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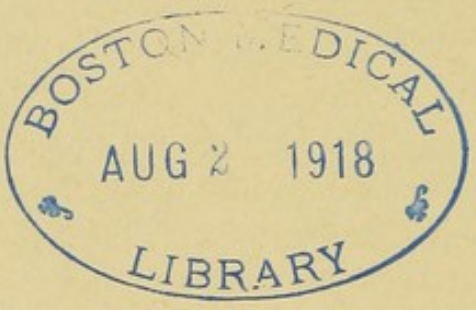

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A STUDENTS' MANUAL OF SURGICAL DIAGNOSIS

The chief aim of the practicing surgeon should be to eradicate disease, to repair the results of bodily injury, and to relieve suffering.

Success in treatment depends largely upon accurate diagnosis. Every student of medicine, therefore, at an early period should acquire a diagnostic method which in the end will enable him to recognize with a reasonable degree of accuracy the various surgical lesions and pathologic processes.

The methods of reasoning employed by different surgeons and teachers, in arriving at a diagnosis in a given case, differ widely.

The two extremes would be represented by the methods popularly known as the "snap diagnosis," and the "diagnosis by exclusion." The following circumstance will give a fair idea of the two methods.

An eminent practitioner of internal medicine was called to attend a middle aged woman suffering from continuous fever, progressive loss of weight and strength, and mild delirium. On entering the patient's room he was told that the illness began by headache, loss of appetite, and general malaise; that the symptoms had gradually increased in severity for ten days, during the last eight of which the patient had remained in bed. There had been no chill, no vomiting, no cough, no pain, no diarrhea, and no urinary disturbances. The patient appeared dull, the lips were dry, the mouth partly open showing the teeth covered with sordes. His examination consisted in looking at the tongue, which was heavily coated, and hastily palpating the abdomen, which was slightly distended and presented a firm oval tumor in the splenic region. The temperature was 104°, pulse 100, respiration 20.

As a result of his five-minute visit and one-minute examination he stated that the patient was suffering from typhoid fever, and advised her removal to the hospital.

The family, not being entirely satisfied with this very super-

ficial examination, sent for another and less distinguished physician. As a result of his carefully elicited history he learned that the patient had suffered from malarial fever in early life; that during the past eight years the patient had had occasional attacks of sharp, left-sided abdominal pain of short duration and not accompanied by fever; that for a month previous to her present illness she had noticed a fulness in the left flank, and that, two or three weeks ago, she had suffered from an ugly furuncle on the neck. The patient had not been out of the city, and presumably had not been exposed to typhoid infection in any ordinary way.

A careful physical examination showed nothing abnormal about the mouth, pharynx, ears, nose, or accessory sinuses. Heart and lungs negative. Abdomen slightly distended, no muscular rigidity, moderate tenderness in left upper quadrant, well marked tenderness to pressure in left costovertebral angle. On deeper palpation a large oval tumor could be felt deep in the left hypochondriac region, which moved slightly with respiration, and which was apparently covered by intestines. The mass presented no sharp or notched border, was ill defined above, but was moderately tender on deep pressure. No free fluid in the abdominal cavity, liver not enlarged; no tenderness over stomach, gall-bladder or appendix regions. Pelvic examination negative. Urine was high colored, contained a faint trace of albumin and an abundant precipitate of amorphous urates; no sugar, pus or blood. At the end of his examination he told the family that he was unable to make an exact diagnosis until he could obtain a specimen of the blood. This examination quickly followed, and showed hemoglobin, 80 per cent., 4,800,000 red cells, 28,000 leukocytes, 89 per cent. polymorphonuclears, no plasmodia. Widal negative.

After gathering all his data the physician, to account for the chief symptom, continued fever, considered four diagnostic possibilities:

1. Malarial poisoning.
2. Typhoid fever.
3. Acute miliary tuberculosis.
4. Severe toxemia from some local septic infection.

Malarial poisoning, although probably present in early life, could now be excluded by the absence of repeated chills and marked remissions in temperature, by the absence of plasmodia in the blood, by

the presence of a high polynuclear leukocytosis, and by the absence of a splenic enlargement.

Typhoid fever could be excluded by the presence of the marked polynuclear leukocytosis; by the absence of splenic enlargement, of the characteristic eruption, and of the Widal reaction.

Acute miliary tuberculosis he excluded by the presence of a high polynuclear leukocytosis and the absence of any definite signs of a pulmonary lesion.

This left only his fourth possibility, or severe toxemia from some local septic process, to account for the chief symptom. This diagnosis was also favored by the evidence of a tender mass in the left hypochondriac region and by the high polynuclear leukocytosis.

