

quinine, and digitalis in pill-form—a half grain of ferrum redactum, three grains of quinine, and a grain of digitalis in a pill three times a day. If the stomach is doing fairly good work, the best results may be expected from this combination. The practitioner is usually consulted when the failure of the heart, dyspnœa, cough, anæmia, albuminuria, and beginning dropsy, announce the rupture of the compensation. The principles of treatment differ somewhat, according to the seat and character of the lesion and the condition of the system. As the ultimate effect of all cases of valvular disease of the heart is to cause ischæmia of the arterial system and stasis of the venous, a general method of therapy may be first developed and the special indications pointed out subsequently. The remedy which has been most employed to oppose the condition of the vascular system in mitral disease of the heart is digitalis. In prescribing this agent there are several points to be carefully considered. Is the digitalis of two years' growth? Is it English or German? Is it wild or cultivated? The second-year plant contains more of the active principle; the production of this continent seems inferior to that of English or German sources; the wild digitalis is more active than the domesticated. For the effect on the circulation and on the kidneys, the officinal infusion is to be preferred to the other preparations, but the infusion is only serviceable when it is made from the proper digitalis. It must be given in sufficient quantity to produce its physiological effects—to diminish the number but increase the force of the pulsations; to raise the tension of the vessels; to increase the urinary discharge. The higher the tension at the periphery, the more decided the recoil, and consequently the better filled is the coronary artery, which includes a more active and healthy state of nutrition of the cardiac muscle. The higher tension of the vessel means an arrest of the outflow of the serum and more active absorption. When the compensation is ruptured, the digestive organs suffer and the blood-making is inefficient. Excretion by the liver is hindered, and the waste of albumen through the kidneys lessens rapidly the amount of this important constituent in the blood. The poverty of the blood reacts, again, on the circulation through the heart. When, therefore, the necessity for digitalis arises, the demand for iron and bitter tonics (quinia) must be heeded also. Experience has abundantly demonstrated that the effects of digitalis are more decided and more lasting when iron and quinia are given at the same time. A tablespoonful of the officinal infusion three times a day until the characteristic effects are produced, and then twice a day, is the amount usually required and that can be borne. As its action is slow, frequent repetition of the dose may cause serious symptoms. If large doses are taken, and if the pulse is much reduced, the patient should maintain a fixed position—what position soever it may be—and not change it suddenly. Especially should he not rise suddenly from the recumbent posture, for under these circumstances the pulse becomes rapid and

feeble and the surface cyanosed. When headache, dizziness, disturbances of vision, vibration of external objects, and anxiety are produced, the dose must be at once reduced or discontinued. It should also not be forgotten that digitalis continued in large doses affects the motor power of the heart ultimately, by exhausting the irritability of the ganglia, when the action becomes rapid, weak, and irregular. It is good practice, during the long-continued use of digitalis, to suspend it for a few days at a time. If it can not be borne, cimicifuga may be substituted—a half to a drachm of the fluid extract three times a day. Sufficient attention has not been given to the utility of cimicifuga as a cardiac tonic and substitute for digitalis. Caffeine and convallaria are more active agents, which more nearly approach digitalis in power, and may be substituted for the latter when its effects on the stomach require it to be discontinued. In antagonism to some of the actions of digitalis, and as a means of lessening the work of the heart, we can not speak too highly of nitro-glycerin. Of the mineral tonics, no one is so serviceable as the acetate of lead. When there is much oppression of breathing, the patient unable to lie down, and becoming exhausted from loss of sleep, no remedy is so valuable as morphine hypodermatically. It affords surprising relief to the distressing symptoms, improves remarkably the driving power of the heart, causes free diaphoresis, and gives time for the action of the other remedies. From the  $\frac{1}{2}$  to  $\frac{1}{4}$  of a grain of morphine, according to the character and susceptibility of the patient, should be given. Next to the remedies for the heart, in importance, are the hydragogue cathartics. The greatest relief is afforded by draining off fluid from the intestinal mucous membrane. Euonymin and iridin have already been mentioned, but more powerful remedies are necessary when there is general dropsy. One of the most useful and efficient of these is the compound jalap powder. As it is important not to interfere with the digestion, this remedy should be administered in the early morning. If not sufficiently active, podophyllin may be added, or, this failing, elaterium may be substituted. Free transpiration by the skin should be maintained. This is best effected by the vapor-bath. The mistake must not be made of attempting to act on the skin and kidneys at the same time. When digitalis is being taken, and bitartrate of potassa or other diuretics, the skin must not be excited at the same time; on the other hand, free purgation assists the action of diuretics. When digitalis can not be borne by the stomach, it may act quite efficiently by external application to the abdomen or back: some leaves inclosed in a muslin bag are steeped in warm water, and kept applied for several hours. When the vapor-bath can not be used, a good substitute is a warm wet-pack covered with blankets. Remarkable benefit has been obtained from the treatment by compressed air, and by the inhalation of oxygen. The compressed-air treatment diminishes the tension in the venous, and elevates it in the aortic system, and also gives relief by contributing to the

