THESIS

being

SOME REMARKS ON CARDIAC DIAGNOSIS,

by

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M.B., Ch.B. Edin. 1911.

M.D. 1919

C O N T E N T S.

SECTION I.

PRELIMINARY.

The following notes on the examination of possible cardiac defects adhere strictly to the province of the title; that is to say, questions of physiology, pathology, treatment and prognosis are not dealt with.

Further, limitation is imposed by the avoidance of observations common to any text book, and by restriction mainly to cases showing a reduction of the field of effort insufficient to endanger life.

Largely, but not entirely, is this work based on a series of examinations of young soldiers presenting the "effort syndrome" with a view to differentiation of the underlying conditions entailing such complaints, the guiding conception of organic disease being the inability of the heart to perform those functions customary and proper to the individual.

Such being premised it may be added that investigation followed a considered routine requiring one or more complete clinical examinations of every case, each occasion taking about an hour.

In differential diagnosis the following conditions should be excluded :- pulmonary tuberculosis, thyroid intoxication, nephritis, intercostal neuralgia, pleurodynia, chronic bronchitis, dyspepsia, and muscular strain. It might not be thought that such cases/

cases would appear but I have had examples of all through my hands as query hearts.

SECTION II.

HISTORY.

Too much stress cannot be laid on the full investigation of the patient's former history. The temptation indeed may justifiably arise of hazarding a diagnosis on an accurate history of infection alone.

The heart has its own acute diseases, but they are few and comparatively infrequent; whereas there is practically no serious acute systemic disease or chronic septic septic infection which can not and but seldom does not leave its sequel of the impaired heart. I need but refer to the immediate and remote effects of rheumatic fever, scarlatina, diphtheria, etc., to be understood. The damaged heart is in short the scar of an old conflict; heart disease is secondary rather than primary.

That the inefficient heart is the legacy of an old infection, acute or chronic, need not be more than mentioned. What however every schoolboy knows many a student forgets, and reiterated emphasis is necessary of the fact that while the dangerous results of rheumatic/

rheumatic fever and its allies are but too well known, it is only too often overlooked that chronic middle-ear disease, chronic furunculosis, dysentery, chronic bronchitis, and the like are equally competent to interfere permanently with the mechanism of the heart.

The following table illustrates this point; it comprises a series of 88 cases in sequence referred for examination of complaints possibly cardiac (acute conditions being excluded).

TABLE I.

	HISTORY 1. Of acute or chronic rheumatic infection.	HISTORY 2. Of acute or chronic rheumatic plus other acute or chronic infections.	HISTORY 3. Of various infections.	HISTORY 4. Nil.	HISTORY 5. Unknown.	Totals
DISEASE. A. Organic cardiac disease	13	4	8	4	2	31
B. Anaemia debility or other disease.	0	1	14	12	0	27
C. Neurasthenia.	2	1	8	10	0	21
D. No appreciable disease.	3	1	2	3	0	9
					Total	88.

From this Table can be inferred :-

1. The approximate proportion of true cardiacs in query cases, diagnosis being along the lines subsequently/

subsequently laid down.

2. The great predominance of a history of rheumatic fever* and the like or some serious infection in the organic cases and vice versa.

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* No statement of rheumatic fever is accepted without a definite account of a long illness in bed with fever and swelling of joints.

SECTION III.

SYMPTOMS.

1. General. The common complaints are breathlessness, pain, palpitation, dizziness, fainting, headaches, lassitude, insomnia, and nervousness.

Of 27 organic cases specifically asked for the "thing that troubled them most", 6 gave breathlessness, 2 gave palpitations, 7 gave pain, and 12 did not think any special symptom worse than the others or mentioned a minor complaint.

In this connection the extraordinary manner in which the damaged heart will maintain the integrity of the individual, and with full compensation give rise to no symptom to indicate its presence has to be seen to/

to be believed. With however the advance of years, exposure to infection or some similar stress, the latent defect is made manifest.

Case No. 14. Latent organic disease lighted up afresh.

Man. Age 33. Thin and ill-looking. Rheumatic fever 8 years ago. V.D.H. Up to recently was employed as a country postman, walking daily about 12 miles and felt very well. Has just been 3 or 4 weeks in bed with "inflammation of kidneys", and now suffers from "beating of the heart", shortness of breath, headaches, dizziness and fatigue. No pains. Heart - $3\frac{1}{2}$: 3: $1\frac{1}{2}$* Loud rough systolic mitral murmur; transmitted; thrill; small soft compressible pulse at 108: 120: 120: ? : ?:* could not complete exercise, distress, panting, soft irregular pulse. Urine - acid, 1030, neutral, loaded with albumin.

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* NOTE - In all illustrations of cases the following conventions are adopted for brevity and convenience.

Heart - Measurements in inches are taken from the midsternal line to the outer left border, middle line to apex beat, and middle line to outer right border, the patient being recumbent, and are so figures. "Heart - $3\frac{1}{2}$: 3 : 1 : " or as the case may be.

