

rule is for this slow action of the heart to be transitory, and to be replaced by a very great increase in the frequency, and this occurrence has usually a bad significance. The slow pulse may, however, continue for some time. In a case of Rosenthal the pulse oscillated between 48 and 56 for four weeks, and the patient a child, aged fifteen, recovered. In certain cases of irritation of the cervical spinal cord by neoplasm, tumors, pachymeningitis, etc., a slow pulse has often been noted. Charcot has observed three cases. In one the pulse was from 20 to 30. In such cases syncopal apoplectiform and epileptiform attacks frequently occur, and in the attacks the pulse may fall to 15 or 20. He also refers to a case in which there was a decided narrowing of the vertebral canal near the occipital foramen, in which a slow pulse was observed. In melancholia a slow and feeble pulse is common. Spring records a case with a pulse of 15. In migraine and hemichrania the pulse rate is low during attacks, as a rule. Lieving quotes Wollendorf as follows: "From the beginning and during the continuation of hemichrania the rate of cardiac pulsations is considerably lowered, the normal pulse rate of from 72 to 76 to the minute, sinking to from 56 to 48 beats." Lieving also records cases of gastralgia, hysterical asthma, epilepsy with gastric aura, in which, during the attacks, the pulse would fall to 50 and lower; also cases of hiccough, in which the pulse-rate was so reduced as to be synchronous with the hiccough.

4. In the period of invasion of erysipelas, diphtheria, and some of the exanthemata; in scleroma neonatorum; in convalescence from gastro-intestinal catarrh; in scurvy, gout; in certain cases of malarial affection; in jaundice; in the attacks of lead colic; in ergotism; and lastly, in some cases of uræmic poisoning in the course of Bright's disease, a pulse of 50 and less is not infrequently observed.

*Rhythm.*—The disturbances of the rhythm of the pulse are those of intermission and irregularity.

An *intermittent pulse* is one in which a pause occurs between the pulsations, which is equal to the time occupied by one or more pulsations.

The intermittent pulse may be present in perfectly healthy persons, and may have always existed. Dr. B. W. Richardson has also shown that it may be produced in a man otherwise healthy, by grief, terror, anxiety, fatigue, pain, passion, adverse fortunes, etc. When it is the only peculiarity of the pulse it is not a sign of any great importance, although it is observed often in cerebral hæmorrhage and in cerebral compression from fractures of the skull, in tumours of the brain, in gout and syphilis. It is present often in dilatation and degeneration of the heart, but is then associated usually with an irregular pulse, especially if the patient moves about. The ventricle requires the stimulus of a greater quantity of blood before it will contract, and one, two, or three contractions of the auricle may occur before there is a pulse-beat. In this way, since varying quantities of blood are thrown into the arteries, irregularity of the pulse results.

*Irregularity of the pulse* is a much more important symptom by itself than the pulse with intermissions. The following are some of the diseases or conditions in which an irregular pulse is a sign of importance:

1. *Neurosal Irregularity.*—The irregularity of the pulse which is often very great, may be provoked by peripheral irritation, as dyspepsia, meteorism, worms, etc. It often occurs in hysteria and hypochondriasis, and in anæmia. With the irregularity there is often intermission of the pulse. In this form of irregularity, the neurosal, exertion, effort, or movements of the body of any kind, have but little effect upon the disturbed rhythm of the pulse. The irregularity and intermissions are not increased, and sometimes are even diminished. Irregularity and intermissions of the pulse, however, when dependent upon valvular disease and degeneration of the structure of the heart, are much augmented by the slightest movement. The exaggerated changes in the rhythm are accompanied by dyspnoea, palpitations, and often synope.

2. *Irregularity of Pulse in Heart Disease.*—In most diseases of the heart the occurrence of degeneration of the muscular substance is marked by the appearance of an irregular and