PROCEEDINGS OF THE BRITISH CARDIAC SOCIETY

An Autumn Meeting of the British Cardiac Society was held at the Royal Society of Medicine, London, on Friday, October 30, 1959. The President, Maurice Campbell, took the Chair at 9.30 a.m. during Private Business, before handing over to the Chairman, William Phillips. 150 members and 23 visitors were present.

PRIVATE BUSINESS

1. The Minutes of the last Annual General Meeting, having been published in the Journal (21, 578, 1959) were taken as read and confirmed.

2. British Heart Foundation. The President reported that a Founding Committee, had been set up by the Council with representatives of the Royal College of Physicians and other bodies as well as the British Cardiac Society; that it had made some progress towards establishing the Foundation; that negotiations with the Chest and Heart Association were progressing favourably; and that, shortly, he would be asking members for a subscription to cover the preliminary legal expenses.

3. Campbell’s term of office as President expiring in May, 1960, in accordance with rule 4, and he being unwilling to offer himself for re-election, Evan Bedford was nominated President.

4. The Annual General Meeting, 1960, is to be held at the London Hospital under the Chairmanship of William Evans on Thursday, May 26. After the Meeting the Society will dine together in the Apothecaries’ Hall.

5. Members wishing to offer communications for the II Asian-Pacific Congress of Cardiology, which was being held in Melbourne, from May 30 to June 3, should send an abstract to Dr. Austin Doyle, the Secretary, by the end of the year.

6. Members wishing to offer communications for the III European Congress of Cardiology, which is to be held in Rome, from September 18 to 24, 1960, should send abstracts to the Secretary of the British Cardiac Society early in the New Year and at latest by February 1.

7. The Council has received an invitation from the Thoracic Society to consider holding a joint Meeting with their Society in 1961, if a date convenient to both can be arranged.

After the Scientific Meeting, the Society dined together at the Savoy Hotel with Maurice Campbell in the Chair. Campbell proposed the health of the guest of honour, Sir Henry Dale, O.M., and welcomed Dr. van Dooren and Professor Warburg, the two Corresponding Members attending the Meeting. William Phillips proposed the health of the President.

SCIENTIFIC COMMUNICATIONS

THE ATRIO-VENTRICULAR TYPE OF ATRIAL SEPTAL DEFECT AND ITS SURGICAL TREATMENT

By D. Evan Bedford and T. Holmes Sellors

The incidence of primum defects, diagnosed clinically, was 10 per cent in 300 cases of A.S.D., aged over 5 years, seen at the Middlesex Hospital, but in paediatric clinics it might be as high as 25 per cent. Details were given of 15 proven cases of primum defect, aged from 7 to 44 years, with an average of 16 years. The sex incidence, 8 male to 7 female, was about equal. Five were slightly undersized but only one was cyanosed. The heart was grossly enlarged in 7, moderately enlarged in 3, and almost normal in size in 5 cases.

A pan-systolic murmur, mitral or tricuspid, was heard in 12 cases of which 5 also had a systolic thrill. The delayed diastolic murmur tended to be longer, louder, and better heard at the apex than in secundum defects.

The electrocardiogram was characteristic in 14 cases, showing left axis deviation in standard leads combined with right bundle-branch block pattern in chest leads. The frontal vectorcardiogram was also characteristic. Only one case presented right axis deviation, a man, aged 44, with pulmonary hypertension and reversed shunt.

Catheterization showed the P.A. pressure to be normal in 4 cases, 30–40 mm. systolic in 8, and 80 mm. systolic in one with a common A-V canal: one patient with pulmonary hypertension and reversed shunt was
not catheterized. P.A. pressures exceeding 50 mm. systolic under the age of 20 should suggest a common A-V canal with a significant ventricular shunt.

Anatomy. The A-V valves were normal in 2 cases, the aortic cusp of the mitral was cleft or deformed in 7, both mitral and tricuspid valves were involved in 3, and 3 had a common A-V canal. A ventricular septal defect did not occur apart from a common A-V canal, and even then it was virtually closed by aberrant papillary muscles in two of the three cases.

Surgical Experience. During the last six months, 12 patients had been operated on using extra-corporeal circulation (Mayo-Gibbon pump) and they caused no undue anxiety at operation, but the post-operative course had tended to be more stormy than in cases of secundum defect closed under hypothermia. The A.S.D. was closed by suture alone in 8, and by an Ivalon patch in 4 cases. The mitral valve was repaired by suture as far as possible.