oxygenation of the blood. Oxygen merely acts in the latter mode, and often affords great comfort when there are paroxysmal attacks of dyspnoea. There are some limitations to the use of digitalis in ruptured compensation with its direful results. It can not be borne at all by some subjects. It is contraindicated in aortic stenosis, and may be dangerous in large doses. When there is mitral insufficiency, as well as aortic stenosis, digitalis may be given, but only in small doses, with a view to its diuretic action. Again, digitalis is of doubtful utility if not positively contraindicated in fatty heart, and consequently in cases of dropsy from dilatation and insufficiency due to fatty degeneration.

#### HEART-CLOTS.

**Definition.**—By the term *heart-clot* is meant a mass of fibrin or of coagulated blood found in one or more of the cavities of the heart. They are divisible into three varieties: First, translucent masses of fibrin, soft, yellowish, and full of serum, loosely attached to the chordæ tendinæ, trabeculæ, or other projecting parts; second, large, loose, black coagula occupying the right ventricle or auricle, and extending into the pulmonary artery or venæ cavæ; third, coagula of variable size, attached to projecting parts, found in all cavities, but chiefly in the left ventricle, and consisting of coagula containing a puriform-looking fluid in their interior. The first variety is not pathological, is formed during the death-agony or after death, and is found in the subjects of chronic wasting disease. The second variety may or may not be pathological, and stand in a genetic relation to the suspension of the cardiac movements. The third variety is always pathological.

**Causes.**—The occurrence of these clots is not affected by sex, but they are more frequent at the middle period than at the extremes of life (Bristowe\*). There are two leading factors in their causation—a condition of the blood; disease of the heart itself. In many diseases the fibrinogenous substance seems to be greatly increased, and thus a state of ready coagulability is induced. If, under these circumstances, the coagulation of the blood is favored by a slow and feeble action of the heart, a slight cause suffices to determine it. The actual determining cause is disease of the heart itself, roughness of some projecting part, or fibrinous concretion deposited on such rough surface.†

**Pathological Anatomy.**—Clots are found in all the cavities of the heart, but most frequently in the left ventricle and least frequently in the left auricle (Bristowe). They form in by-places, and are entangled in the rough surfaces and inequalities. The appearance of the clots differs according to the circumstances of their formation. Leaving

\* "Pathological Society's Transactions," vol. xiv, p. 71.