To account for this tender tumor he considered also four possibilities:

1. Pyonephrosis.
2. Perinephritic abscess.
3. A suppurating cyst of the kidney, liver, or spleen.
4. An abscess from acute diverticulitis.

Pyonephrosis was favored by the early history of renal colic; by the shape, position, and mobility of the mass; by the fact that it apparently lay behind the intestine, and by the marked costovertebral tenderness. As there were no facts elicited which would exclude pyonephrosis, a question mark was placed opposite it.

Perinephritic abscess was excluded by the mobility of the mass, by its oval and distinctly circumscribed contour, and by the absence of edema of the superficial tissues of the flank.

A suppurating cyst of the kidney, spleen, or left lobe of the liver, although extremely rare, could not be excluded, as it might easily present the same symptoms and signs as a pyonephrosis. Such a cyst, however, would be more likely to be of renal origin on account of its position behind the intestines. As this possibility could not be excluded a question mark was placed after it.

An intraperitoneal abscess from acute diverticulitis was excluded by the absence of early symptoms and signs of peritoneal irritation, as acute pain, vomiting, and muscular rigidity. An extraperitoneal abscess from the same cause was excluded by the shape and mobility of the mass.

This left two inexcluded possibilities to account for the tender

tumor in the flank, a pyonephrosis, which was probable, and a suppurating cyst, which was only a remote possibility. To clear up his remaining doubt, however, the following day he made a cystoscopic examination with the indigo-carmine test. This revealed an abundant flow of colored fluid from the right ureteral orifice and no efflux from the left. The ureteral catheter on the left side was arrested by an obstruction about 10 cm. above the bladder. This examination demonstrated an obstructed ureter, which would account for the pyonephrosis, and enabled the physician practically to exclude a suppurating cyst. His diagnosis therefore was an acute pyonephrosis probably due to an impacted calculus in the lower portion of the ureter.

This diagnosis consistently accounted for every fact elicited in the history. The early colics indicated renal calculus without ureteral obstruction. The fulness in the flank was probably the uninfected hydronephrosis which resulted from the impaction of the calculus in the lower ureter. The furuncle furnished the necessary microorganisms to the blood, which attacked the damaged kidney and gave rise to acute septic infarcts, converting the sterile hydronephrosis into an infected pyonephrosis with the resulting grave toxemia.

The diagnosis in this case was subsequently confirmed by operation, and the patient made a satisfactory recovery.

The great advantage of the method by exclusion will be recognized even in a comparatively simple case as the one just related. Its superiority in obscure and complicated clinical problems is even more striking.

It is a lamentable fact that the great majority of medical men throughout the country to-day, in making a diagnosis, take only a fragmentary and incomplete history, make a hasty and wholly inadequate physical examination, avail themselves rarely of the help of the clinical laboratory, and in the end consider only the most obvious and frequently observed diagnostic possibilities. While practitioners of large experience and quick observation often will arrive at a correct diagnosis, seemingly by intuition, the plan is a vicious one and in the end will lead to disastrous mistakes.

It is therefore a matter of the utmost importance that a medical student, as soon as he begins his clinical work, should acquire a definite method to be followed in all cases presented to him for diagnosis. It matters little just what method he employs so long as it

possesses three essential characteristics: (1) The taking of a full and accurate clinical history; (2) the making of a complete and painstaking physical examination, including laboratory findings, and (3) logical reasoning from the data thus obtained.

In our experience the method of diagnosis by exclusion is the one which possesses most advantages for the student, in that it necessitates the consideration on each occasion of a large number of pathologic possibilities, common or rare, to account for a given clinical picture.

It is also of advantage in that it not infrequently leads him to the conclusion that, in certain cases, a definite diagnosis cannot be made with the data available.

This method of teaching diagnosis was introduced in the surgical department of this college in 1900. Our plan at that time was to bring a patient before a class section. One student would elicit the history, a second student would record the history on a specially prepared blank, a third would make the physical examination, and a fourth would record his findings. The results of any laboratory or X-ray examinations were then furnished from the hospital records if requested.

