when new buildings were under construction. The operation was delayed for several months while the throat department was being finished. When the surgical quarters became available only four out of forty waiting children required operation. Sutcliffe has observed similar improvement at the Sea Bathing Infirmary at Margate in the health of children waiting for operations which subsequently proved needless. Danischewsky, the honorary secretary of the Russian Committee on Rheumatism, also writes: "Infection [with us] is now considered as a function of three variables, the micro-organism, the macro-organism, and the environment." It is well known that many French authorities are inclined to dissociate from true rheumatism all acute infective conditions.

The use of vaccines must follow the accepted doctrine on infection. Treatment by preparations of gold is still in an experimental stage. Strasser of Vienna and others advocate a "simultaneous therapy" of arthritis by a combination of remedies. This practice is opposed by other authorities, because of the difficulty of interpreting the reactions which are produced. They hold that "in the use of physical remedies, especially baths, the daily reaction is a necessary guide to treatment. The simultaneous use of vaccines or of gold inevitably blurs the picture and deprives the practitioner of essential guidance in conducting the cure.

Conclusion

The knowledge of chronic rheumatism has been clarified and extended in recent years, and new suppositions are leading to new knowledge. More reliance is now placed on physical medicine, both for the prevention and for the relief of chronic rheumatism. Many observers have been impressed by the disturbances in the peripheral circulation, the systemic vaso-constriction and curtailment of blood flow in the arterioles and capillary bed, by the failure of the normal reaction to cold, especially when muscular activity is in abeyance, and by the consequent slow invasion of chill. What is the remedy of choice to deal with the invasion of cold on the surface of the body? Interesting new evidence of the effect of external heat in removing stiffness and pain and other effects of exposure to cold, fatigue, and occupational trauma is forthcoming from pithead baths.

The same processes seem to be at work in articular and in non-articular forms of chronic rheumatism. Consequently, the methods of treatment applicable to arthritis also apply to sciatica, lumbago, and fibrositis. To this entire category of chronic painful diseases the distinctive generic name of rheumatism has always been given, and this older and limited connotation of the name has been confirmed by recent knowledge.

The establishment in England of rheumatism centres for consultation and treatment³ for large numbers of cases, served by medical officers who devote their whole time and thought to the study of rheumatology and physical treatment, appears to offer advantages which it would be difficult, if not impossible, to obtain in any other way. The early physiological abnormalities of rheumatism could be properly investigated; light would be thrown on many obscurities of causation, and well-ordered schemes of preventive and curative treatment could be devised. They would go far to establish the methods of physical medicine on a scientific foundation, and would help to launch a medical-social campaign against rheumatism in England which might, in time, be carried to a point that few have dreamed of.

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MALIGNANT ENDOCARDITIS DUE TO BRUCELLA ABORTUS

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The occurrence of death in cases of undulant fever is unusual, and a fatal termination as a result of endocarditis would appear to be very rare. This is true of infection both by *Brucella melitensis* and by *Brucella abortus*. The earliest record we can find of the former is that of Hughes,¹ who in 1897 described four cases of undulant fever in which the heart was affected and all of which terminated fatally. Three of the patients suffered from definite vegetative endocarditis, the fourth from pericarditis. Recently Casanova and d'Ignazio² have described a case of vegetative endocarditis of the aortic valve due to *B. melitensis*.

In infection by *B. abortus* cardiac involvement is equally uncommon. Kristensen³ has recorded one case in which the lighting-up of an old endocarditis caused death, the terminal event being probably an embolus of the mesenteric artery; but no post-mortem examination was held, so that the precise condition was not established. Scott and Saphir⁴ have recorded the case of a patient who had previously suffered from rheumatic fever with endocarditis, and who died as the result of infection of *B. abortus*. Post mortem, recent vegetations were found superimposed upon the old valve lesions, so that death was almost certainly due to this cause, but no histological examination of the vegetations was made. Profound myocardial damage occurred in two cases described by Attinger.⁵ In neither was any endocardial involvement recorded. Thus beyond the case of Scott and Saphir we have been unable to find a record of the condition established by post-mortem examination.

Case Report

The following case of a patient who died of endocarditis due to *B. abortus* is therefore worthy of record.

In March, 1935, the patient, a wool-packer aged 47, suffered from "influenza" followed by persistent diarrhoea, which necessitated his admission to hospital on April 27th, 1935. He was much emaciated. The abdomen was slightly distended, but neither liver nor spleen was palpable. The heart was not enlarged and no murmurs were detected. There was tenderness over both kidneys posteriorly, and albuminuria and haematuria were present. The Wassermann test was negative. The patient gave a history of occasional attacks of tonsillitis until tonsillectomy was performed four years previously. His work never brought him in contact with live animals, and he drank milk very sparingly. No other member of the family complained of illness.

The diarrhoea quickly cleared up, but pain persisted in the upper abdomen. There was pyrexia ranging up to 100° F. with a relatively higher pulse rate. The blood agglutinated *B. abortus* to a titre of 1 in 6,400, and blood culture, which was negative with routine media, showed *B. abortus* to be present in large numbers when suitable methods were employed.

After a slight improvement the patient's condition deteriorated steadily. A systolic murmur developed at the apex. The liver became enlarged, but the spleen could not be palpated. The fingers showed definite clubbing. There was progressive anaemia, and casts were found in the urine. On one occasion only a stool containing bright red blood was passed. The temperature was never undulating, and the leucocyte changes usual in undulant fever were absent. Later a presystolic murmur developed and the diarrhoea recurred. Oedema appeared, the pulse gradually failed, and the patient died on July 10th.

