

whole subject of both diagnosis and prognosis will be greatly advanced and rendered more certain. In differentiating between ecchymosis and some forms of gangrene, we find the slight elevation of vital heat in the former, and lowering in the latter, is a feature that renders the diagnosis very much more certain. At present, however, with the great mass of practitioners, this little instrument is of more value as a guide to prognosis, indicating, as it does, vital changes long before any material observable change occurs in the general symptoms.

*Alterations in Volume.*—A part, or organ, taking on an increased size, it is often of the first importance to decide whether we have a simple hypertrophy, or a tumor to deal with. The regularity of the outline, extent of tissue involved, degree of irritability, probable etiology, and other points must receive due attention, as well as the nature of the part implicated. Thus a glandular enlargement would be attributed to hypertrophy, unless it was partial, while an enlargement of tumor form, in non-glandular regions, would be considered a tumor, unless some other circumstances should occur to modify it.

*Alterations in Transparency.*—In the case of scrotal changes, this is an important indication. Thus an enlargement of the scrotum, soft and fluctuating more or less, indicates effusion, but whether blood or serum, can only be told by testing the transparency; it would be opaque in the former instance, and translucent in the latter. So with some forms of cysts, as ranula, or many of the large serous cysts, they can only be distinguished from polyps or myeloid growths by a test of their transparency.

*Alteration in Consistency.*—The stony hardness of scirrhus, and the compressibility of fatty or ordinary non-malignant

growths, is a diagnostic feature of the first importance. So also the doughy feeling of œdema, and the elastic crepitating sensation in emphysema.

*Alteration in Relations.*—The observation of changes of relation, one part with another, must obviously greatly assist in determining the condition. Thus the prominence of one acromial process, and a depression below it, would at once suggest dislocation of the humerus or fracture. So also in muscular ruptures, and fractures with displacement.

*Alterations in Mobility.*—The preternatural rigidity of a joint, or limb, with full consciousness, and absence of muscular rigidity, coming on suddenly after an accident, and observed within the space of a few hours, would at once direct attention to a luxation; while unusual mobility, with a greater range of motion, under the same circumstances, would indicate fracture in the immediate neighborhood of a joint. Rigidity of a part, of long standing, developing slow, and without noticeable deformity, would indicate ankylosis, unless there was much distortion of the part, when muscular contractions would be more probable.

*Alterations in Pulsation.*—In many diseases of the arteries, as well as in the case of abscesses and tumors in the neighborhood of blood vessels, it is of the first importance to observe and correctly interpret any change in pulsation, whether in form or rhythm. Thus the sudden cessation of arterial pulsation in a part, with a state of turgescence above, with a well defined painful spot, would suggest embolism. A greatly augmented arterial action, with some enlargement at one or more points in the part, with a subsidence of the abnormal action, on pressure on the artery, below the point of compression, and increased turgescence above, will at once point to aneurism. So a suspicious swelling over an

artery, which ceases to pulsate on gently drawing it in a direction away from the vessel, will be set down as non-aneurismal at least, its actual nature being determined by other examination.

*Alterations in Sound.*—The dullness, on percussion of the chest, being in marked contrast to the resonance in other locations will indicate solidification from some cause; so the numerous changes in the cardiac action, valvular sounds, and so on, are of the first importance in thoracic and cardiac diseases. The peculiar blowing, whistling, or *bruit* of aneurism, will be found unlike anything else, and are considered confirmatory in that condition. The sound or tone of the voice, also, will often point to some laryngeal or faucial lesion. In very many ways such changes will be of the utmost diagnostic value.

*Alterations in Smell.*—The cadaveric of gangrene, the change in the odor of pus, the urinous smell in cases of uræmic poisoning, and the sweetish odor of the perspiration in pyæmia, are all valuable examples of the necessity for paying attention to this point.

The *elicitation of crepitus*, will often serve to differentiate between fracture and dislocation, as well as to distinguish a serous effusion from a purulent.

