Variations on the state of the Public

J. H. Marshall

1868
The information we obtain by physical diagnosis is generally more reliable and more valuable than that obtained from the statements or cross-examination of a patient, and we should be blameless ourselves to neglect any point of physical which might enlighten us upon his condition. It should, however, always be remembered that there is a danger of overrating or underrating the importance of certain symptoms, and no single symptom should (as in the majority of cases) be taken as indicating anything exclusively in itself. I do not wish to attempt to point out the importance of each branch of physical diagnosis, and I shall content myself with referring only to the variations observable in the state of the pulse.

We can obtain important information from day to day by ascertaining the state of the pulse at the wrist, without which, we should very likely in many cases, be in both our diagnosis and treatment, and therefore it should always be carefully
noted and its true character ascertained. Indeed it is so conveniently situated for examination at the wrist, that it might have been placed there especially as an indicator of certain phenomena, if we would but take the trouble to examine it.

In some cases we have to depend a great deal upon the state of the pulse, for our guidance when we are in doubt. As for example, in cases of fever when we are doubtful as to the propriety of administering stimulants, or in determining their good or ill effect, or the propriety of their continuance or discontinuance.

Before referring to the alterations which take place in disease, it will be well to consider its variability in health.

The pulse varies in health, as well as in disease. It also varies in different persons, and may vary in the same individual at different times or under varied circumstances. It is a measure not only of the number, force, quickness, regularity, and degree of equality of the
heart contractions, but also of the quantity of blood sent forth at each beat.
Hence it is a good measure of the circulation, and would be a perfect one were it not that the coats of the arteries vary in their degree of contractibility. And this variation whilst it impairs the value of the pulse as a measure of the circulation, gives it an additional claim to our attention, as a criterion of the state of the nervous system; for this it is which modifies the contractibility of the arteries.

Of all the characters, its frequency is the most easily ascertained. This corresponds with the number of the heart's contractions; it can never exceed that number, although it may fall short of it. In hypostole all the beats of the heart are so feeble that no pulse can be felt at the wrist.

The qualities we must attend to are its frequency, its regularity, its fullness, and its force. Its number in health varies with age, sex, & temperament; with posture, time of day, food, sleep, exercise, oriental
emotion: temperature and density of air; quantity of blood contained in the vessels; and the strength and vigour of the frame. According to Parrot, the frequency of the pulse increases in a corresponding ratio with the elevation above the sea, and the evidence of Dr. Harleian corroborates the statement. In health, the pulse reaches its maximum about noon and its minimum towards midnight. It is more frequent in the erect than in the sitting posture, and quieter in the sitting than in the recumbent posture.

It strikes me as being singular, that although the above statement is generally admitted, yet in examining the pulse, Physicians and surgeons are quite indifferent as to whether the patient is in one position or the other, and make no allowance for the difference. For instance, in works on Physiology, as to the effect of position, viz. that (extensio cordis) between standing and sitting there is a difference of 10 pulsations, between sitting and lying 5," and between standing and lying, 15 pulsations.
Perhaps it is because we judge very much by its character as well as by its frequency.

The difference of rapidity between the pulse of the male and that of the female is usually 10 beats per minute more in the female. The pulse of the infant at birth and for some time after has a variable frequency, and is little to be depended upon as a test of the state of health. The pulse of the healthy adult male may be described as being regular, equal, moderately full, compressible, and swelling slowly under the fingers, that of the female, and of the child of both sexes is smaller and quicker in the beat. In old age it assumes a hardness, on account of the increased firmness of the arteries. Nothing definite is known with regard to the influence of temperament upon the frequency of the pulse; high and low frequencies have been met with in those of the same temperament.
thing to find pulses of very low frequencies in persons of conspicuous temperament remarkable for energy, and nervous excitability, yet the pulse in the conspicuous temperament is usually full, hard and quiet; and that of persons of the sympathetic, restless and nervous habit. The stromous diathesis is often characterized by a full pulse of low frequency, while those subject to cold have generally a stronger pulse of higher frequency. In all probability the large chest and muscular frame are accompanied by an infrequent and the spare frame and small chest by a frequent pulse.

Temperature of body and surrounding atmosphere have an undoubted influence on the pulse. Cold lowers and heat quickens it. Exposure to a high temperature causes marked acceleration. Exposure to a temperature of 260°F raises the pulse to about double the ordinary standard. The general effect of food is to excite the pulse, and this is greater with animal than with vegetable food, and the effect
of food is more marked in infancy than in after life. Alcoholic drinks and some articles of diet influence the pulse in a marked degree. Rest has the effect of diminishing, whilst both active and passive exercise increase it. Passive exercise as in riding, and the various forms of carriage conveyance, has an effect upon the pulse, which is partly due to the varying action of the muscles in supporting the various positions into which the body is thrown, and partly to a cause pointed out by Dr. Brunet in the following passages.

