is laid upon the diaphragm made by these laces, which can be altered or replaced to meet the comfort of the patient. There is great merit in this device, the patient himself training the end of his stump to bear its full share of the weight under his own sensation and control. Hinges for the knee are sometimes applied. The vertical split weakens the bucket, but it is said to give comfort. The material costs 9s. 6d.

FIG. 7.—The Eaton Gate peg.

extent sacrificed in this attempt. The material costs about 12s. 6d.

6. *Erskine House*.—This peg consists of a bucket made up of vertical laths, to the lower end of which a wooden diaphragm perforated for a wooden stem is attached; to the upper end an elliptical wooden ring is fixed. Inside these laths is a compressible bucket attached to the lower edge of the ring and embraced by a strap and buckle. These elliptical rings are made in a special manufactory and are supplied in eight sizes. The adjustable bucket inside the laths is made of a single piece of three-ply wood one-eighth of an inch thick, and its overlapping edges are free and yield to the pressure of the strap and the buckle, so that as the limb shrinks it can be altered by a

FIG. 9.—The Kensington peg.

are riveted in their whole length, making a perfect cone in length and a perfect circle in cross section. This gives stability and endurance. A new peg is made if shrinking takes place. The cost of materials is 8s. 6d.

It is not claimed for any of these pegs that it is ideal. Workers realize that the perfect peg has not yet been

5. *Eaton Gate*.—This peg is made of fibre and is cone-shaped. Its overlapping edges are not riveted, but bound together by a series of broad straps and buckles, while the upper edges are upholstered and then covered with a movable chamois leather covering, which can be changed. In this peg an attempt is made to serve the double purpose of the therapeutic and the auxiliary pegs; it can be used before shrinking has taken place, and gradually tightened as the shrinking progresses. Stability and permanence are to some

FIG. 8.—The Erskine House peg. A. Wooden ring; B. strap round compressible bucket; C. C. laths; D. diaphragm; E. wooden stem.

tightening of the strap. The wooden stem passes through the hole in the wooden diaphragm and is adjustable as to length. It is firmly fixed by screws when the height of the patient is ascertained. The material costs about 15s.

7. The *Kensington* peg is a fibre cone like that already described. The rim along the inner side is slightly everted, when moist, with a hot tool, and then padded. The bucket, which is simply the top of the cone, is upholstered in such a way as to accurately fit the stump. A movable and washable sock covers the rim and lines the bucket. In the case of a short thigh stump a pelvic band with a hip hinge is attached. This gives better control of the peg by the stump. There is no vertical split in the bucket, and the overlapping edges

found, and all are attempting new designs. It is hoped that all the dépôts will use their best endeavour for the provision of an auxiliary limb which will so fulfil the every need of a limbless man that the provision of a permanent limb may be postponed for a longer period than has hitherto been the rule, in order to avert the great cost of refittings following premature manufacture, and the consequent disappointment of the man.

SOME REFLECTIONS ON CARDIAC CONDITIONS IN SOLDIERS.

BY

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THE belief of Hippocrates that the heart was not affected by disease, which idea persisted well into the seventeenth century, stands in strange contrast with our present-day experiences of the numerous ramifications of cardiac specialism. The war would seem to have made affections of the heart bulk more largely in the eyes of the profession than ever before.

In any large military hospital at the base on any front there is always in the medical wards a fair proportion of so-called cardiac cases; then again, in the examination of recruits, the invaliding of soldiers out of the army or their recategorization, the view taken of the cardiac condition is frequently of primary importance. In a military hospital the number of cases with definite organic disease of the heart is, as might be expected, comparatively small, for such would hardly have passed through the various meshes which encompass the prospective recruit prior to his admission into the army. The large majority of these cardiac cases have gone sick with a variety of symptoms, such as shortness of breath on the march, faint feelings or a general sensation of exhaustion, pointing certainly *prima facie* to some derangement of the circulatory system and often classified under the rather unsatisfactory title of "Disorderly Action of the Heart." As in other departments of medicine, or indeed of life in general, war would seem to have revealed aspects of heart affections which had been but imperfectly apprehended before.

