of the disease. But we think that R plays a greater part, and that without a certain metabolic type—a certain "humoral" type, to use a Hippocratic expression—the micro-organism W, inoffensive probably in other individuals, cannot determine the disease.

GENERAL DISCUSSION.

Sir JAMES BARR (Liverpool) said that in 1913 he gave an address at Sunderland on rheumatoid arthritis which excited a good deal of controversy in the *BRITISH MEDICAL JOURNAL*. The views which he then expressed he had consistently held and practised ever since—namely, that true rheumatoid arthritis was due to a prolonged mild acidosis which decalcified the synovial membrane and fibrous tissue of the joints, and finally attacked the cartilages and bony structures. The popular idea was that the disease was microbic or toxic in origin, and all known organisms had been called into requisition to explain different cases, but no specific organism had been discovered. Whatever the cause of the acidosis, the immediate cause of the mischief was the decalcification. In all these cases there was defective vagotonia, the stomach was dilated, whether distended or not, with acid fermentation of its contents. There was no hyperchlorhydria, though the amount of free hydrochloric acid was not necessarily below normal. The amount of free hydrochloric acid was not sufficient to arrest the acid fermentation and formation of organic acids; although the blood never became acid, these acids were sufficient to lessen the buffer salts in the blood and attack the fixed calcium in the tissues. There were many acid-forming organisms in the stomach where the stasis was. Any stasis in the bowel might give rise to intestinal putrefaction, but the *Bacillus coli* flourished in an alkaline medium and was not a causative agent of rheumatoid arthritis. In these cases there was increased basal metabolism, and very few of them could hold their breath for thirty seconds. The pulse was frequent, the blood pressure low, and perspiration occurred readily. Overaction of the ovaries and thyroid worked mischief by increasing calcium metabolism. Any of his audience could bring on pains in their joints by living on a carbohydrate diet and taking large quantities of citric, tartaric, acetic, or lactic acid; he would not advise them to carry the experiment too far for fear they might work mischief without the aid of a micro-organism. In his opinion there was no other chronic disease so amenable to treatment if taken early, say within the first six months; so long as the cartilages and bones were not involved the case was very hopeful. In this respect he sympathized with the spa physicians, because they chiefly had to treat

the derelicts of the medical profession. The cases which required the attention of a surgeon had been very badly handled. It might be thought that the decalcification would be very easily corrected by giving large amounts of soluble calcium salts, but no matter how much was given by the mouth only a small amount was absorbed, and the amount of calcium which the blood would hold was not sufficient to act as a buffer salt; it was therefore necessary to give also a liberal supply of sodium and potassium salts. The calcium passed into the lacteals as a soap, consequently it was necessary to form a soluble soap with unsaturated fatty acids such as olive oil. Stearin and palmitin formed very insoluble soaps which only irritated the bowel. Unnecessarily large doses of calcium were apt to lessen the motor function of the stomach; hence milk was not the best method of administering calcium, as it might cause undue retention and lead to acid fermentation, which worked mischief. The sour-milk craze in this disease had fizzled out long ago. The only endocrine glands of value were the parathyroid, pituitary, and suprarenal, which led to calcium retention. In a myxoedematous patient the development of rheumatoid arthritis must be a rare event, but osteoarthritis might readily occur. The best diet was red meat, and, as Dr. Woods Hutchinson had said, plenty of it; he had entered very fully into that question in 1913, and there was no need to repeat what he had then said. A good plan was to take a glass or two of hot water three hours after meals and then elicit the stomach reflex, which relaxed the pylorus and allowed the stomach to empty itself. This should always be done at bedtime and be followed by two tablespoonfuls of olive oil.

The PRESIDENT (Lord Dawson), in closing the discussion, said that it seemed clear that infection played a part in the etiology—the question was, what part? It was often difficult to decide the balance of advantage and disadvantage in removing septic foci. In some cases the infection might be in some part so difficult of access as to make even its detection impossible, and in others it might well be that lack of resistance allowed an ordinarily harmless organism to become pathogenic. In investigating the factor of low resistance the clinician looked for co-operation with the biochemist, and Professor Cawadiaz's observations were very suggestive on this point. With regard to the extraction of teeth, he looked upon age as a contraindication to any extensive removal, and the results of extraction were often very disappointing; but even so some comfort might be derived from the fact that the care now given to the teeth had undoubtedly produced a great improvement in the general health of the people.