† Ibid., cases by Dr. J. W. Ogle.

out of consideration the masses of fibrin, which have no pathological import, the two other varieties differ in consequence of the changes wrought by age. The second variety mentioned above consists of a large, black, rather loose venous coagulum, which fills one or the other cavity of the right side and projects into the annexed vessel, which may be completely filled by it. Such a clot, we may suppose, is sometimes the cause of death after *post-partum* hæmorrhage, or such as Sir Joseph Fayrer describes\* as forming and causing sudden death after surgical operations. After profuse hæmorrhage of this kind, the propelling power of the right ventricle is so feeble that coagulation may readily ensue. The shock of a surgical operation may induce such slowness and weakness as a severe hæmorrhage, and result in the same accident. In the third variety the clot has undergone transformations due to age. It is firm, tough, grayish, yellowish, and brownish in strata, or variously intermingled, and attached to the columnæ carneæ, chordæ tendinæ, or other parts. It usually contains in the interior, in a pseudo-cyst, a quantity of thick fluid having a "grumous" or "puriform" appearance, and consisting of the fibrin, red and white corpuscles, undergoing the transformation usual to blood under these circumstances.† These clots are in position for a long time, often. Rarely are they found in a sound heart, and usually the changes of endocarditis have taken place, the coagulation of the blood being induced by roughening and exudation of the membrane.

**Symptoms.**—Nothing can be more indefinite than the symptomatology of heart-clots. Nevertheless, we may make an attempt to define, from recorded cases and from observation, the character of the disturbances of function caused by them. There are two distinct groups of symptoms belonging to the two forms of clot. After *post-partum* hæmorrhage, or after a surgical operation, or during the course of some septic disease, there suddenly comes on an extreme oppression of breathing, wild restlessness, beating about the bed and crying out for air, deep cyanosis, a fluttering heart without pulse at the wrists, which stops in a few minutes; the patient falls back, the agitation ceases, but then a general convulsion may occur, and all is over, or death occurs quietly without any convulsive movement. In the other variety the symptoms develop more slowly, and may extend over several weeks. The earliest symptoms are irregularity in the heart-movements, indistinctness of the murmurs, difficulty of breathing, anxiety, oppression, cyanosis. The action of the heart becomes more and more feeble, the sounds run into each other and are dull and confused, the difficulty of breathing continues, moist *râles* appear all over the chest from œdema

\* "The Medical Times and Gazette," vol. i, 1873, p. 58; also "Pathological Society's Transactions," vol. xxvii, p. 70.

† Cases by Dr. J. W. Ogle, "Pathological Society's Transactions," vol. xiv, p. 65, *et seq.*

of the lungs; the cyanosis deepens; dropsy comes on; stupor passing into unconsciousness, and convulsions end the scene.

In most of the cases recorded by Ogle, the urine was albuminous; there were lesions of the lungs, and effusion into the thoracic cavity. While the recorded symptoms are closely similar to the account given above, the state of the heart as to rhythm and the character of the sounds differ among themselves, and agree in part only with the above description. The duration of these cases ranged from a few days to six weeks, and the symptoms during that time seemed to depend on the presence of the clot found *post mortem*.

**Treatment.**—Notwithstanding the uncertainty which must attend the diagnosis in these cases, which at its best must be a fortunate guess, some details of treatment are necessary. The treatment by frequent small doses of ammonium carbonate offers the best prospect of relief. In the cases which occur suddenly, and immediately extinguish life, the intra-venous injection of ammonia should be practiced. This method consists in the injection into any vein—in this case, the jugular—of one part of aqua ammoniæ to two parts of water, by an hypodermic syringe. Of course, precautions must be taken to avoid the introduction of air or any foreign body. It has been abundantly demonstrated that this intra-venous injection of ammonia is entirely safe. In the less acute cases, there is a small prospect of success from the persistent use of the ammonia. The action of the heart must be maintained by the judicious use of digitalis and alcoholic stimulants.

#### PALPITATION OF THE HEART.

**Definition.**—By the term *palpitation of the heart* is meant a functional disturbance of the organ, characterized by increased rapidity of movement, with more or less irregularity of rhythm.