The *elicitation of fluctuation*, in suspicious swellings, will point to effusion of some kind, either pus, blood, or serum, and while of the first importance, in appropriate cases, can only be considered one element in the range of indications; to determine the character of the effusion, requiring other and different tests.

While what has been written above is of the highest importance in a systematic examination for disease or accident, there are very many other points that must not be neglected. Among the more important are the following:

The *nervous system* must be examined, to determine alterations in nerve action; the sensibility of the integument, whether increased or diminished; the condition of voluntary function; as well as alterations in any of the special senses. Paralysis, spinal lesions, brain-lesions, as well as local nerve injuries, can only be accurately understood by inquiring into the action of the nerves. In many cases the use of the electric battery, the æsthesiometer, and other appliances will be needed to determine nice shades of difference. In no other class of cases will the practitioner meet with so much embarrassment, as in the detection of nerve lesions, hysteria, and hypochondriasis simulating them so perfectly.

*Pain*, it would seem, would always be positive evidence of the existence of some lesion. But the *degree* can never be accurately determined, some highly sensitive persons giving way completely to an amount of pain that would be considered trifling in another of more heroic qualities. Throbbing pains usually indicate suppuration; shooting or lancinating, nerve lesions; a smarting or burning excoriation, etc., but as a symptom, it is of little value. It will be seen in *Inflammation (Surg. Therap.)* that increased functional activity may often be considered equivalent to pain.

The *organs of special sense* must always be interrogated in profound vital disturbances. In many instances we may expect to find the earliest indication of approaching disease in this way. Thus the ophthalmoscope will often furnish the first symptoms of diabetes, albumenuria, or cerebral lesion. Alterations in hearing, or some abnormality in the auditory apparatus, often purely functional, will occasionally direct attention to the fauces.

*Respiration* will be affected in accidents about the neck or chest, as in dislocations or fracture of the hyoid bone;

fracture of the ribs; foreign bodies in the throat or chest; effusions into the pleura or pericardium. A sticking pain on inspiration, at one point, with short gasping respiration in consequence, with some deformity perhaps, and pain on pressure, will often be the only symptom of fractured rib, with impaction in the lung.

The *circulation* must frequently be observed, as indicating some obstruction, in augmented cardiac action; local lesions or interruptions, as productive of embolism, etc., must be carefully looked into. Sources of compression in case of varix, and numberless other contingencies, demands careful examination of these organs.

The *digestive tract*, will frequently demand particular attention. Thus severe and protracted vomiting, may proceed from cerebral lesions or gastric irritation; the former being often unaccompanied by nausea, more persistent, and continued long after the stomach has been completely emptied, will frequently direct attention to the seat of the morbid action.

The *urinary secretion* is to be examined, for many purposes, both diagnostic and prognostic, and is rapidly becoming recognized as one of the most reliable indications of deep-seated morbid action. In determining upon instrumental treatment, of any kind, or for any purpose, the existence of albumenuria or diabetes, would decidedly contra-indicate it. The existence of oxaluria, and many profound vital changes can only be positively told by urinalysis, as well as nervous exhaustion, and the like. Strange to say, however, as shown in another place (*Lithiasis; Surg. Therap.*) urinalysis is of little importance in the calculous disease, as there may be no stone and the lithic elements in excess, or a large calculus, and no evidence of it found in the urine. As a means of

estimating the condition or activity of waste and repair, we have no better guide than an examination of the urine.

The *genitals* often present useful indication, as hernia, due to urethral stricture; epilepsy, induced by congenital phimosis and preputial adhesions to the glans. In case of alleged rape, the absence of the penis, or some other potent impediment, will acquit the accused; or in alleged gonorrhœal communication, can only be determined by examination of the party charged with the offence.

The *skin* often presents valuable indications of the extent of morbid. The pallor and lowered temperature in extreme anæmia; the scarlet color and elevated temperature, of inflammatory conditions; the clammy condition on the approach of death; and the irritation from innervation, are but a few examples of the importance of carefully examining into the state of the skin.