Pulse - The pulse-rates are taken lying, sitting and standing, with a 30 second interval; then immediately after the specified exercise (20 hops on each foot), and lastly 60 seconds after completion of the exercise. The figures are always given in that order, for instance, "Pulse:- 60 : 66 : 72 : 120 : 70". The latter/

latter two are always quarter-second times.

Blood pressure. The systolic and diastolic pressures are taken lying and figures "systolic/diastolic"; after a five minute interval in the standing position, the test is again applied (standing) and similarly figured in the second place - so "B.P. 120/75: 118/72".

Tracings - polygraph or sphygmograph - were taken in the great majority of cases. They are not shown except where considered essential.

The Haemoglobin index: by the Tallquist scale is recorded, e.g. "Hb - 90%" -

It is assumed that a full examination of the patient is carried out, so that negatives unless illustratively required, are omitted.

2. Breathlessness.

Breathlessness does not necessarily occur in cardiac impairment only and occasionally is not complained of at all in a case presenting a definite lesion. But it can in the latter be readily elicited by questioning or by a simple exercise test. It should be borne in mind in this connection that all persons leading a sedentary life may get "out of puff" running up stairs, etc., and that secondly everyone adapts his exertion as far as possible to his comfort.

Breathlessness/

Breathlessness is an important, perhaps the most important, symptom in heart disease. It is frequently the first indication of a diminution in the response to effort. Organic disease with debility, anaemia, and the like, possesses no specific time or set distance before this becomes apparent, the varying extent of the involvement permitting a varying reaction. Where however a deficiency of nervous tone is the causative factor concerned, breathlessness occurs or is complained of to quite an unnecessary extent.

3. Pain.

There are various types of precardial pains complained of by cases suggesting or simulating cardiac disease.

The most serious form is of course angina pectoris. This is a truly agonising pain, not necessarily induced by exercise. It is always accompanied by hyperaesthesia and enlargement. Its position tends to be mid-sternal, but may be adjacent to the nipple. It radiates into the shoulder and down the inside of the left arm and passes off suddenly. The description of his pain by the patient is characteristic.

Case No. 3. Angina Pectoris.

Man. 48. Highly coloured, heavily built, alcoholic type. Had been much troubled with sciatica, now better. Buried by shell fire three times, last in May 1917.

In/

In Jan.1918, noticed that he got breathless on slight exertion, such as he formerly could readily undertake. Then he began to have attacks of pain. He stated that in the attacks he first feels weak, then he gets breathless, the heart meantime beating very rapidly; the chest feels tightly constricted and there comes an intense and horrifying sensation of going to lose consciousness. Next he feels the pain striking below and outside the nipple, radiating down the left arm and shooting through to below the scapula, but it only lasts a moment or two. Then the heart suddenly gets all right and except for feeling weak and exhausted he has no further trouble. During the attack the heart-beat is fluttering but appears to be regular; in the course of the next day or two he notices an occasional irregularity, but not particularly disturbing.

He has had one attack when in bed. Heart - $5\frac{1}{2}$: $4\frac{3}{4}$: $1\frac{1}{2}$. Sounds nil. Pulse - forcible and hard, regular. Hyperaesthesia - in 5th.interspace, left pectoral, and left upper arm.

The ordinary painful sensation of organic cardiac disease is always induced by effort and is not particularly severe. Its position is always beside the nipple, and it may radiate to below the scapula or up to the shoulder, but never into the arm. It frequently remains beside the nipple. It never occurs at night or at rest, but characteristically is noted just after cessation from exercise. Relief is gradual, there being no sudden stop. The true angina is not certain of an exact point where the pain strikes, but this type of case can lay a finger tip on the place. A hyperaesthesic space (in the 4th or 5th) can usually be detected, and enlargement is common.

Case/

Case No. 18. Slight organic disease.

Man. Age 24. Slight but well built. Rheumatic fever in 1907. D.A.H. 1915. Diphtheria 1916. V.D.H. 1917. Complaints - fatigue, dizziness, palpitation, pain around and below nipple, not transmitted anywhere; notices it more when resting after work than during exertion. Heart - 5 : 4½ : 1. Musical crescendo, presystolic mitral murmur not well propagated. Thrill. Inspiratory acceleration induced. Slight hyperaesthesia in 5th around apex beat. Pulse 80 : 80 : 84 : 180 : 92. Irregularity after exercise.

Cases of anaemia or debility do not usually complain of precardial pain.

The "organically irritable" heart should be separated from the "functionally fretful". The latter is but the manifestation of a general condition, i.e. neurasthenia, and is to be distinguished by certain features. It should of course be remembered that a cardiopath may become a neuropath or vice versa.

The neurasthenic always has pains, always of a vague or indefinite type. They are never severe, never sufficient to limit his (or her) desires in any direction; induced by excitement rather than by exercise; frequently occurring at night. There is spurious hyperaesthesia anywhere the examiner may suggest or on many points on the chest wall. Radiation may be in any direction but never into the arm or through to below the scapula. The pain passes off gradually. There is no enlargement of the heart.