The class was then asked to criticize the history and physical examination, and to suggest other lines of inquiry or examination. When all available data had been collected, each member of the section was asked for a possible diagnosis, which in his opinion would account for the symptoms and signs present. These various diagnostic possibilities were then written upon a blackboard by an assistant. When every possibility had been suggested and written upon the board each member of the section in turn was asked to exclude one, beginning at the top or bottom of the list. If a student was able to give adequate reasons why a given diagnosis should be excluded it was crossed off; if he could not furnish a reason for excluding it a question mark was placed opposite it. If any doubt existed as to whether it should or should not be excluded the question was put to a vote by the class. In this manner each possible diagnosis was considered at length, and in the end if only one possibility was left unexcluded that was the diagnosis entered on the history. If several possibilities remained unexcluded the class was asked for suggestions with a view to further questioning or examination to clear up the diagnosis. If further facts were desirable, such as

would be furnished by an examination of the eye grounds, an X-ray plate, a cystoscopy, catheterization of the ureters, lumbar puncture, etc., the case was entered in the record as one in which no positive diagnosis could be made without the help of one or more of these special examinations.

While it is not reasonable to expect a busy practitioner to write down the various diagnostic possibilities in as simple a case as a scalp wound or Colles fracture, and while he may not employ a blackboard or paper and pencil even in his more difficult and complicated cases, still the habit of logical reasoning once thoroughly acquired as a student, will later be unconsciously followed in all his diagnostic problems.

The method of teaching surgical diagnosis outlined above proved so satisfactory in the fourth year section work that the writer adopted it with certain modifications in his third year clinics. As the student at the beginning of his third year has had only a preliminary course in surgery, it has been found useful to furnish him with a few elementary charts giving a simple classification of the ordinary surgical lesions, to which he can refer in his earlier efforts in diagnosis. At a later period more comprehensive charts for regional diagnosis are employed, until he has acquired the habit of making his own charts, either mental or graphic, for the solution of his diagnostic problems.

Before presenting these charts and describing the method of their employment, however, it will be well to consider for a moment a general classification of surgical lesions.

In this our aim has been to adopt the simplest classification possible, and while we recognize that there are a few conditions which may not, at first thought, readily fall into one of the four primary groups, by a little further consideration it will be found that they can be so classified. For instance, simple hypertrophy of the thyroid gland is probably not an inflammatory condition and, strictly speaking, is not a new growth; but as it always presents itself as a tumor when of sufficient extent to demand surgical consideration it may be so classed. The same is true of the condition described as diffuse virginal hypertrophy of the breast. The subclassification of "hypertrophies" has, however, been employed in some of our charts for the purpose of fixing these conditions in the mind of the student, as differing somewhat from the other groups of tumors. The same may

be said of calculus disease when present either in the bile or urinary passages. These we have classified as inflammatory conditions for the reason that some product of inflammation is invariably present at the time of their origin

All surgical lesions can be primarily classed in one of the four following groups:

1. Injury.
2. Deformity.
3. Inflammation.
4. New growth.

Injury.—If we have a patient suffering from injury, the next question to be asked is, what tissue or tissues are involved in the trauma. These may be classified as follows:

1. The soft parts.
2. The bony skeleton.
3. The viscera.

If the injury involves the soft tissues, is it limited to the skin or cutaneous appendages, or does it involve the muscles, the tendons, the blood vessels, nerves, lymphatics, or the superficial glands?

If the injury is of the bony skeleton is it of a bone or joint? If of the viscera what organ or organs have been injured?

The nature of the injury must next be considered.

If of the soft parts, we must consider: contusions, wounds, burns, frostbites.

Contusions may be superficial or deep, and are often associated with rupture of the superficial blood vessels and muscular fibers. Wounds may be divided into abrasions; incised, lacerated, or contused wounds; severe crushes or traumatic amputations. Wounds are also classified as infected or uninfected wounds. Burns may be classified as being caused from contact with flame or some hot object, from contact with some hot liquid or live steam (scalds), from the sun's rays, electricity, radium, or the Röntgen rays. A frost bite may be caused by exposure to a low temperature or contact with some cold substance as liquid air.

If the injury is of the bony skeleton we must consider wounds and fractures of the bones; contusions, sprains, or dislocations of the joints. Fractures are either simple or compound. They may be

complete or incomplete, single or multiple, comminuted, transverse, oblique, spiral, V- or T-shaped, splintered, or impacted. Dislocations may be simple or compound, partial or complete, reducible or irreducible.

In injuries of the viscera we must consider subparietal injuries or contusions, and open wounds. The severer forms of contusions of the solid viscera often are associated with hematomata; those of the hollow viscera with rupture and extravasation of their normal secretions, or contained solid or fluid matter. Visceral wounds may be incised or stab wounds, gunshot wounds, ruptures, or lacerations.

Deformity.—Deformities are divided into the congenital and acquired.