Finally, the *tout ensemble*, as the French say, as the haggard, anxious expression, the waxy appearance of the surface; and the generally deranged functional activity, as seen in the cancerous subject towards the close of the case, should receive early attention. So also the evidences of congenital syphilis, as the aged, worn look, and other well known general features, must not be overlooked.

The microscope, ophthalmoscope, exploring needle, and the test-tube must be at hand, and the surgeon who is desirous of fulfilling his whole duty to his patient, must familiarize himself, as much as possible, with their use. I have found the ophthalmoscope so indispensable, in many ways, chiefly to throw light into cavities where the patient cannot be placed in a favorable position, that I carry the pocket instrument of Nacet with me habitually. It has the advantage of having an unusually large mirror, or reflector,

is very small and compact, and I strongly advise all students and young practitioners to procure one and perfect themselves in its use.

*Chemical examinations*, while of little value in surgical diagnosis, may be valuable in determining the elements of urinary calculi, and thus furnish a guide to the nature of the morbid process that results in the formation of the stone. In other particulars I have no knowledge of its being of any special value in surgical practice.

The *exploring needle* must never be neglected, in examining all fluctuating swellings, and no such swelling should be opened until we have accurately learned the nature of the contents.

What has been written is intended solely as an outline of the method to be pursued in constructing a theory of the case in hand. It cannot, as said earlier, include the whole subject, as that would involve the whole field of medicine. Apart from purely personal considerations, the surgeon should remember that no matter how extensive the experience of any one practitioner may be, it will require the experience of very many to construct a scientific and perfectly reliable treatise. It is not alone the patient and surgeon in an individual case that is benefitted, but society and the whole profession, if the best use is made of opportunities.

Let us next consider the second element in our scheme, viz.:

2. *Etiology*.—By *etiology* we mean that department of medicine which treats of the causes of disease, being derived from two Greek words, signifying cause and disease. To judge from many of our text-books it would seem that writers and practitioners generally considered the course of

morbid processes to be the reception of some injury, when, as a matter of fact, the morbid process is frequently latent, only waiting for some cause to fan it into life.

As said elsewhere (*Surg. Therap.*) it is hardly possible to determine the proper measures to be employed in the treatment of a malady, without having some rational conception of the causes at operation to maintain the morbid action. Under some circumstances, operative measures are imperatively demanded; in others they would expose the sufferer to dangers that might be averted and their practice be unpardonable. The conscientious practitioner will use every exertion to devise the best treatment for his patient, and an accurate knowledge of his condition is of the first importance.

Etiology naturally divides itself into two classes of causation, the predisposing, or maintaining; and exciting, or determining.

(a). *Predisposing causes* are all such influences, bodily conditions, or circumstances that make one person more liable than another, or that expose all mankind to accident or disease. For instance, a preternaturally long mesentery, a patent condition of the peritoneal vaginal process, or an unusually large opening at the inguinal canal or elsewhere, will expose the individual to greater danger of hernia than his neighbor more happily circumstanced. At the same time the very existence of the inguinal canal exposes *all* men to hernial protrusions. In both instances they are alike predisposing causes. Also in the case of fracture, the form and texture of the bones, advanced age of the individual, and an occupation that exposes the person to accident, are to be considered predisposing causes.

While both classes of causation must receive due attention,

it seems proper to consider those under this head as far more important, and demanding closer attention than those of a determining character. It is fair to conclude that these causes are permanent, and that they not only place the sufferer in danger of a renewal of the accident or morbid phenomena, but that their continuance exercises a very potent influence on recovery. How absurd it would be to attempt to treat with any hope of success, a case of necrosis from phosphorus, poisoning, and still permit the victim to follow his accustomed avocation. Simple as it sounds in theory, however, it is often exceedingly difficult in practice; indeed, there are many cases in which the predisposing causes cannot be discovered at all. As in malarial and epidemic fevers, the predisposing cause is only recognized as a mysterious "receptivity;" individuals, side by side, do not suffer alike, although exposed to the same influences; indeed, some escape entirely, even when no attempt is made at prophylaxis.