On the one hand war has shown the strength, on the other hand the weakness, of the heart. Many of us must have encountered cases with an organic valvular lesion which had yet been able to carry on satisfactorily for a considerable length of time, and had finally gone sick with something having no obvious connexion with the heart condition. No one can fail to be astonished at the amount of hard work which can be performed by a man with a serious cardiac lesion who has either escaped the vigilance of the recruit examiner or fallen in with an unduly indulgent one. Thus, I well remember a case of mitral stenosis in a man aged 42, whose lesion was clearly due to an attack of rheumatic fever contracted some twenty years previously, but who had been driving a motor in the A.S.C., first in France and then in Salonica, since 1914, and had not suffered from any cardiac symptoms till a month prior to his admission into hospital with malaria in July, 1917. Similarly, I came across a young Canadian with obvious aortic regurgitation, dating from an attack of chorea at the age of 17, who had served in France for eight months in the infantry and about the same period in the field artillery without having had any cardiac symptoms to trouble him, and who had come into hospital for a gunshot wound of the thigh. French writers are of opinion that mitral stenosis is the form of valvular lesion which shows least resistance to active service conditions, whereas aortic disease, when of rheumatic origin, may be viewed more favourably; but it need hardly be said that all valvular lesions, whether mitral or aortic, when of degenerative, arterio-sclerotic origin, are quite unfitted for active service in any form.

But, of course, the war has also disclosed the hitherto unknown weakness of some hearts, just as it has surprised us with the unexpected strength of others. Many of those hearts which give way on active service are, doubtless, intrinsically unsound, though their owners have been able to do their ordinary work in civilian life with little inconvenience, because it has involved no special stress or strain. Hearts are affected less by the actual

amount of work entailed by military life than by the sudden and unexpected demands made upon them from time to time; the same daily output of work might have been accomplished without risk had the man been able to take his own time about it. By testing the reaction of such hearts to exercise no doubt much assistance is gained for making a general estimate of the cardiac reserve power, but the exigencies of active service in the field make a great strain upon the nervous system, and it is this factor which it seems almost impossible to estimate beforehand, at least by any mechanical devices.

French physicians have recorded three definite cases of permanent tachycardia of emotional origin; in each case the tachycardia developed after concussion due to shell explosion. The serious effect of emotion upon the heart was noted long ago by Corvisart during the French Revolution, who said, "I am not the only physician to whom it appeared that organic diseases of the heart during the reign of terror were more frequent than in ordinary times."

Most of these cases with what one might call "sub-normal" hearts complain of shortness of breath on quite moderate exertion, at times of giddiness and faint feelings, but most especially of a general sense of exhaustion, occasionally, too, of nocturnal palpitations, but complaint of actual pain has in my experience been infrequent. The most usual physical signs in such cases are a rapid pulse, a diffuse slapping impulse, and at times an indefinite short systolic murmur at the apex, which has really but little resemblance to a true organic mitral murmur. Careful inquiry would elicit that in very many instances these cases had in the distant past suffered either from rheumatism, diphtheria, frequent attacks of influenza, or that during the war they had been in hospital with trench fever or some indefinite febrile disorder. There is little doubt in my mind that these last-named affections do quite definitely impair the efficiency of the myocardium.

On the other hand, malaria, which has affected so large a number of our soldiers and of which I have had the opportunity of seeing a good deal both in Salonica and afterwards at home among the soldiers returning from the various Eastern fronts, seems quite exceptionally to have had more than a transitory effect upon the heart. Many cases have, of course, been much weakened in their general health by the constantly recurring attacks, but, in my experience, it is seldom that cardiac manifestations, when present, can be attributed to malaria. It so happens that many cases of malaria have also suffered from dysentery, and it seems probable that such cardiac weakness as occurs may be due to the dysentery rather than to the malaria. It may be remembered that Da Costa, in his classical article upon "The irritable heart of soldiers," gives as one of the most frequent causes of it "prolonged diarrhoea."

Apart from an occasional case of obvious Graves's disease which has developed rapidly owing to the unfavourable condition of active service, it has not been my experience that the tachycardia so common in soldiers can often be traced to hyperthyroidism, and this seems also to be the experience of Continental physicians, though much has been written to the contrary in this country. A far more potent cause is tobacco, particularly in the case of young soldiers. Among older men arterio-sclerosis is fairly common, at least in its early stages. But on careful investigation it will be found due to causes which were in operation before the man entered the army, but obviously made worse by the abuse of alcohol and tobacco, while the excessive meat dietary, which is so characteristic of the British army, has also a most unfavourable influence upon the condition.