Case/

Case No. 33. Neurasthenic.

Boy. Age 18. Slightly built, intelligent. Has defective eyesight and hernia. History of scarlatina and appendicitis. Has always been nervous. Complaints- pain just above and inside nipple, which shoots downwards, sometimes of a sharp stabbing nature, or may be a sort of vibrating; stops gradually; heart beats quite regularly. Comes on when taking exercise or when sitting quiet reading. Never at night. Gets giddy if he turns round once or twice. Headaches posteriorly. Gets easily breathless.

Hb - 90%. Heart - 3½ : 3 : ¾. Sounds nil. Slight inspiratory acceleration induced. No hyperaesthesia. Pulse - 120 : 120 : 120 : 138 : 120. Normal pulse lying - 60 to 70. Pulse small and regular. Reflexes exaggerated. B.P. 130/94 (lying).

Case No. 30. Functionally fretful heart.

Boy. Age 18. Thin built and sallow. Rheumatic fever in 1914. Is very nervous, for instance, during thunder. Complaints - for last 8 months (in 1918) has had pains around heart, position over ensiform, of a stabbing nature, coming on mostly at night; at the same time his head starts aching and he feels dizzy. Passes off gradually. Giddiness after exertion. Breathlessness. Heart thumps if he does too much walking. Sweats a lot.

Hb. 90%. Heart - 4 : 3½ : ¾. Sounds nil. Slight inspiratory acceleration induced. Hyperaesthesia both pectorals. Pulse small, regular, rapid. Average pulse when asleep - 66 (four tests). Rates - lying - 104 and 112.

Sitting - 92 & 112 & 100.
Standing - 108 & 92 & 120 & 112.
After exercise - 152. 60 secs. after 104.

The rates were taken in ¼ minutes at short intervals on the same examination. B.P. (lying) 136/82.

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4. Palpitation.

By palpitation is meant a temporary "fluttering"

or/

or "thumping" of heart at a rapid rate evident to the patient. It is a complaint common to many diseases.

Where a cardiac question is involved two types can be readily distinguished by the association of the symptoms with exercise. Where there is any deficiency in the cardio-vascular mechanism palpitations are - or may be - induced by effort, and are not seen under any other circumstances. This class of case includes organic disease, debility and the anaesmias.

Where the error lies in the nervous control palpitations are a constant complaint, are not solely related to reaction to exertion, but occur on almost any occasion, e.g. in a crowd, at night in bed, if frightened, sitting quietly reading, etc.

While differentiation should be precise it is always liable to modification in that the cardiopath may become a neuropath or may be suffering from some other condition liable to give rise to similar complaints and thereby confuse the issue and the diagnosis.

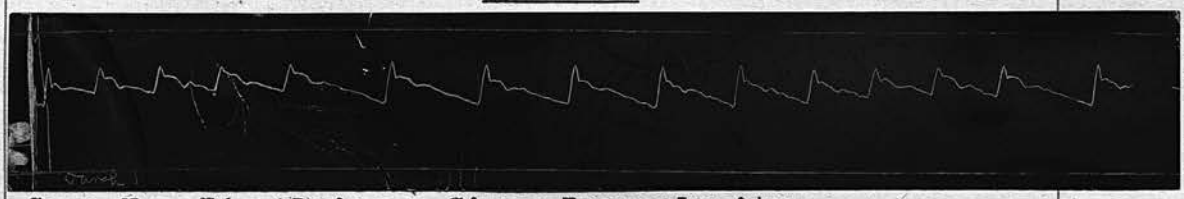
Case No. 34. Debility, Sinus irregularity, Palpitations. Tracings.

Boy. Age 18. Thin pasty-looking. Pleurisy and bronchitis. Has always been delicate. T.B. on mother's side. Complaints - pain about the 6th rib and across upper part of chest, always there more or less. Has it at night and after exercise. Short-winded. Weak. Giddiness. Faintness. Gets attacks of "heart beating like mad"; does not go on very long; his heart seems to get caught between his ribs - induced by excitement or after pains.

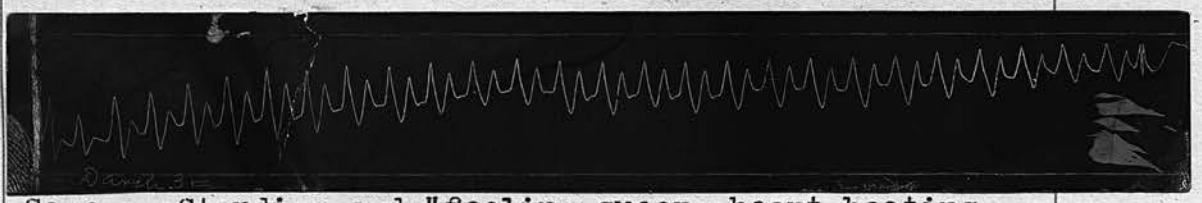
Hb. 90%. Heart shows cardio-pulmonary murmur and sinus/

sinus irregularity. Heart 3½ : 3 : 1.
Pulse - lying 56 & 60 & 68.)
sitting - 64 & 64 & 60.)at short intervals.
Standing - 68 & 76 & 76.)
After exercise - immediate - 148.
" " after 60 secs. 72.
Distressed by exercise and pulse small, B.P. 128/86. (lying). Lungs - prolonged exp. all over - emphysema.