THE SURGICAL TREATMENT OF MITRAL STENOSIS.

BY

H. S. SOUTTAR, C.B.E., M.Ch., F.R.C.S.,
SURGEON (WITH CARE OF OUT-PATIENTS), LONDON HOSPITAL.

THERE can be no more fascinating problem in surgery than the relief of pathological conditions of the valves of the heart. Despite the consecutive changes to which these lesions may have given rise in the cardiac muscle, the relief of the lesions themselves would undoubtedly be of immense service to the patient and must be followed by marked improvement in his general condition. Expressed in these terms, the problem is to a large extent mechanical, and as such should already be within the scope of surgery, were it not for the extraordinary nature of the conditions under which the problem must be attacked. We are, however, of opinion that these conditions again are purely mechanical, and that apart from them the heart is as amenable to surgical treatment as any other organ. Incisions can be made into its chambers, portions of its structure can be excised, and internal manipulations can be carried out, without the slightest interference with its action, and there is ample evidence that wounds of the heart heal as readily as those in any other region.

The conditions which appear as fundamental are, first,

that the operations have to be carried out on a structure in rapid movement; and secondly, that no interference whatever with the circulation must take place. The first is not quite so difficult as it sounds, for it is possible to fix the actual portion of the heart which is under operation, but it must obviously limit the possibilities of repair. In animals the second condition may sometimes be ignored, and the circulation has been clamped for as much as two minutes. This, however, would never be justifiable in a human being, in view of the extreme danger to the brain from even the shortest check to its blood supply. Any manipulations which are carried out must therefore be executed in the full flow of the blood stream, and they must not perceptibly interfere with the contractions of the heart.

The simplest valvular lesion for surgical interference is stenosis of one of the valves, and of these the mitral valve is perhaps the most accessible. I have been interested for some time in the development of a suitable technique for reaching this valve, and I owe to Dr. Otto Leyton the opportunity presented by the following case for putting my ideas to the test. A description of the case itself will give the clearest indication of the method of approach I adopted and of the technique which I devised.

Description of Case.

L. H., aged 15, was admitted to the London Hospital in January, 1921, suffering from chorea and mitral stenosis. Her subsequent history was one of many relapses, with steadily

increasing failure of compensation. In September, 1924, she was admitted with haemoptysis, vomiting, and severe dyspnoea. She was cyanosed, her feet were swollen, and her liver was enlarged and tender. After three weeks in hospital she had greatly improved and was sent to a convalescent home, whence three weeks later she was discharged.

Early in March, 1925, she appeared at the London Hospital with cough, dyspnoea, and pain in the limbs. She was sent home to bed and given digitalis and aspirin, but she did not improve. After a severe attack of epistaxis and precordial pain she was again admitted as an in-patient.

She was a thin girl with a bright malar flush. Her pulse rate was 128, and respirations 32. Cardiac pulsation was visible over a large area of the left chest, and the rib cartilages in this area were very soft and had a forward bulge. The apex beat was in the fifth space, outside the mid-clavicular line, and the area of cardiac dullness extended to the second space above. In the mitral area there was a long rumbling diastolic murmur, followed by a soft blowing systolic murmur, the latter being conducted out into the axilla. A presystolic murmur was present, but was not very marked. The liver was not obviously enlarged, but was slightly tender on palpation.

After a week's rest in bed her pulse fell to 80 and her respirations to 24, while her general condition greatly improved. Her pulse was now small but perfectly regular, with a systolic pressure of 95 mm. There was no presystolic murmur or thrill, but a long diastolic murmur of low pitch was followed by a soft blowing systolic murmur.