This preliminary report could only give the early results. There had been 2 post-operative deaths, both cases of common A-V canal, and two patients were still in hospital, one with a serious staphylococcal infection. Of the remaining 8 patients, the result was so far satisfactory in 7; but one with a large heart and failure before operation was not improved and valvular incompetence had persisted. It was too early to decide the indications for operation in primum defects, but patients with large hearts, gross valvar regurgitation, or common A-V canals seemed relatively unfavourable cases for surgical repair.

Sinus Arrhythmia: Observations in Atrial Septal Defect and Normal Subjects
By L. G. Davies and B. Fotiades (introduced)

We have observed that patients with atrial septal defect show less respiratory variation in heart rate than do normal subjects. This reduction in sinus arrhythmia is greatest in patients with the largest left-to-right shunts.

This finding lead us to re-examine the nature of sinus arrhythmia in normal subjects. Inspiration increases the volume of the pulmonary vascular bed, left heart filling is diminished, the stroke output falls, and the rate quickens. Inspiration also increases the return of blood to the right atrium and after three or four beats this blood is available to augment left ventricular filling, the stroke volume increases and the rate slows.

In atrial septal defect inspiration diminishes the left-to-right shunt so that left ventricular filling and stroke output is maintained.

We believe the most acceptable explanation of sinus arrhythmia is that it is a baroceptor response to changes in the stroke volume of the left heart. It is comparable with the changes in rate that occur during the Valsalva manoeuvre.

Tracers in Diagnosis of Left-to-Right Shunts
By David Weitzman and Joan McAlister (introduced)

Radio-active phosphorus ($^{32}$P) and nitrous oxide ($N_2O$) were used as “tracers” during cardiac catheterization for localization of left-to-right shunts. The $^{32}$P technique has already been described (Lancet, 1958, 2, 1356). Red cells labelled with this substance are injected into the pulmonary artery with continuous sampling from the right heart to demonstrate early return through a shunt.

The nitrous oxide method, described by Morrow and Sanders (Circulation, 1958, 17, 284) depends on the solubility of this gas in body tissues. The venous $N_2O$ concentration therefore rises far more slowly than the arterial during the first minutes of inhalation. When there is a central left-to-right shunt, samples from the shunt chamber show a higher $N_2O$ concentration than those drawn more distally.

Advantages of the $N_2O$ method are simplicity and repeatability. In doubtful cases, however, the results are subject to the same difficulties of interpretation as the oxygen saturation figures. The radio-phosphorus method, although more laborious, is more reliable since it shows a clear time interval that is independent of shunt magnitude.

The Electrocardiogram at High Altitude
By Frederic Jackson and Hywel Davies (introduced)

A transistorized electrocardiograph was taken to 19,150 ft. (5820 m.) on Ama Dablam in the Himalayas. The records from seven subjects normally resident at sea level showed two prominent changes—(1) the development of a striking right axis shift in the limb leads as the altitude increased, and (2) flattening, and
in one case inversion, of the T waves in leads over the left ventricle. These changes reversed completely after returning to sea level. The graphs from five Sherpa porters who were born and had always lived at 12,000 ft. showed a developing right shift with altitude, but without left ventricular T wave changes.

Breathlessness on effort was the main symptom. Periodic dyspnœa when lying flat was troublesome in the early days at over 16,000 ft. (4880 m.), but later on this was not noticed even at 19,000 ft. (5800 m.). No one suffered from chest pain or anything resembling angina of effort. Chest X-rays taken at the start and end of the expedition showed lowering of the diaphragm but no increase in the size of the heart.

The atmospheric oxygen tension is halved at 18,600 ft. and the inference is that these T wave changes are due to myocardial ischemia, though the effect of disturbance of the electrolytes in the blood resulting from physical exhaustion has not been excluded.

Obstructive Cardiomyopathy Simulating Aortic Stenosis

By D. Teare (introduced), A. Hollman, J. F. Goodwin, and W. P. Cleland

The term obstructive cardiomyopathy has been introduced to describe a condition of asymmetrical or localized hypertrophy of the heart that involves the ventricular septum and produces narrowing of the outflow or inflow tracts of one or both ventricles. Asymmetrical hypertrophy has been reported by Teare (Brit. Heart J., 20, 1, 1958) in eight patients who came to autopsy. Two of these were members of a family in which nine relatives were also affected. This family has been studied clinically and evidence suggesting obstruction to the right ventricular inflow tract has been found.