That the predisposing conditions may operate as maintaining, needs little argument. Take fracture, from slight force, in an old man. A similar exertion of force, in the case of a young man, would have produced no such result. The predisposing cause is recognized as a preponderance of the inorganic elements of bone, giving the organ increased brittleness, perhaps greater porosity, certainly less elasticity. These same conditions act as maintaining causes as well, as the break will heal with less readiness and union be much less perfect, than if the proper elements of bone were furnished in due proportion. We must consider it our duty, therefore, to search for the predisposing causes as an absolute prerequisite of cure.

*Exciting or determining causes*, are those immediately productive of the disease or injury. Swallowing irritant poison

would be the exciting cause for the resulting gastritis; application of fire to a burn; blow of a fracture, and so on. As a means of diagnosis solely, and with little if any reference to treatment, an understanding of the exciting cause is of the first moment. A man is seen lying in a state of coma, and we learn he has fallen on his head, or sustained some injury to that part. We at once think of concussion or compression of the brain, and our diagnosis is then half made out.

In the case of morbid action it is of far less moment. A tumor may follow a blow, or an ulcer a wound or contusion. In neither case can the injury be looked upon as a *cause* of the tumor or ulcer. Other forces, predisposing or maintaining causes, are at work, and are almost entirely responsible for the condition. True they might never have appeared but for the injury; on the other hand, the injury would have produced no such effect on a person not predisposed to their formation.

A further consideration of causation must be referred to special accidents and morbid processes; it is utterly impossible, at this time, to treat the subject other than in the most general way. The causes are as many as there are accidents or diseases, and each separate case will need separate and especial mention.

3. **PROGNOSIS.**—This word is likewise derived from the Greek, from two words signifying, "to know beforehand." It is the "act or art of foretelling the course and event of a disease." While hitherto less systematized than the two branches of our topic previously considered, it is of the first importance, and demands careful consideration and study. The topic may be appropriately considered under four heads; *viz.*, as to the continuance of life; as to the preservation of

function; as to the preservation of symmetry; and as to the duration of the case.

(a). *Preservation of life*, contrary to a popular opinion, can never be determined upon with any degree of certainty. When we read of men carrying a musket ball in the heart forty years; another with five bullets in the skull; of a tamping iron passing through the brain, and life not only preserved but continued without apparent loss of comfort, we may well question whether extent of the injury can, in all cases, determine the extent of the menace to life. With the exception of injuries to the medulla, section of the spinal cord, or laceration of the aorta or some other large arterial trunk, almost all degrees and varieties of serious lesions, even of what are supposed to be organs absolutely essential to life, have been received and life preserved. It is scarcely within the facts to consider bodily health and vigor a reliable guide in prognosis, as many instances are recorded of feeble individuals having sustained severe injuries without loss of life, and robust persons succumbing to slight accidents. As far as the nature of the injury itself is concerned, with exceptions noted above, we must practice caution in reaching conclusions too hastily. Prognosis must always be unfavorable when the shock is profound, hæmorrhage copious, recuperative powers deficient, the existence of previous disease of a serious character, there is dyscrasia of any kind, and the sufferer is either plethoric or anæmic, a resident in unhealthy quarters, or has been subjected to the depressing influences of poverty. Traumatism as a rule, secures a more favorable prognosis than idiopathic or specific morbid action, particularly when the shock has been slight, the bodily vigor is good, and the case is seen sufficiently early. The condition of the mind will be found a highly important

consideration, and when there is much depression, and a morbid despondency, as often occurs in the case of the ignorant and superstitious—the prognosis must be guarded. Habits of intemperance, or prostitution, must exercise a very unfavorable influence on the result, as well as any habits that have a tendency to lower the vital vigor and tone.