In view of her many relapses it appeared that her heart was unable to establish compensation for the combined stenosis and regurgitation from which she suffered, and it was therefore decided to attempt to relieve the stenosis by surgical means.

Operation.

On May 6th, 1925, under intratracheal anaesthesia, a curved incision was made along the fourth left intercostal space, up along the middle of the sternum, and outwards along the first left intercostal space. The skin and subcutaneous tissues, with the left breast, were turned outwards, exposing an area of the chest wall about five inches square. On the outer side of this area a short horizontal incision was made along each of the three ribs exposed (Fig. 1), and through these incisions the ribs

FIG. 1.—Skin and subcutaneous tissue reflected, with ribs exposed prior to division.

were in turn divided. The chest wall was now divided a little within the line of the original incision by cutting through the muscles and costal cartilages, and the flap so formed was turned outwards, the pleura being included in the flap (Fig. 2).

A very full exposure of the left side of the pericardium was thus obtained, while with an intratracheal pressure of 15 mm. Hg there was only moderate collapse of the left lung. The action of the heart now became extremely hurried, the pulse rising to 150, and it was evident that until it settled down nothing further could be attempted. After five minutes' delay the beats became slower and steadier, and it was decided that we could safely proceed. The pericardium was opened by a vertical incision three inches long, in the centre of which the left auricular appendage came prominently forward (Fig. 3). Two sutures were passed through the upper and lower margins of the appendage, so that it could be readily drawn forward. As the heart was still beating very rapidly the wound was covered with hot saline pads and a subcutaneous injection of 1/100 grain of strophanthin was given. After a delay of ten minutes the heart had steadied down to a rate of 120, and the blood pressure, which had fallen to 60 mm., had returned to 80 mm.

The auricular appendage was now drawn forward, a soft curved clamp (Fig. 4) was applied to its base, and it was

FIG. 4.

incised in an antero-posterior direction with scissors (Fig. 5). Into this opening the left forefinger was inserted (Fig. 6), the

FIG. 5.

FIG. 6.

clamp was withdrawn, and the appendage was drawn over the finger like a glove by means of the sutures. The whole of the inside of the left auricle could now be explored with facility. It was immediately evident from the rush of blood against the finger that gross regurgitation was taking place, but there was not so much thickening of the valves as had been expected. The finger was passed into the ventricle through the orifice of the mitral valve without encountering resistance, and the cusps of the valve could be easily felt and their condition estimated.

The finger was kept in the auricle for perhaps two minutes, and during that time, so long as it remained in the auricle, it appeared to produce no effect upon the heart beat or the pulse. The moment, however, that it passed into the orifice of the mitral valve the blood pressure fell to zero, although even then no change in the cardiac rhythm could be detected. The blood stream was simply cut off by the finger, which presumably just fitted the stenosed orifice. As, however, the stenosis was of such moderate degree, and was accompanied by so little thickening of the valves, it was decided not to carry out the valve section which had been arranged, but to limit intervention to such dilatation as could be carried out by the finger. It was felt that an actual section of the valve might only make matters worse by increasing the degree of regurgitation, while the breaking down of adhesions by the finger might improve the condition as regards both regurgitation and stenosis.

It was now decided to withdraw the finger and close the appendage. Unfortunately, at the critical moment of withdrawal the lower retaining suture cut through, the appendage slipped back into the pericardium, and there was a sudden gush of blood, which, however, was instantly checked by pressing the appendage against the heart. With a little manipulation the tip of the appendage was now grasped between the finger and thumb, which held it securely closed while an assistant passed a silk ligature round it and tied it off. The pericardium was closed, and a certain amount of blood, which in this *contretemps* had escaped into the pleural cavity, was removed with moist gauze pads. The intratracheal pressure was raised so as to cause the left lung to expand, and the wound was closed in layers, the ribs being accurately sutured in position. Before the flap was actually closed a small quantity of 60 per cent. alcohol was injected into the intercostal nerves just outside the point at which the ribs had been divided.