Seven other patients presented with symptoms and signs suggestive of appreciable or considerable aortic stenosis, but were unusual in that the upstroke time of the arterial pulse was normal, the systolic murmur was maximum near the apex, a basal thrill was never felt, and valvular calcification was absent. In three patients the cardiogram and X-ray showed features implying involvement of the right side of the heart in addition to the left. Angiocardiography in two patients showed a greatly hypertrophied left ventricle. Right heart catheterization was performed in three patients and in two showed a gradient in the body of the right ventricle, possibly due to the hypertrophied septum. The aortic valve gradient was measured by simultaneous brachial and left ventricular puncture in two patients and was 60 and 65 mm. Hg respectively. In one of these patients, symptoms demanded surgical exploration, which revealed a massive hypertrophy of the left ventricle obstructing the subaortic region: this was excised by the aortic route under total cardio-pulmonary bypass, and nine months after operation the patient is still symptom free.

It is suggested that asymmetrical hypertrophy may produce clinical syndromes resembling aortic stenosis, tricuspid stenosis, mitral stenosis (as in one of Teare's cases), and right ventricular stenosis. The detailed physical signs, diagnosis, special investigations, and pathology were presented, and the aetiology, prognosis and treatment discussed, with special reference to the production of the physical signs, in the aortic type.

A Modified Anoxia Test—Review of 111 Patients

By Norman Coulsed (introduced) and E. Wyn Jones


The Clearing of Alimentary Lipaemia by Patients with a Raised Serum Total Cholesterol

By Harold Cohen (introduced by Gumpert)

A standard 75 g. fat meal was given to six patients with a raised serum total cholesterol. Four of these patients had thyroid deficiency, one had coronary artery disease, and one had xanthomatosis. In all six the resultant alimentary lipaemia was intense and prolonged. Evidence was adduced from the treatment of myxœdematous patients that the basic abnormality producing a raised serum total cholesterol is the abnormality in the clearing of lipaemic plasma, and it was suggested that this mechanism is responsible for cholesterol and lipoprotein changes in coronary artery disease.

Repetitive Ventricular Tachycardia

By P. Stock

Three cases have been encountered in the past eighteen months. One, a man, aged 22, is of exceptional interest. His arrhythmia consists of repetitive runs of ventricular ectopic beats separated by either one or two sinus beats. The number of ectopic beats in each paroxysm is usually four or five but varies from three
to twelve. A ventricular origin is established by the frequent occurrence of fusion beats. Two distinct ectopic foci can be recognized: one type dominates most paroxysms but over half of the paroxysms start with an ectopic beat of different origin. A continuous recording of the arrhythmia over twenty-five minutes has been analysed statistically. There was a highly significant difference between the lengths of the postparoxysmal pauses preceding the different paroxysmal patterns. The mechanism is explicable in terms of the varying refractory period following different pause lengths. A second independent mechanism favouring one paroxysmal pattern was demonstrated: it showed a cyclic variation over six minute periods. Retrograde conduction with reciprocal beats occurred frequently. Shifts in sinus rhythm due to retrograde conduction appear largely responsible for variation in the length of the pause. The findings are incompatible with the re-entry theory of extrasystoles. Haemodynamic data are available. Observations over eighteen months suggest the condition is benign.

The second case appeared to depend on a parasystolic focus. The third had no special features.

**Progress after Mitral Valvotomy**

By Clifton Lowther (introduced) and Richard Turner

Of more than 1000 patients with mitral valvular disease who have been under observation at the Cardiac Department of the Western General Hospital, Edinburgh, in the past ten years approximately 500 have been treated surgically. The progress has been followed of the first 200 patients who were subjected to mitral valvotomy more than five years ago and survived the procedure. The factors influencing the result have been analysed. Eighty per cent have maintained worthwhile improvement and are only considered because many have done so despite the fact that important adverse factors were present. The analysis is mainly concerned with those whose progress was less satisfactory.

The causes of a disappointing result include a valve unamenable to operation, inadequate surgical technique, traumatic mitral regurgitation, previous or subsequent myocardial damage, other valvular defects, pulmonary vascular changes, and unrelated disease. Twenty-five patients have now been subjected to a second valvotomy.

Critical re-appraisal of factors that are sometimes considered to be contra-indications to operation is indicated since many good results have been obtained in patients over 50 years of age and in those with much cardiac enlargement, gross calcification, aortic valvular disease, or a loud systolic murmur.