TRACINGS.



Case No. 34. Lying. Sinus Irregularity.



Same. Standing and "feeling queer, heart beating like mad".

Case No. 50. Neurasthenic. Sinus Irregularity. Palpitations.

Boy. 18. Mother T.B. Nervous type. Complaints - states has cough, spit and sore throat - neither physical signs nor cough noted. Attacks of palpitations after work or walking; the heart beats away very quickly, then stops still for a little, then goes on again and by and bye gets better. This often happens when he is in bed and he has always suffered from it more or less. Also induced by exercise. Pain in chest right across - when in bed or taking exercise. It follows the palpitation. Breathlessness. Giddiness. Tiredness.
H.B.90%. No hyperaesthesia. Sounds clear. Sinus irregularity. Heart - 3½ : 3 : 1. Good pulse - 64 : 68 : 64 : 124 : 76. Reflexes normal.

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5. Other complaints.

Headaches are common in anaemia or in neurasthenia, but not in organic disease.

Dizziness is essentially a neutasthenic complaint as Faintness belongs to the anaemic or debilitated.

Lassitude occurs in any run down condition. In organic disease, anaemia, debility, or neurasthenia, may be seen the same lack of interest, lack of energy, lack of spirit.

SECTION IV.

EXAMINATION.

INSPECTION.

1. General. The general appearance, colour - especially of the lips, attitude, tremor, sweating, etc., should be observed, as well as note taken of the precardiac region. The shape of the chest, its movements and pulsations both in the chest and neck should be considered.

The maximum pulsation of the apex beat may be easier palpated than seen. The pulsations in the neck may occasionally show the rhythm of the auricular pulse.

The variations of the pulsations with position are of no material value.

PALPATION.

2./

2. The apex beat being determined is a reliable guide to the size of the heart. It is usually inside the nipple in the 5th interspace, about three inches from the mid-sternal line. Its variation in character and place and the deductions therefrom do not need remark here.

The apex beat in young subjects may change in position with posture, but I have not been able to attach any clinical significance to the movement.

3. Thrill - is a peculiar and quite characteristic sensation imparted to the fingers in the presence of certain bruits. It may be present with soft murmurs of non-organic nature, but is usually associated with the rough organic type. Unless the very definite and unmistakable sensation be noted it should be considered as absent; in this as in many other of the finer details of examination, self deception may readily be practised.

Thrills vary markedly with posture. It is in the standing position that they are best felt. Exercise will further accentuate a thrill, may even induce one in the soft anaemic bruit, or it may completely abolish them (with the murmur) in which case they are not organic.

In view of the association with murmurs illustrations are afforded under para. 6.

Well/

Well-established valvular lesions always show a thrill with conditions physically suitable.

4. Hyperaesthesia.

In the true angina hyperaesthesia is always present. Its location is the left pectoral and the left arm just above the internal condyle of the humerus anteriorly.

In the organic heart not showing true angina, hyperaesthesia is also constant, is present around the nipple, i.e. in the 5th interspace or thereby and can often be followed outwardly for a variable distance.

This hyperaesthesia is slight and is not to be compared with that seen in angina.

Case No. 6. Organic.

Man. 31. Strongly built. Rheumatic fever 1909. Complaints - pains since the fever of a shooting stabbing nature, located by patient exactly at apex beat. Palpitation. Breathlessness. Dizziness.
Hb. 85%. Heart - 5 : 4¼ : 1. Soft systolic mitral murmur best heard standing, not well propagated. Thrill standing only. Hyperaesthesia - inside and above left nipple and in 5th interspace in axilla.
Respiratory variation induced. Pulse - 52 : 68 : 74 : 104 : 84 : B.P. 128/82. 132/90.

The hyperaesthesia of the neurasthenic resembles his pain in being located anywhere from the umbilicus to the cricoid and it can be frequently suggested to the/

the patient that one place is more tender than another.

Case No. 49. Neurasthenic.

Boy. 18. States has always been delicate and under medical attention. Complaints - pains, - indicated position diffusely over left side and stomach: come on at any time, more so walking or working. States he is always breathless. Giddiness. Faintness.

Hb. 87%. Heart 3½ : 3 : 1. Systolic murmur all over both lying and standing. No thrills. Not transmitted. Both pectorals tender on palpation. Abdomen held rigid. Pupils brisk. K.J. exaggerated. Refuses to perform exercise.

B.P. 140/74 : 156/74.)
178/96 : 175/100.) on separate
126/88 : 145/80.) occasions.