The fact that so many cases suffering from some apparent cardiac disability are not, strictly speaking, cardiac at all has been much insisted upon by many observers, and particularly by British physicians. Such cases might be regarded as conditions of "cardasthenia," on the analogy of neurasthenia, though this latter term has more subtle and wide-reaching connotations than its name would seem to indicate. In any given instance of one of these indefinite cardiac conditions, to determine how much is due to a nervous and how much to a muscular affection must be left to the acumen of the individual physician; it is unlikely that mechanical methods will prove of much assistance in this type of case. Medical labels are bad for soldiers, and perhaps for other people, too, while nothing is more unwise than a false precision. Medical officers are often much hampered by the rigidity

of the official nomenclature of diseases, which tends to impress the soldier too much with the name of his complaint, to which he clings with a pathetic persistence; also it leads to that "education of diseases" so strongly deprecated by Plato in the Republic.

A NOTE ON THE THYRO-TOXIC HEART.

BY

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CERTAIN conclusions as to the relation of thyroid secretion to the action of the heart seem to be definitely accepted.

1. Prosenchymatous enlargement of the thyroid causes mechanical trouble only, and has no effect on the heart. There is no trouble until a sclerosing process destroys gland substance, then myxoedema may start.

2. It is parenchymatous enlargement that gives trouble.

(a) There may be only intermittent overactivity without decided permanent enlargement; this is hyperthyroidism.

(b) There may be marked permanent overgrowth, with fluctuating overactivity, culminating in the permanent fast heart of Graves's disease. One form of paroxysmal tachycardia is due to excessive secretion; the rapidity stops short with the cessation of the secretion, and it has been known to occur as the stethoscope was being used.

(c) Between these conditions is a minor degree of overgrowth obliterating the inner sulcus along the clavicular ending of the sterno-mastoids, the fullness moving up on swallowing. In some 2,500 cases of recruits classes (a) and (c) account for 5 per cent. of the cases of cardiac disturbances. This amount of hyperthyroidism amongst men was never suspected until they came to be examined with their throats exposed. The dark or neurotic type has hyperthyroidism ten times more frequently than the blue-eyed.

3. In thyroidism the pupil is dilated. A mild solution of adrenal extract which causes contraction of a pupil not influenced by thyroidism fails to produce contraction when under this action. This is supposed to be diagnostic. Usually in cases of type (c), when the question is put, "How do you sleep at night—do you ever wake?" the answer is, "After a sleep I awake frightened." "And what do you notice then?" "My heart is beating very fast, and sometimes I have to sit up in bed." Some of these patients complain of insomnia with the same waking after they have managed to get asleep. Sometimes there is only the history of waking up with night sweats.

4. Adrenal secretion contracts the arterioles and slows the heart if its hormone fails to activate the thyroid. Excessive adrenalism occurs on sudden fright or on profound nerve strain, as in "fright" chorea, or the strain of action, as many take it, as also great mental and physical fatigue in certain constitutions, and from other causes. The first two causes specially concern front-line soldiers and the fatigue group, and even those undergoing only the strain of training at home. If the thyroid responds by activity that balances the excessive adrenalism it is well. But, once set going, the thyroid may secrete for long after the necessity ceases; hence an obstinate tachycardia. There is also a normal permanent secretion of the adrenals, with a corresponding balanced thyroid secretion. If the former falls short, the latter remaining at its normal, there is a potential hyperthyroidism without any enlargement. The pupil reaction to the adrenal secretion with change in blood pressure would be diagnostic.

5. A peculiar fact is that the thin-faced dark type of man, as a rule dolichocephalic, seems to be specially liable to hyperthyroid action—in my figures ten to one gives the relative frequency. I believe there is some connexion between this condition and the secretion of the testes, and that the man not living the sexual life is specially prone to it.

6. In a heart driven by the thyroid secretion the diastole is shortened; in intermittent cases there is a temporary weakening of the myocardium; if permanently driven the heart muscle "rags out" in atrophy. In addition to a