While it is almost impossible to give any certain rules for determining the menace to life, the following conditions may be considered as usually unfavorable:

*Mental sphere*.—Prolonged coma, *primary* delirium, great fear of death and conviction of it being impending.

*Eyes*.—Pupils immovable, particularly when dilated.

*Mouth*.—Dry and sticky; heavy brown coating on tongue, sordes on teeth; trembling of the tongue on protruding it; cannot protrude the tongue, the tip catching on the teeth.

*Face*.—Expression of terror, or absence of expression; answers correctly, but no change in features. Extreme pallor; waxy appearance.

*Chest*.—Varying irregularities of respiration; feeble, rapid cardiac action. It has been observed (RAUE, *Path. and Diag.*) that when the heart's action and respiration become synchronous, death is imminent. That is, the organs of respiration and circulation being supplied by the sympathetic and cerebro-spinal axis, but not equally, there is not an exact synchronism, in health, in the regular proportion of one to four; there is a slight but perceptible variation, say 1 to 3.9; when, therefore, it becomes *exactly* one to four, it is evident that the nerves of one system have ceased to act, and the two functions are carried on by those of the other. Death is then imminent.

*Pulse*.—Weak, fluttering, irregular, compressible.

*Temperature*.—A rise of more than 7°, will be ominous,

as the fall, in reaction, will be far below normal; a fall of more than 3°, will nearly always foretell death. Yet in the *Med. Advance*, Vol. 7, p. 147 is a case by Dr. Claypool, of Toledo, Ohio, in which the fall was 7°, and death was delayed 72 hours. This case, however, as far as I know, is entirely unique.

*Urinary organs.*—Suppression or great diminution of the urine: albuminous urine.

*Intestinal tract.*—Involuntary stools, or occasionally entire want of stool. Finally, extreme general prostration and debility, so that the patient slides down off the pillow, and clammy coldness of the skin. Other indications, in special cases may rise, but in general most or all of the preceding may be looked for in fatal cases.

(b). *Preservation of function* can usually be foretold with a greater degree of accuracy than that of life. Complete destruction of an organ, as a kidney—will of course permanently destroy function. Complete divisions, with wide retraction, of a set of muscles, as the flexors of the leg, will probably forever destroy their usefulness. The prognosis, in this particular, will, therefore, depend entirely upon the anatomical knowledge of the surgeon, as well as his familiarity with the processes of repair, and the physiology of the parts injured or involved.

(c). *Preservation of symmetry*, must be foretold by the exercise of the same knowledge. Wounds with extreme retraction or gaping, can hardly fail to heal with some scarring, the degree depending upon the time elapsing since the accident; extensive burns must be followed by more or less deformity; fractures of the nasal bones, that are not reduced for some hours, are well known to result in disfigurement, as also comminuted fractures generally, particularly

with much displacement. Our prognosis in this respect, therefore, is likewise to be founded upon our surgical knowledge and skill.

(d). *The duration of the case*, can only be prognosticated, by comparing it with similar conditions, either occurring within the range of our experience, or as derived from reading. Under the most similar and favorable circumstances, there must be much diversity in this respect, the vital resistance, the nature of the surroundings, the bodily health of the patient, and a host of minor considerations, being essential factors. Next to dogmatic opinions as to life or death, nothing can be more hazardous than to venture hasty opinions on the duration of the case. There are so very many apparently trivial symptoms and conditions to be considered, that a non-committal course is always to be pursued.

I have here concluded a hasty and necessarily imperfect account of the leading principles of surgical diagnosis. If no other object has been attained, certainly I can scarcely have failed to prove the truth of the doctrines of our introduction, and shown that the accomplished surgeon must possess an amount and kind of information that can scarcely be demanded of the general practitioner. Without a perfect understanding of what is demanded and expected of him, none should engage in the practice of this complex department of medicines, unless he is to be satisfied with mediocrity—and all such the profession can very well afford to dispense with.