Post-mortem Findings

Death was found to be due to mitral endocarditis with embolic lesions in the kidneys and spleen. The left ventricle was slightly hypertrophied, with mitral stenosis and fusion of the cusps. The anterior cusp and part of the posterior cusp were covered by friable vegetations resting on dense fibrous tissue, in which was some calcareous deposit. Cultures from the vegetations were overgrown by a post-mortem invader, but bacilli showing the usual *Brucella* morphology were found in large numbers in sections of the vegetations. These were mostly in aggregates of varying size up to 30 to 40 microns in diameter, parts of the vegetations being apparently largely composed of these masses of organisms. No Gram-positive cocci were seen.

The spleen contained three white infarcts and was not enlarged. In the cortices of both kidneys were large numbers of small red infarcts, and thrombosed vessels were readily found in sections, which also showed small focal collections of polymorphs and lymphocytes. No marked change was found in any of the other organs, there being no enlargement of the lymph glands or liver.

Discussion

This case presents several points of special interest. The calcified area in the mitral valve suggests the probability of previous valvular disease, and the vegetations produced by *B. abortus* may therefore have commenced at the site of an old lesion. To the frequency of such a sequence in other infections attention has been drawn by Cowan and Rennie.⁶ That the earlier damage must have been slight is clear from the history and from the physical findings on admission to hospital. Moreover, there was no evidence of any active infection other than that due to *B. abortus*. The blood cultures gave no other pathogenic organisms nor were any demonstrated in the vegetations post mortem. There seems little doubt, therefore, that all the recent lesions and the fatal outcome were due to *B. abortus*.

The upper abdominal pain so frequently complained of by the patient is difficult to explain, even with the post-mortem results before us. The damage to the liver and spleen seems insufficient to account for it, and similar pain in endocarditis with renal involvement is a most unusual feature. Nor could the pain be related to the diarrhoea. Post mortem, nothing was found to account for this diarrhoea and for the intestinal haemorrhage. This is in line with the findings of Cooper and Marsteller⁷ in a fatal case of undulant fever without endocarditis. In their case, too, haemorrhage occurred on one occasion only, and post mortem no lesion could be discovered.

Summary

1. A fatal case of malignant endocarditis of the mitral valve due to *B. abortus* is recorded.

2. Only one similar case, confirmed by post-mortem examination, has been found in the literature.

We are indebted to Dr. Buckell, who found a titre of 1 in 9,896 for *B. abortus* and 1 in 3,766 for *B. melitensis* in the blood, and isolated *B. abortus* from the urine.

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BELLADONNA POISONING BY LIQUID EXTRACT OF LIVER

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The following details of a case of belladonna poisoning present some serious questions for consideration.

On Sunday, September 15th, 1935, a woman aged 46, who had been suffering from pernicious anaemia, and had taken without harm six 15 oz. bottles of liquid extract of liver (1 fl. oz. = 1/2 lb. liver), all supplied direct by the same firm of manufacturing pharmacists, within half an hour of taking 1/2 oz. from a seventh bottle from the firm showed symptoms of belladonna poisoning, there being dryness of the mouth, flushing of the skin, impairment of vision, numbness of the extremities, and mild delirium. Medical aid was not summoned on this occasion, and no further dose was taken until Tuesday the 17th, when 2 drachms only of the extract were taken. Within half an hour there was a recrudescence of all the original symptoms, with complete dilatation of the eye pupils, the patient having to be walked about the room to prevent her from falling asleep. One of us (N. F. W.) was called in; recovery followed the administration of morphine, strychnine, and hot coffee.

The manufacturers were forthwith advised that they must cancel all further supplies of the batch of liver extract of which the contents of this bottle were a part, and recall any stock held by retailers. The remainder of the contents of the bottle in question was then submitted to the second-named author for examination for belladonna alkaloids. From the final chloroform extract from ammoniacal solution was obtained a residue which, after drying at 40°-50° C., gave typical alkaloidal precipitates with Wagner's and Mayer's reagents, and yielded a positive Vitali reaction (red-violet with freshly prepared 10 per cent. alcoholic caustic potash after evaporating with concentrated nitric acid and cooling). A control experiment on a liquid extract of liver obtained from an entirely different source furnished negative results when similarly tested.

In a quantitative determination 5 mg. of alkaloid were obtained from 2 fl. oz. of extract, corresponding to a maximum of 1/25 grain per fl. oz., or 1/50 grain in the Sunday dose, and 1/100 grain in the Tuesday dose. Biological tests carried out for us by Dr. W. A. Bain in the Pharmacological Laboratory at the Leeds School of Medicine showed the active principle to belong to the belladonna group of alkaloids (see addendum). It was therefore concluded that atropine and/or other belladonna alkaloid was present in the liver extract, and since 1 fl. oz. of liver extract is equivalent to 1/2 lb. of liver the indication is that the original alkaloid content of the liver was about 1/12 grain per lb.

Although a 2 drachm dose does not contain more than 1/100 grain of alkaloid (the therapeutic dose being 1/240 to 1/60 grain), it should be remembered that adults tend to show less tolerance for the drug than do children, and that the total alkaloids of belladonna (which consist of hyoscyamine and atropine) possess a greater physiological activity than atropine alone. Moreover, in a case in which belladonna treatment is not indicated, it is possible that the effect would be more pronounced than in one in which there were symptoms calling for such treatment.

Sources of the Alkaloids

There appeared to be two possible sources of the alkaloids. The possibility of contamination of the bottle through its having originally contained an atropine salt solution or a belladonna preparation was strongly denied by the manufacturers. It was ruled out later by the fact that, shortly after the present case had been brought to our notice, symptoms of belladonna poisoning occurred in another patient who had been taking from another