**Causes.**—The heart possesses a power of independent motion; but as this motor apparatus is not sufficient to keep up the action of the organ, it receives accessions of force from the great centers. To maintain the movement at a uniform rate, there is a regulator apparatus, designed to prevent overaction, or “to inhibit.” Besides this mechanism for evolving force, and applying it so as to produce uniform results, the action is affected by the state of the vessels, by the density of the blood, by the movements of the respiratory organs, by the activity of the organic functions in general, and by the functions of animal life. Accordingly, to maintain the action of the heart, there are—  
1. A motor apparatus—rhythmically discharging motor ganglia—situated in the substance of the heart. 2. Exciters of activity, branches from the cervical sympathetic, and also from the spinal cord, irritation of which increases the movements of the heart. To regulate the movements of the heart, there are—1. The pneumogastric, irritation of which

may arrest the heart in the diastole. 2. The depressor nerve of Ludwig, which acts by dilating the blood-vessels. The fibers of the sympathetic, dilator, and constrictor, affect the work of the heart by increasing or lessening the tension at the periphery. When the peripheral vessels are dilated, the work to be done by the heart lessens, and hence the contractions are less numerous and forcible, and *vice versa*.

The mechanism by which the action of the heart is kept at a uniform rate may be disturbed by a variety of causes: by muscular exercise; breathing rarefied air, as in the ascent of mountains; by mechanical interference with the movements of the organ, as thoracic effusions, tumors of the mediastinum, flatulent distention of the stomach, atheroma of the arterial system generally, etc. Moral and emotional causes, as grief, hope, anxiety, fear, excessive mental effort, etc., increase the action of the heart. Various reflex troubles have the same effect—as affections of the nervous system, reacting on the nervous apparatus of the heart—such as uterine disease, gastralgia, worms in the intestinal canal, etc. The cardiac ganglia are rendered irritable by the excessive use of tea, coffee, tobacco, spirits, etc. The excitor apparatus of the sympathetic may be the seat of a disturbance, as in Grave's disease, etc.

**Symptoms.**—There may or may not be, previous to the attacks of palpitation, any symptom of trouble in the heart. When such preliminary symptoms are felt, they consist of a vague sense of uneasiness, præcordial oppression, or dull pain. There is no fixed period for the attacks, unless excited by some habit or custom, as eating, smoking, etc.; neither have they any special duration, but may last from a few minutes to some hours, or a day. The attack consists of a rapid and tumultuous beating of the heart; dyspnoea, anxiety, and an hysterical sense of choking accompany the beating; the heart seems almost to turn over, to rise up into the throat; the recumbent posture can not usually be borne, especially lying on the left side, and the sitting posture, leaning somewhat forward, is the most comfortable position; there are also experienced more or less vertigo, faintness, flashes of light, coldness of the surface with cold sweating and a very weak pulse, or it may be the surface is warm and perspiring, the pulse full and strong. The face may be pale or flushed, but is always expressive of anxiety; speech is difficult, or is arrested. The physical exploration, if no cardiac lesion exist, is merely negative. The movement, if very rapid, can not be separated into its component parts. Examination must be made, in the interval of the seizures, to ascertain the real condition of the heart. The duration of the attacks, as already stated,

\* Case of Dr. Cotton (“The British Medical Journal,” June, 1867), in which the pulsations were 240 per minute, and ceased on the evacuation of a tape-worm.

is very variable. The beating may subside in a few minutes, or several hours may be occupied in returning to the normal. At the conclusion of the paroxysm, a quantity of pale, limpid urine is usually passed, and there is a strong sense of fatigue and exhaustion, with a tendency to sleep.