**Mitral Valvotomy and Restenosis**

By D. E. L. Wilcken (introduced by Goodwin)

Fifteen patients who developed restenosis of the mitral valve after mitral valvotomy are described. Restenosis was considered established after the findings at a second valvotomy were compared with the known degree of relief of stenosis achieved at the first. At the first operation in 7 patients one commissure had been split completely with or without a partial split of the other; in the other 8 there had been a partial split of one commissure only. A period of clinical improvement followed in each patient, succeeded by uniform deterioration and a second valvotomy became necessary in all. An additional case, seen at autopsy, of restenosis occurring after both commissures had been split completely to the valve ring was presented.

The incidence of restenosis was related directly to the nature of the valve split obtained at valvotomy. Where one commissure (usually the lateral) had been split completely and the chordae freed, with or without a partial split of the other commissure, 11 per cent of patients restenosed during a 5 to 7 year follow up period. The incidence was higher when there had been a partial split only of one commissure and much lower when both commissures had been split to the valve ring. Restenosis was slightly more common when the valve was rigid but did occur with a freely mobile valve. In no patient was there evidence of renewed or continuing rheumatic activity. There was no evidence of any fundamental difference in the pathogenesis of 'true' and 'false' restenosis. The pathogenesis and methods directed towards reducing the incidence of restenosis were discussed.

**Combined Mitral and Aortic Stenosis**

By M. Honey (introduced by Baker)

Certain clinical, radiological, electrocardiographic, and haemodynamic findings have been studied in 35 patients with dominant or pure stenosis of both mitral and aortic valves. Of these, 32 have been operated upon and in them surgical assessment of the mitral valve area and an operative aortic valve gradient are
available. In many of these right and/or left heart catheterization has been performed and in the three unoperated cases complete hemodynamic assessment (by left atrial puncture) has been made. The cases with the highest aortic valve gradient usually have less severe mitral stenosis. Where severe mitral stenosis and severe aortic stenosis coexist, the aortic gradients are usually only small or moderate, a finding attributed to the low cardiac output. These observations explain the low incidence of angina and syncope, of electrocardiographic and X-ray evidence of L.V.H., and of post-stenotic dilatation and calcification of the aortic valve. The results of operation (mitral valvotomy alone in 11 and mitral and aortic valvotomy in 21) were presented.

The Cardiac Output on Exertion in Normal and Abnormal Subjects

By Ivor Gabe and Brian Robinson (introduced by Leatham)

There is a need for an objective method of determination of cardiac efficiency. A test has been devised with measurement of the cardiac output during calibrated amounts of work without the complications and possible risk of cardiac catheterization.

The subject exercises on a bicycle ergometer at a measured rate of work, which is increased in steps of 10 or 20 watts at three minute intervals, until either the pulse rate rises above 160/min., a rate of 100 watts is achieved, or the patient feels too tired to continue. The cardiac output is measured by the dye dilution technique using Evans Blue dye injected via a catheter in the superior vena cava, the resultant curve being recorded by means of an ear oximeter. The output is recorded at rest, at two intermediate steps, and at the highest rate of work.

Ten normal subjects and ten subjects with mitral valve disease have been investigated with the test. In normal subjects the cardiac output has been found to rise progressively with increasing work from resting levels of 5–8 litres to 15–21 litres a minute at 100 watts. The pulse rate rose at the same time to a maximum of 135–160 a minute.

With this test patients with mitral stenosis were found to be more disabled than their symptoms had suggested. With only mild symptoms, the maximum work they could perform was often limited to 20 watts, at which time the ventricular rate had risen to 160 or more, whether in sinus rhythm or atrial fibrillation: the maximum output was 5–8 litres a minute. In a patient with mitral stenosis but entirely free of symptoms, the maximum output was 11 litres a minute.

High-speed Cine-angiocardioographic Studies of the Right Ventricular Outflow Tract in Pure Pulmonary Stenosis

By Hamish Watson, C. Pickard (introduced), K. G. Lowe, and I. G. W. Hill

Attention has recently been focused on the possible role of infundibular muscle hypertrophy as an obstruction to the outflow tract of the right ventricle in pulmonary valvular stenosis. By high-speed cine-angiocardioigraphy it is possible to visualize the dynamics of this region during the various phases of the cardiac cycle and this method would appear to offer valuable data in the study of the problem.

A fairly constant pattern is emerging in those patients with valvular pulmonary stenosis in whom the right ventricular pressure is high enough to warrant surgical treatment. The hypertrophied muscle throughout the whole length of the outflow tract contracts during systole, acting as it were in opposition to the rest of the ventricle and thus increasing its difficulty in emptying. It may be that given a certain degree of valvular stenosis a vicious circle becomes established with results that do not necessarily depend on the severity of the initial valvular lesion.

The paper was illustrated by slow motion films.