"In a long vein below the heart when the body falls, the blood by its inertia and the supporting action of the vessels, does not fall as fast, and therefore really rises in the vein; and as there are valves in the veins preventing return, the circulation is thus quickened without any muscular exhaustion on the part of the individual. This helps to explain the effect of movements of carriages, of vessels at sea, etc."
of squeeze, and of the effect on the circulation of passive exercise generally, and leaves it less a mystery why there are so often useful in certain states of weak health."

The effect of mental emotion upon the pulse is too well known to need any comment. During sleep the pulse falls, slightly in adults but considerably in young children.

Irregularity of the pulse is a condition which we sometimes meet with, and one which claims our attention.

Dr. Watson says: "Irregularity of the pulse is natural to some persons. I have a brother who enjoys very good health, and whose pulse is habitually irregular. I have been told that when he was ill with a fever at school, it became regular. I have heard of similar cases. There are two varieties of irregular pulse: in one the pulsations of the artery are unequal in number and force, a few beats being from time to time more rapid and feeble.
than the rest, in the other variety, as palpitation is from time to time left out, the pulse is said to intermitt. These two varieties may coincide in the same person, or they may exist independently of each other. Irregularity of the pulse may be caused by disease within the head, by organic disease of the heart, by simple disorder of the stomach, or it may be merely the result of debility, and the prelude to the complete stoppage of the heart's action from asthenia. How important it is to ascertain and continue each of these meanings of the same symptom. It may indicate mental disease; it may simply be danger at all; it may afford us clue to any available treatment; or it may teach us how to ward off impending dissolution.

I think Dr. Bateman remarks upon irregularity of the pulse so fond, that I have given them in his own words.

In disease both very high, and very
low frequencies have been met with.
Extraordinarily slow pulses have been observed; in one case of Epilepsy by Dr.
Burnett, the number was fourteen.
These low frequencies are generally little affected by excitations, and as in a case reported by Dr. Graves remained unaltered by febrile attacks. The pulse often falls to a very low frequency during convalescence from fevers, and other exhausting maladies; and a very infrequent pulse has been especially noted among the anomalous symptoms of Hydrocephalus.

Very high numbers have been counted at times in disease.
Dr. Joy has counted 200 in a case of Hydrocephalus, and Dr. Ting states that he has himself counted upwards of 170 in pulmonary consumption, and during the rapid formation of diffused abscesses of the brain in a boy of ten, suffering from a fatal attack of Typhus fever; he distinctly counted 264 beats in the minute, being nearly three times as fast
It is believed that the low frequencies of the pulse sometimes exist with so infirm to occur in that state and degree of debility without disease which gives rise to the infrequent pulse in the adult, and that they do not occur in vigorous health.

The pulse in males usually follows the same pulse in disease as in health. The pulse is inverted in females; but in both sexes the exceptions are numerous.

When called to a patient, it is necessary to take certain precautions in examining the pulse. It should always last a short time till the sensations usually occasioned by the visit have subsided.

I have seen or more than once see when going round the wards of the hospital two or three individuals examine a patient's pulse, and each one has given a different statement as to the rapidity and character of the pulse, within the space of a minute and a half, and I believe the discrepancy of opinion
arose from the emotions of the patient, on the approach of the professor to the clinical class, and the effect of emotion upon the pulse. I noticed it particularly in the case of a woman of excitable temperament, who had been eleven. Her pulse when first examined was 140, and in a very short space of time, as soon as the emotion subsided, it fell considerably. I believe that at the end of the visit it had fallen to between 80 and 90.

When the arm passively is held in abducting the pulsation by any degree of pressure, and the blood still forces its way through the artery beneath our finger, we say it is hard, or acrompensible. Sometimes it is felt to strike a large portion of the finger, and then we say that it is full or large, as well as hard. When it strikes on a very narrow portion of the surface of the finger, it is compared to a thread; and if at the same time it be hard, such a pulse is said to be wiry.

Valvular disease of the heart affects the pulse.
Diseases of the left side chiefly affect the arterial pulse, giving rise to irregularity and inequality; those of the right side affect the venous circulation, causing pre-systolic pulsation into the jugular veins — a condition known as the venous pulse.

The pulse of aortic regurgitation disease is peculiar, being generally full and sharp and without any prolonged swell of the artery; it is generally termed a jerking pulse.

In initial disease it is usually soft or irregular.

In diffuse inflammation of cellular tissue, the pulse is always frequent; it may be short and jerking but is without strength and steadiness.

