only to part of the illness.

In retrospect, it is clear that surgical drainage ought to have been undertaken much earlier. Treatment of collections of pus without adequate drainage is always unsatisfactory. Resection of a window of pericardium permits free drainage, has few complications, and permits confirmation of the diagnosis. It should be done early (McKusick and Harvey, 1955). Boyle reports an improvement in the mortality from purulent pericarditis from 100% to 25% with the introduction of antibiotics, but his experience emphasizes the importance of surgical drainage in reducing this figure still further. It seems probable that in this case earlier drainage would have prevented the emergence of bacterial resistance. It is also interesting to speculate whether it would have influenced the formation of the mycotic aneurysm and its subsequent rupture.

Mycotic aneurysm has been reported in tuberculous pericarditis (Foley, Probert and Seal, 1956) but it has not been recorded in pyogenic pericarditis. In tuberculosis the aorta may be involved either by hæmatogenous spread (Foley and others, 1956) to the vasa vasorum, or by direct extension from an adjacent tuberculous focus (Maloney, 1955). Rupture of the vessel may follow with or without the formation of a false aneurysm. Lymphatic spread of infection in the arterial wall has been reported by Rob and Ngu (1960) in staphylococcal mycotic aneurysm; Smith and Hutchison (1957) described two cases of mycotic aneurysm, one pyogenic and one tuberculous, which were due to lymphatic spread of infection. In the present case lymphatic spread or direct extension from the mediastinum seem to be the likelier sources. It is difficult to say whether or not early drainage would have prevented the development of this complication. The presence of a broad mediastinum early in the illness suggests that mediastinal involvement was early, and drainage might well have had no influence on the development of the aneurysm.

Summary

A case of staphylococcal pericarditis is described. No source of the infection could be demonstrated. Recurrent cardiac tamponade was striking though the signs of infection were inconspicuous. It is suggested that this picture was due to delay in surgical drainage and partially effective antibiotic therapy perhaps resulting from inadequate drainage. The patient died of a ruptured mycotic aneurysm of the aorta.

We wish to express our thanks to Dr. H. M. Foreman and Mr. H. R. S. Harley under whose care the patient was; and to Dr. R. M. E. Seal who performed the post-mortem and the histological and laboratory investigations.

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PORTAL HYPERTENSION IN THE ABSENCE OF CIRRHOSIS OR OBSTRUCTION IN THE PORTAL VEIN

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PORTAL hypertension in man is usually associated with obstruction to blood flow through the portal vein system either within the liver, as in cirrhosis, or in the vein itself, as may follow neonatal portal thrombo-phlebitis. According to the site of obstruction, portal hypertension is described as of intra- or extra-hepatic origin. Increased resistance to flow through the hepatic veins, as in the Budd-Chiari syndrome, is also associated with a raised portal pressure, and this form has been described as of supra-hepatic origin. Recently a more elegant distinction has been made between portal hypertension of pre- and post-sinusoidal origin, according to whether there is a normal or raised wedged hepatic venous pressure respectively (Taylor and Myers, 1956), cirrhosis commonly giving rise to the post-sinusoidal type and occlusion of the portal vein a pre-sinusoidal type.

There is a group of patients, however, who have portal hypertension with a well developed collateral circulation in the absence of any organic obstruction to flow through the portal vein or its intra-hepatic branches. The following case is an example of this unusual and interesting condition.

Case Report

J. G., a 7-year-old schoolboy, presented at the Central Middlesex Hospital on 31.12.62, with a small hæmatemesis. His past history included measles and mumps but was otherwise unremarkable. He was the middle child in a family of three, born in England of Irish parents. His sisters, aged 12 years and 3 years, and both his parents were well although his mother was said to have mild asthma. His birth was normal, he was not jaundiced in the neonatal period and there was nothing that could be taken for a history of umbilical sepsis with portal vein thrombosis. There was no past history of hepatitis and he had not been taking aspirin

or other drugs prior to his hæmorrhage. He had, according to his parents, been quite well until the day of admission when he vomited three or four clots of bright red blood. He was noted to have a palpable spleen, Hb. 28%, w.b.c. 3,200/cu.mm., platelets 40,000/cu.mm. He was given a transfusion of whole blood and allowed home to await further investigation.

During the following three weeks he remained rather unwell although he complained of no specific symptoms. On 21.1.63 he was admitted to the Whittington Hospital under the care of Dr. S. Yudkin, for investigation, and was found to be clinically anæmic, to have two bruises on his leg and to have an enlarged spleen palpable three finger-breadths below the costal margin. His liver was just palpable but not enlarged, and there were no bruits audible over the liver or spleen.

Investigations: Hb. 45% and 40%, w.b.c. 2,500 and 2,000/cu.mm. (85% neutrophils), platelets 100,000 and 86,000/cu.mm. Sternal marrow biopsy showed a hyper-cellular normoblastic marrow with increase in the red cell precursors. All biochemical tests of liver function were normal and were as follows: S. Bilirubin 0.65 mg./100 ml., S. alkaline phosphatase 12 K.A. units, S. proteins 6.7 gm./100 ml., S. albumin 4.1 and globulin 2.6 gm./100 ml., with a normal electrophoretic strip. Thymol turbidity 2 and zinc sulphate turbidity 6. Prothrombin time 17 seconds (control 15 seconds). Urine urobilinogen normal. A percutaneous liver biopsy was taken with a Menghini needle and was quite normal.

A diagnosis of primary hypersplenism was considered and he was transferred to Dr. T. A. J. Pranker's care at University College Hospital for further investigation of red cell survival. ⁵¹Cr. labelled red cell survival (Dr. P. Toghill) was T_{1/2} 20 days showing slightly decreased survival compared with a normal of 24–26 days. At one stage during the observations there was a rather more rapid fall in blood activity suggesting occult gastrointestinal bleeding. Counting over the spleen showed no pooling or evidence of excessive splenic destruction of red cells. Faecal occult blood testing was strongly positive on two occasions, moderately positive on three