Immediately the chest was closed the heart's action returned to normal, and on the conclusion of the operation the general condition of the patient was indistinguishable from that at the beginning. She had a bright colour and an excellent pulse. Except at the moment when the suture cut out her condition had never caused the slightest anxiety, and even then there was only a momentary drop in the blood pressure. The whole operation took precisely sixty minutes.

She made an uninterrupted recovery, the freedom from pain or any disturbance which might have been expected to result from the operation being remarkable. Her general condition appeared to be greatly improved, but the physical signs showed little or no change. She was sent to the country and kept in bed for six weeks, but as at the end of that time her pulse rate had remained constant at about 90 she was gradually

FIG. 2.—Ribs divided, and flap, formed by cutting through muscles and costal cartilages, turned back; left side of pericardium exposed.

FIG. 3.—Vertical incision in pericardium, exposing left auricular appendage.

allowed to get up. At the end of three months she declared that she felt perfectly well, although she still became somewhat breathless on exertion.

REMARKS.

I believe that this is the first occasion upon which an attempt has been made to reach the mitral valve by this route in the human being, or to subject the interior of the heart to digital examination. The value of the method

cannot possibly be judged on a single case, but I think that I may claim to have shown that the method is practicable and that it is reasonably safe. Indeed, the features which most struck all who were present at the operation were the facility and the absolute safety of the whole procedure, while even on a first attempt the amount and precision of the information to be gained by digital exploration were very remarkable. I had intended to divide the aortic cusp

by passing a thin hernia bistoury along my finger (Fig. 7) and thus to relieve the stenosis, and this could have been done with perfect facility had it been considered advisable.

FIG. 7.

The problem of cardiac surgery has frequently attracted the attention of both physicians and surgeons, and two years ago the *BRITISH MEDICAL JOURNAL* summed up, in an admirable article, its history and position at that time. It is now being attacked with characteristic energy by several American surgeons from various points of view. On the experimental side Duff Allen, by means of a most ingenious optical device, has succeeded in actually seeing the mitral valve in the cat and in dividing a cusp, using

the approach through the auricular appendage. On the clinical side Cutler, after an elaborate experimental investigation, succeeded in excising portions of stenosed mitral valves in human beings by means of an ingenious valvulotome, working through the ventricle. The operation was, however, necessarily blind and proved to be somewhat dangerous. It appears to me that the method of digital exploration through the auricular appendage cannot be surpassed for simplicity and directness. Not only is the mitral orifice directly to hand, but the aortic valve itself is almost certainly within reach, through the mitral orifice. Owing to the simplicity of the structures, and, oddly enough, to their constant and regular movement, the information given by the finger is exceedingly clear, and personally I felt an appreciation of the mechanical reality of stenosis and regurgitation which I never before possessed. To hear a murmur is a very different matter from feeling the blood itself pouring back over one's finger. I could not help being impressed by the mechanical nature of these lesions and by the practicability of their surgical relief.

BIBLIOGRAPHY.

- Allen, D. S.: Intracardiac Surgery, *Arch. Surg.*, 1924, viii, 317.
Cutler, E. C., Levine, S. A., and Beck, C. S.: The Surgical Treatment of Mitral Stenosis, *Arch. Surg.*, 1924, ix, 689.
BRITISH MEDICAL JOURNAL (leading article), September 22nd, 1923, p. 530.

SYPHILIS AND ANEURYSM:

AGE AND SEX INCIDENCE AND CAUSE OF DEATH IN AORTIC ANEURYSM.

BY

E. M. BROCKBANK, M.D., F.R.C.P.,

HONORARY PHYSICIAN, ROYAL INFIRMARY, MANCHESTER.

IN the account, published in the *JOURNAL* of May 16th (p. 928), of the discussion on aneurysm in the Section of Medicine of the Royal Academy of Medicine in Ireland, Dr. Speares referred to 30 cases of aneurysm in only 13 of which there had been a positive Wassermann reaction. As I have had occasion lately to look up my own experience on the influence of syphilis in predisposing to aneurysm I found this number of positive tests surprisingly low, because in every one of 19 men and in 3 of 5 women in my own hospital beds with thoracic aneurysm, regarding whom there was a definite statement about a previous history of syphilis or in whom the Wassermann test had been performed, there was evidence of syphilis. I therefore asked my house-physician, Mr. A. R. Somerford, to look up the experiences of some of my colleagues on the Manchester Royal Infirmary staff, and with their permission, for which I thank them, he has done so, with the results recorded below. The total number includes my own cases.