While pulse tracings were being taken he was noted as breathing at the rate of 57 a minute.

The anaemic and the debilitated do not have any hyperaesthesia.

PERCUSSION.

5. Size of the Heart.

By percussion the size and shape of the heart is made out.

In 49 non-organic hearts examined the average was - from the mid-sternal line -

L.B. 3.4 : A.B. 3.1. : R.B. 1.1. :

In 22 organic cases the average was -

L.B. 4.1. : A.B. 3.5. : R.B. 1.2.

It may be accepted that definite cardiac impairment/

impairment always gives rise to enlargement. The normal sizes are $3\frac{1}{2}$: 3 : 1. approximately, for they will vary with the individual according to physique and employment. A rough and ready guide, by no means so inaccurate as might be supposed, is the nipple beyond the inner edge of which the left border should not reach.

Enlargement of the right side is apparent when the R.B. is 2 inches out.

Enlargement to the left exists when the L.B. is 4 inches out, except perhaps in a large and powerful man. Generally speaking, a heart may be taken as enlarged if its total transverse diameter exceeds 5 inches.

AUSCULTATION, etc.

6. Murmurs.

The heart sounds ought to be clear and distinct and there is no doubt but that the presence of impurity is due to some underlying cause, indefinite and obscure as that may be.

In point of fact impurities are very common, and may or may not be of value.

A long series of recruits, partially trained, those with any complaint whatever being strictly excluded, were found by myself to show a large proportion of impure sounds, from 15 to 20%.

If/

If any unusual heart sound be considered, as it should be, in relation to character, attitude, exercise and respiration, certain distinctions between the actually and permanently diseased valve and the so-called "functional" condition become apparent.

A rough or musical sound, or one present other than in systole is always organic. The murmur of valvular disease is further best heard standing up, is accentuated by exercise or by forced respiratory effort, and is extremely rare in the pulmonary or tricuspid areas. Organic disease, at any rate in the early stages, is generally restricted to one valve, a mitral lesion being most common.

It has been stated that only organic murmurs are propagated: this is not correct.

Non-organic bruits are always systolic in time, are always soft and blowing and are best heard lying down. When not constant in the same attitude , when varying with the respiratory cycle, or when disappearing after exercise, a murmur is never organic. Further, non-organic prefer to affect more than one valve at a time, usually the pulmonary and mitral.

Case NO. 68. Non-organic murmur and thrill.

Man. 29. Strongly built, physical training instructor. Beri-beri & D.A.H. in 1916. No complaint whatever. Hb. 90% Heart - 4 : 3½ : 1. Lying - shows a soft, blowing, loud systolic mitral murmur not propagated. No thrill. Softened pulmonary systolic. Standing - mitral murmur not so definite but propagated slightly. Well marked thrill. Systolic pulmonary unchanged. Respiratory variation well marked. Pulse -

72 : 74 : 80 : 116 : 76 : Nil else.
B.P. 128/76. : 144/86. Hyperaesthesia - nil.

Case No. 81. Debility. Non-organic murmur without thrill.

Boy. 18. Poor physique. Pneumonia and scarlatina in childhood. Complaint - "bumping" of heart, varying a lot, sometimes very fast as when walking, and again very slow as when lying. Breathlessness. Pain in the middle of the sternum. Has always been so troubled.

Hb. 90%. Heart - $3\frac{1}{2}$: $2\frac{3}{4}$: 1. Lying - a loud soft systolic murmur at pulmonary and mitral, more so former; not propagated; no thrill. Standing - murmurs not so marked; no thrill; not propagated. More marked after exercise. No hyperaesthesia. Pulso - 92 : 80 : 92 : 140 : 88. Sinus irregularity noted. B.P. 124/82: 132/82.

Case No. 80. Neurasthenia. Propagated mitral murmur lying, absent standing and after exercise.

Boy. 18. Fair physique. Pneumonia childhood. Sister died of T.B. Complaint - since Father's sudden death two years ago, has complained. Sometimes in bed heart suddenly starts fluttering like a "bird's wing", and can hardly get breath. Burning pain in left side. Breathless with exercise or any shock or excitement. Weakness. Giddiness.

Hb. 87%. Heart - $3\frac{1}{2}$: 3 : 1. Lying - soft systolic mitral murmur propagated to axilla. No thrill. Standing and after exercise, sounds clear, though mitral systolic flapping. No hyperaesthesia. Pulse - 100 : 100 : 104 : 144 : 124. B.P. 122/80. : 144/92.

Case No. 85. Gas-poisoning. Cardio-pulmonary murmur.

Man. 23. Gassed four months ago. Since then has had breathlessness, giddiness, sleeplessness, weakness, no pains. A soft short murmur, resembling a presystolic mitral but only heard towards the end of inspiration and accentuated by deep breathing. No thrill.

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7. SINUS IRREGULARITY.