**Treatment.**—Prophylaxis is important. The vice, of whatever kind, on which the attacks depend, should be removed. Tea, coffee, and spirit drinking must be given up; errors of digestion, reflex disturbances, and curable diseases must be corrected or cured. The hygiene of the individual must be carefully investigated, and sources of disturbance be put aside. The general health must be maintained at the highest point of efficiency. In the absence of any explanation of the paroxysms, the presence of a tape-worm may be suspected. For the immediate relief of the paroxysm, there is no remedy so efficient as the hypodermatic injection of morphia. If the surface is pale and the extreme vessels contracted, inhalation of nitrite of amyl (two or three drops) affords prompt relief. The inhalation of ether is also effective. All narcotic agents must be used with caution, because of the certainty, if the attacks are frequent, that the habit of their abuse will be formed. The application of cold, in the form of an ice-bag to the præcordial space, is an effective means of quieting the heart. The galvanic current, from ten to thirty or forty elements, passed through the pneumogastric and cervical ganglia of the sympathetic, often gives great relief. If there is no cardiac disease, chloral is an efficient quieting agent, and the bromides may also be given with good results.

---

## DISEASES OF THE BLOOD-VESSELS.

---

### ARTERITIS—INFLAMMATION OF THE ARTERIES.

**Definition.**—The acute form of arteritis is uncommon, and is rather a surgical than a medical topic. Chronic arteritis, on the other hand, is not only a common but it is an extremely important disease. It has received various designations, as *endarteritis*, *atheromatous arteritis*, *arterial sclerosis*, *arteritis deformans*, etc., intended to indicate the nature of the change undergone by the vessels.

**Causes.**—It is extremely rare before forty, and frequent after fifty. Men are probably more liable to it than women, but there is slight difference as regards sex. Various cachexiæ seem to hasten its devel-

opment. A fatty change occurs in the intima during the course of severe and prolonged anæmia. Chronic alcoholism, the poison of lead, gout, rheumatism, syphilis, etc., are supposed to be influential in developing the disease at an early period. Functional strain, in accordance with a well-known law, tends to excite arteritis; hence its early appearance in the aorta. Sometimes aortitis is derived, by contiguity of tissue, from endocarditis.

**Pathological Anatomy.**—The initial change consists in a proliferation of the connective-tissue corpuscles of the intima; the young cells crowd the space between the lamellæ, and, pushing up the intima, form a projection about a line above the general level. This abundant formation of new cells requires an amount of pabulum which can not be supplied, and hence the proliferating cells undergo a fatty degeneration. While this process is going on, a solution of the basis substance (the connective-tissue matrix) takes place.\* This change appears to the naked eye as yellowish or yellowish-white opaque spots or patches, distributed through the thickened elevations of the intima, which become soft and friable, and are gradually detached, leaving an abrasion, or "atheromatous ulcer." These abrasions may be coated with masses of fibrin, or blood-clot may form on and adhere to them. Coincidentally with the process of fatty metamorphosis, another process, beginning also in the sclerosed intima, develops. This consists in a deposition of calcareous material—the lime salts, chiefly—in the basis substance of the intima, and between the lamellæ. Plates of considerable size are thus formed in the aorta; they may be several inches in length, and of a curved shape corresponding to the aortic curve, and may extend over one half, even more, of the circumference of the vessel. Their rough surfaces project through the innermost lamella into the vascular lumen. These two processes very frequently coincide. The alterations taking place in chronic arteritis are not confined to the intima, but the media and the adventitia also participate. The unstriped muscular fiber undergoes fatty metamorphosis and calcification, or disappears by simple atrophy. In advanced cases the adventitia inflames, becomes infiltrated with cells, or undergoes fibroid degeneration. The results of arteritis are very important; when the small vessels are affected, their lumen is encroached on and may be entirely obstructed, or a large number affected to a less degree, the amount of blood passing to the district supplied by them will be much reduced, and important nutritive alterations must occur. The changes in the tunics of the vessels especially involve their elasticity, and they become mere rigid cords, through which the blood passes in jets. The loss of the power of elastic recoil exposes them to injury as the blood is driven through, and they slowly dilate or yield in places, forming

\* Rindfleisch, *op. cit.*, p. 211, *et seq.*