During the last few years 56 cases with undoubted clinical evidence of intrathoracic aneurysm, and in which there were definite records of a history of syphilis or of the results of a Wassermann blood test, were admitted to the wards of the Manchester Royal Infirmary. Of these 56 cases 47 were men and 9 were women. In 52 cases, or 92.85 per cent. (45 men and 7 women), and in 43 of the 45 men (95.5 per

cent.), there was a definite history of previous syphilis or a positive Wassermann test.

The Wassermann blood reaction was positive in 40 out of 44 cases tested (90 per cent.). Of the two men in whom the test was negative and regarding whom there was no negative syphilitic history, one, aged 51, had a definite aneurysm according to x-ray findings; while the other, aged 53, had an intrathoracic tumour which "looked like an aneurysm" by x rays. Of the two women without a definite Wassermann reaction the serum of one, who was aged 51, gave delayed lysis in 1 in 5 dilution, and the x-ray findings in the other, aged 53, were only "suggestive of aneurysm." The ages of the 52 patients with positive test or history of syphilis varied in the men from 29 to 68, and in the women from 37 to 70, and were grouped in decades as shown in the following table.

TABLE I.—Age and Sex of Cases with Evidence of Syphilis.

Age.	Males.	Females.
Under 30 ...	1	0
31-40 ...	3	1
41-50 ...	20	4
51-60 ...	16	1
61-70 ...	5	1
Total ...	45	7

TABLE II.—Age and Sex Incidence of 200 Cases of Aortic Aneurysm found post Mortem.

Age.	Males.		Females.		Total.	
	Cases.	Per cent.	Cases.	Per cent.	Cases.	Per cent.
21-30 ...	13	7.5	2	7.4	15	7.5
31-40 ...	65	37.6	5	18.5	70	35.0
41-50 ...	52	30.0	14	51.85	66	33.0
51-60 ...	37	21.5	6	22.2	43	21.5
61 and over	6	3.4	—	—	6	3.0
Total ...	173	86.5	27	13.5	200	100

The average age at death of the above cases was 43.87 years. It is important to note that in 42.5 per cent. of all the cases death occurred before 40 years of age, and in 75.5 per cent. before 50.

Age at Death in Aneurysm, Tabes Dorsalis, and General Paralysis.

It is interesting to compare the age at death in aneurysm with that of tabes dorsalis and general paralysis of the insane, all of which are said by some authorities to be caused by syphilis only.

Tabes Dorsalis.—Byrom Bramwell has published his experience of the age at death of 258 cases of tabes in the subjoined table (see *A System of Syphilis*, D'Arcy Power and J. Keogh Murphy, 1909, vol. iii, p. 185; see also article on syphilis and life assurance by the present writer).

TABLE III.—Age at Death in Tabes Dorsalis.

Age.	No. of Cases.	Per cent.
20-30 years... ..	37	14.3
31-40 " " " " " "	121	46.8
41-50 " " " " " "	70	27.0
51-60 " " " " " "	25	9.6
61 " " " " " "	5	1.9
Total ...	258	99.6

Here we see that 61.1 per cent. of the cases died before 40 years of age, and 88.1 per cent. before 50. The average age at death is not stated, but it must have been about 40, and not more than 44.

General Paralysis.—For general paralysis Byrom Bramwell found in his own practice and in the Scottish Widows Fund insurance experience that the average age at death in 66 cases was 43 years. In Allbutt and Rolleston's *System of Medicine* (second edition, vol. viii, p. 365) G. H. Savage gives the ages of 425 subjects of general paralysis from asylum returns: 62 per cent. occurred before 40 years of age and 89 per cent. before 50 years of age. The average age at death is not stated, but it must have been about 40, and not more than 44.