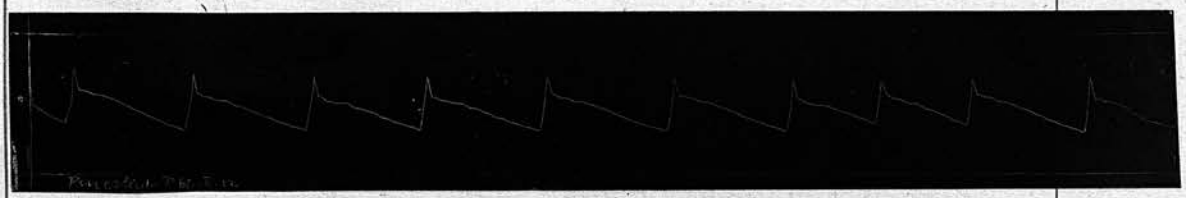
Rhythmic variations in the length of the heart cycle of short duration and perfectly regular are frequently the result of cardio-pulmonary interaction. The variation consists of an increased rate during inspiration and a slowing during expiration. To be exact the times do not quite coincide, the effect of respiration being slightly delayed throughout.

When this condition is naturally present it is known as sinus irregularity. When induced by volitional deep breathing it is known as the respiratory variation.

Sinus irregularity is common in the young and healthy heart. It disappears with increasing years. It is often associated with a slow rate of breathing and is usually not constant. The presence of definite sinus irregularity indicates a healthy heart muscle. The alteration of rate is not usually noticeable to the individual.

TRACINGS.

Case No. 102. Pneumonia; false crisis; lysis; pulse on third day after, showing sinus irregularity.



Case No. 119. Inconstant irregularity, which the patient had himself observed by listening to his heart beat while in bed. P.60. R.12.

Case No. 71. While convalescent from rheumatic fever.

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8. Respiratory variation can be induced by deep breathing in any heart not seriously diseased. The amount of variation, i.e. marked, medium or slight, is a fair index of the heart muscle condition. In well compensated cases it may be very evident. The test should always be applied as it is undoubtedly

as it is undoubtedly

position the result may

ed that I have never been

er 50 years of age.

iratory variation.

Complaints - breathless-
s sternum. Headaches.

of value. In the recumbent

be better. It should be not

able to obtain it in cases ov

Case. No. 35. Organic. Resp

Man. 27. History nil.
ness. Faintness. Pain acros
Palpitations/

Palpitations. Dizziness. Nervousness.
Hb. 90%. Heart - 5 : 4½ : 1½. Presystolic mitral murmur and thrill, both lying and standing. Pulse - 68 : 84 : 104 : uncountable : 100. Pulse mitral after exercise with distress and dyspnoea. B.P. 134/84 : 122/88. Respiratory variation well marked - vide tracing.

TRACING.

Case No. 35. Lying and breathing deeply.

Case No. 24. Organic. Respiratory variation.

Man. 36. Poor physique. Complaint of fatigue. Breathlessness. No pain. L.B. in nipple line. No hyperaesthesia. Reaction to exercise poor. Rough musical systolic aortic murmur best heard lying down. Respiratory variation well marked.

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9. EXTRA - SYSTOLE.

Extra-Systoles are of frequent occurrence both with healthy and unhealthy heart muscle. Their import should be judged according to systematic principles.

The sign is readily recognised with the stethoscope and the finger: there is heard immediately after an ordinary sound-cycle a premature, sudden, short, sharp sound or pair of sounds in the nature of a miniature heart beat followed by a prolonged pause/

pause. While commonly so it is not always within the consciousness of the patient. The pause is always noticeable in the pulse, but the beat itself may not be sufficiently strong to be transmitted.

Extra-systole is noted more often in the expiratory than the inspiratory period and indeed when a feature of the case may be induced by deep breathing, the prolongation of the beats in expiration favouring its occurrence.

Generally speaking, extra-systole should be regarded as of similar value to a murmur, and like the latter its recognition in certain circumstances is definite evidence of the impaired heart.

Where extra-systoles are increased by exercise, or when the regularity not of the time but of the size of the premature beat varies, there is a diseased heart.

Where the phenomenon is present occasionally, or is completely abolished by exercise, or is only noted under the stimulus of nervous excitement, it can be allocated as further examination warrants, but is not of itself positive evidence.