The disease may prove rapidly fatal, and the chances of recovery are measured by the strength of the pulse, and the clearness of intellect, or the reason.

A prominent symptom of aortic is an abiding frequency of pulse, it is permanently more frequent than the pulse of health.

If continued fever, during the first stage of the disorder, the pulse becomes more fre-
greater than his health. It varies in different cases & does occasionally become even slower than natural, but generally its frequency augments. The acceleration is greatest in those constitutions which are the most irritable. In young persons, in females, and in delicate males it will often rise to 120, while in strong or adult it does not so early attain its maximum of frequency, and perhaps does not exceed 100 throughout the whole course of the disease. Should the pulse in any instance reach 130 or 140, the disease is severe; and the majority of such patients die. The absolute frequency is not however of so much importance in this disorder, as its steadiness.

If it shifts from one number to another, that affords a worse prognostic even than its being very frequent, provided it keep at the same standard. During the second week, the pulse becomes more frequent, weaker, and more compressible. There are some cases of fever (though not Commonly...
in which death appears to take place from mere debility of the heart, and in these cases the pulse becomes small, weak, and like a thread. Often after being rapid and strong, the pulse falters, becomes soft and weak. Very often without losing its frequency, it will become necessary to administer wine or other stimulants. When recovery takes place, as the patient returns to health, the pulse gradually regains its normal standard of frequency.

We also see changes take place in the pulse of women, during and after labour. During the second stage of labour, it always increases in frequency, though the amount varies in different individuals. Shortly after delivery it falls nearly, but not quite in proportion to its previous frequency; i.e., it descends nearly as much below its ordinary standard, as it was above it. After the lapse of a few hours a reaction takes place. The amount of which is nearly, but not quite, in proportion
to the original increase and subsequent collapse. As an illustration, let us suppose the pulse to have risen to 120 during the second stage; then during the Collapse it will fall perhaps to 60, and no reaction taking place it will rise to 100 or 110. This is not given as the accurate standard of these changes, but merely as illustrative of the changes which have been observed in most cases.

In severe nervous prostration after labour the pulse either sinks below its due proportion, or more frequently remains very quick, treble, and fluttering during the period of Collapse.

Dr. Churchill says, "In almost all the cases of prostration after labour, when I have had an opportunity of examining the pulse up to the time of the occurrence, I have found it remain quiet, and perhaps full, instead of fluctuating after delivery. This has been so marked in several cases that I now never leave a patient so long as this peculiarity..."
remains, and in more than one instance I believe the patient has owed her safety to this precaution. "Three cases occurred within a very short time of each other, in which I noted this undue quickness of the pulse without any other outward symptoms; at that time there was no excessive discharge, and the uterus was well contracted. In all these alarming haemorrhage occurred within an hour, and was with difficulty arrested. I have also remarked an undue frequency of pulse, when the after-pains are extremely violent; and as the uterus is in such cases tender on pressure, it requires care to distinguish between this state and the commencement of inflammation.

All the observations I have been able to make, confirm Dr. John Clarke's remark, that as patient can be considered safe whose pulse exceeds 80 beats.
*For a description of the instrument see Carpenter.*
110 or 120, it strongly indicates either disease or a great tendency to it. How strongly therefore does it demand due attention.

Several instruments, some of them very ingenious ones, have been invented for measuring the pulse, though not much used.

Where it is necessary to be very accurate as to the character and force of the pulse, or where it is necessary to compare the two sides to see if there be any difference, an instrument invented by Vierordt, and called by him, the "Rhythmograph", is sometimes of great service. I have seen it used by Professor Bennet, to show the difference between the pulse of the right, on the two sides, in a man with thoracic aneurism affecting the head of the pulse on one side. One thing which is a drawback to the use of the instrument is, that it is sometimes a difficult matter to adjust it properly, and unless it be properly applied, it may produce very results. Other instruments might be mentioned as worthy of notice, but it is only very
peldom that we need any other assistance than our own fingers to ascertain the condition of a pulse. It must be evident, however, that the sense of touch needs to be cultivated like every other sense, and it needs some practice to be able to define the true character of a pulse in some instances. Terms such as: feeble, soft, unequal, irregular, intermittent, confused, imperceptible, etc., are used to convey ideas of impressions felt, and it takes some time before the sense of touch and the mind's idea can appreciate such distinctions.

In conclusion, I think it will be seen from these observations, that the variations which have been noted in the state of the pulse, are of importance and interest in some cases. That the state of the pulse is in some instances worthy of particular attention, as indicating either the presence or the approach of danger, or the reverse.

In some cases it may mean nothing
at all, though I should think they form a curiosity.