Extra-systoles occurring during severe infections, e.g. pneumonia - where I have repeatedly seen them, are an indication for cardiac attention, and infer, especially/

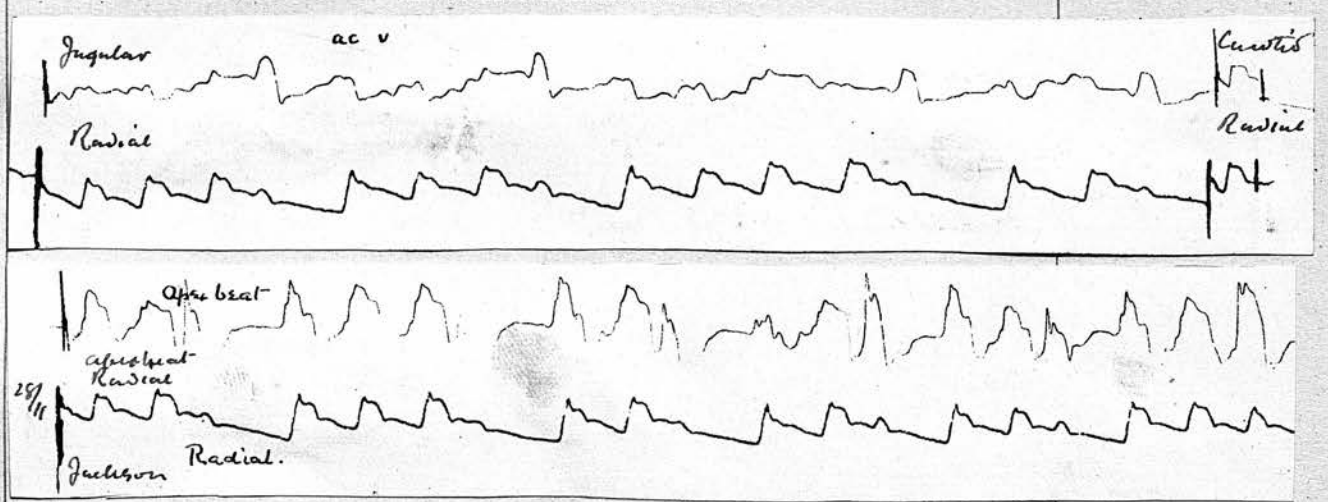
especially if they develop in the later stages, being unknown before, toxic damage to the heart muscle.

They are common as an expression of temporary strain, e.g. after severe coughing, after major operations; or of declining vigour, e.g. after middle age, when they are so frequently noted.

It is important in obtaining information from the patient to arrive at the date of their inception, a value lying in their coincidence with a severe or chronic infection, when more seriousness can be attributed to their presence.

TRACINGS.

Case No. 36. No appreciable disease. Extra-systoles abolished by exertion.



Case No. 74. Organic disease. Extra-systoles induced by exertion.

Case No. 72. Organic. Extra-systoles of different sizes.

Same Case. The lower tracing is of the ordinary lying pulse, the upper is under the influence of volitional deep breathing. It commences from the end of expiration and shows the appearance of extra-systoles during the expiratory slowing of the beats.

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10. THE PULSE.

While the various characters of the pulse in health and disease do not need description, it may be noted in differential diagnosis that the "pulsus "bisferiens" is often seen in anaemic conditions.

Case No. 40. Anaemia. Pulsus Bisferiens.

Boy. 18. Slight, anaemic looking. Hb. 75%. Soft systolic murmurs lying but not standing. Heart size and exercise reaction normal. Pulsus bisferiens.

TRACINGS.

Case No. 40. Pulse lying.

Same. Pulse sitting.

Same. Pulse standing.

The sphygmograms above illustrate further the adaptations of the rate and size of the pulse to posture. Attempts have been made to measure the size variation on the sphygmograph, but no satisfactory results could be obtained. These differences according to posture are increased relatively in disease, cardiac or otherwise. In the normal individual there is about a ten per cent increase with each change of position, allowing sufficient time (30 secs.) for the effect of the exertion to pass off.

A conception of the general condition of the patient is obtained by this very simple method of testing the bodily adaptation to the ordinary requirements of life; the point should be more often observed.

The ordinary lying pulse - I am speaking of men up to their prime - is in the sixties, usually about 65. The sitting pulse is in the seventies, about 72, and/

and the standing is about 77 or 79.

In the organic heart the rates are very often increased and the differences are more marked. In the anaemic or debilitated the rate is usually higher but the differences remain about the same. In the neurasthenic spurious tachycardia is nearly always observed, the same high rate,- say 120 - in all positions being noted.

The pulse taken when the patient is asleep never shows nervous rapidity and is a means of correction of opinion as to the ordinary rate of a given case. This pulse is normally rather slower than the lying pulse - 60 or 62.

The complaint of the patient that his field of effort is limited may be guaged by the reaction of the pulse rate to exertion. Various tests have been employed, but having found the normal, the following has been largely used by me. The standing pulse being noted, the patient hops 20 times - good strong hops - on each foot. The immediate pulse rate is taken and again 60 seconds after completion. This is a severe exercise and it is to be presumed is employed with discretion.

The healthy heart in the man of under 40 does not become uncountable, mitral, or irregular on completion of the exercise; it ordinarily reaches about 120.

After/

After 60 seconds it has returned to the original standing pulse or below it.

Consequently the truth of the statements of any case can be verified by his pulse reaction and by the signs he presents after exercise: in health there is no distress, no pallor, no complaint of faintness, and no undue panding.

In the organic the reaction is always unsatisfactory, depending on the amount of compensation, i.e. that when an organic case has any complaint at all his reaction to exercise will quickly show the labouring heart. Even if his compensation and the adaptation of his life to his heart's requirements are excellent this test will almost invariably display the fault. The rate immediately after exercise is frequently uncountable; by the degree of return (after 60 seconds) a conception of the extent of impairment of the heart muscle can be obtained.

In the anaemic or the debilitated the reaction is commonly satisfactory, for there is in them no actual damage of the cardiac structure. It should of course be borne in mind that the test may be vitiated by the presence of another disease, e.g., nephritis, bronchitis.

In the neurasthenic, the functionally fretful heart muscle fails in many cases to return completely after/

after the exercise but the error is always slight. The immediate effect of exercise moreover is not extreme and the other signs presented by the patient in true distress are wanting.

The following table of averages taken from a series of cases in sequence are submitted in support.

TABLE II.

A. Organic. 28 tests in 22 cases.

75 : 77 : 83 : 124 ?*: 98 ?*′:

*average of 18, the other 10 being uncountable.

*′average of 22, the other 6 being uncountable.

B. Anaemic, Debility and other Diseases.

30 tests in 24 cases.

75 : 77 : 89 : 114 ?*: 89.

*average of 26, the other 4 being uncountable.

C. Neurasthenic.

23 tests in 19 cases.

83 : 84 : 91 : 130 ?*: 99.

*average of 21, the other 2 being uncountable.

11. BLOOD PRESSURE.

The instrument I use is a French's modification of the Riva - Rocci. The palpatory method was adopted for both systolic and diastolic and is figured herein, as follows :- The armlet being adjusted, the pressure is raised and the height at which/

which the radial pulse disappears noted; the pressure being further raised slightly is allowed to fall and the height at which the radial pulse returns is noted. The latter is taken as more accurate for the systolic pressure. The finger being then transferred to the brachial in the bend of the elbow, the pressure is allowed to continue falling, and the change from the immediate heavy throbbing beat to the slighter and softer normal is readily apparent. This is taken as the diastolic. A few m.m. (8 - 10) before this a slight preliminary change in the brachial beat may be noted occasionally, corresponding to the accepted period by the phonendoscope.

The phendoscopic method is considered more accurate, but for practical purposes the above method is more convenient and affords information sufficiently precise.

The general value of B.P. notably the systolic, in certain conditions is not remarked on.

In however the differential diagnosis of cardiac conditions, the following table of averages supports the belief that organic impairment with good compensation has always higher pressures than the normal.

The anaemic, debilitated, etc., show ordinary or slightly/

slightly reduced results.

The neurasthenic exhibits undue emotional effects on the figures, which are nearly always higher than would be expected. The ages of the cases ranged from about 18 to 30 years.

TABLE III.

A. Organic disease.

24 tests in 20 cases.

137/88 (lying) : 148/89 (standing).

B. Anaemia, Debility, etc.

17 tests in 15 cases.

126/77 : 126/80.

C. Neurasthenia.

27 tests in 19 cases.

129/83 : 140/85.

D. Normal.

31 tests in 23 cases.

121/73 : 125/77.

SECTION V.

CONCLUSION.

Due regard being given in the clinical examinations to the exclusion of diseases of other systems or organs (vide Sec.I), the consideration of the aspects of cardiac diagnosis presented in the preceeding pages permits a differentiation of "effort syndrome" cases into three main groups which may be briefly summarised.

A. Organic Heart Disease.

The genuinely damaged heart has been damaged by an infection, acute or chronic, which the case-history will relate. The symptoms of choice are breathlessness and pain of a specific type related to exertion. The heart is always enlarged and may show a murmur, which may again be definitely of an organic nature and which if well established is nearly always associated with a thrill. Hyperaesthesia is present. Respiratory variation varies according to the amount of compensation. Extrasystoles of a special occurrence may appear and indicate the damaged heart. The pulse-reaction to posture and exercise is poor. Blood-pressure is higher than normal.

The above of course only covers early cases.

B./

B. Anaemia and Debility.

In view of the lack of more precise expressions the terms are employed as they are generally understood.

Such cases have no specific history. The complaints common are of lassitude, weariness, tiredness, weakness and headaches. There are multiple soft systolic murmurs varying with posture, without hyperaesthesia or enlargement. Sinus irregularity is frequent, and induced respiratory variation is well marked. The pulse rates and blood pressures are normal or nearly so.

The patient is generally of poor physique and colour, with a low haemoglobin index.

C. Neurasthenia.

With no infection history the neurasthenic is full of complaints, pain of some sort and location being constant. Palpitations are common, but like the pains have no precise association with exercise. The attitude, speech and appearance are of the nervous type, tremor and sweating being apparent. Soft systolic murmurs with spurious hyperaesthesia, but without enlargement, may be noted often along with sinus irregularity. Extra-systoles of a negligible type may be present. The pulse shows a "consultation" rapidity, but reacts well to exercise, and the blood pressure varies unduly under the influence of emotion. The reflexes are exaggerated.