Congenital deformities are largely due to arrested development, the effects of intrauterine pressure or constriction, or to the more or less complete fusion of two embryonic units. As examples of arrested development we may have the various forms of harelip, cleft palate, meningocele, spina bifida, imperforate anus, hypospadias, epispadias, exstrophy of the bladder, horseshoe kidney and other visceral anomalies, vascular irregularities, and muscular defects. As examples of those due to intrauterine pressure or constriction we may have the various types of club-foot, club-hand, congenital dislocations, and spontaneous amputations. As examples of the fusion of two embryonic units we may have two fully developed but joined individuals, as the famous Siamese twins, double-headed monsters, supernumerary extremities, and the various types of polydactylism.

Regarding the acquired deformities we may divide them into those due to trauma, those due to disease, and those due to static conditions, to faulty attitudes, or lack of muscular development. Of those due to trauma may be mentioned distortion of the soft parts by losses of tissue or by the formation of contracting cicatrices, those of the bony skeleton due to non-union or vicious union of fractures, or to unreduced dislocations; paralytic deformities due to injury of the central or peripheral nervous system, and atrophies from injury to the vascular apparatus. Of those due to disease we may have the deformities due to paralysis or contraction of the muscles from disease of the central or peripheral nervous system; those due to losses of tissue in bone or soft parts from suppuration or other forms of destructive inflammation; those due to ankylosis and restricted motion from rheumatic or other inflammatory diseases of the joints, and

the various deformities of the skeleton from obscure nutritive disturbances, as rickets, acromegaly, leontiasis, etc. Of the static conditions and those due to faulty attitudes and lack of muscular development we may mention the various forms of scoliosis, flat-foot, knock-knee, and bow-legs.

Inflammation.—If we consider inflammation as an "effort on the part of an animal organism to rid itself of an irritant" we may divide all inflammations into those due to infection with pathogenic microorganisms and those due to conditions other than infection, as trauma, chemical or thermal agencies, electricity, and the various forms of radiant energy. The former would be classed as *infective* inflammations, the latter as *noninfective* inflammations.

Inflammations also may be divided into acute and chronic, the acute being those in which the process is a comparatively rapid one, giving rise usually to heat, swelling, redness, pain, and impairment of function, and often accompanied by systemic disturbances as fever, malaise, nervous bodily phenomena, weakness, and loss of flesh.

The *acute infective* inflammatory processes are due to the presence in the tissues of microorganisms. Of these there are a large variety, and the resulting inflammations vary considerably in their intensity, their tissue destruction, and their toxic symptoms. Thus the staphylococcus, as a rule, produces in the soft parts only a limited or circumscribed area of inflammation, generally resulting in abscess, with a comparatively low degree of toxemia.

The members of the streptococcus group, on the other hand, generally give rise to a rapidly spreading inflammatory process, much tissue necrosis, and a high degree of toxemia.

The Bacillus aerogenes capsulatus, or gas bacillus, causes a virulent, spreading, gangrenous emphysema of the cellular tissues, with a rapidly progressive and generally fatal toxemia.

The *chronic infective* inflammations may be grouped in four general classes: Those which are the result of, or represent, the late stage of acute infection; those due to tuberculosis, syphilis, or one of the mycotic infections, as actinomycosis or blastomycosis.

Infective inflammations are further subdivided into the suppurative and nonsuppurative types; the former due to the action of the so-called pyogenic organisms, the latter to organisms which, under ordinary circumstances, do not produce frank suppuration. Of the

nonsuppurative types of inflammation we recognize the catarrhal, fibrinous, and diphtheritic, generally occurring in the mucous membranes; the rheumatic, in joints; the erysipelatous or gangrenous types, in the skin and subcutaneous tissues.

Of the *acute noninfective* inflammations we have the traumatic and nontraumatic. As examples of the traumatic may be mentioned the hot, red, swollen, tender, painful, and functionally impaired joint observed after mechanical injury (traumatic synovitis); or the acute inflammatory reaction which follows a severe bruise of the soft parts, associated with extensive ecchymosis or hematoma. Both of these processes are reparative, but the vascular and tissue reactions are the same as if the irritant were microbic.

The nontraumatic group comprises a number of types not well understood. In general they may be said to be due to errors in metabolism resulting in some form of autointoxication, or perhaps, in some instances, to disturbed action of the nervous system. Among these one finds the acute gouty arthritis, the angioneurotic edema, erythromelalgia, erythema nodosum, etc. In the acute joint manifestations of gout one observes every classical symptom of inflammation, often in its severest type; in the others some of the cardinal symptoms and signs may be wanting.

Of the *chronic noninfective* inflammations we have three classes: the fibrous, the calcareous, and the hypertrophic. These may be said to represent the terminal stage of an inflammatory process by which nature has attempted to repair some injury. As examples of these types we may mention the chronic induration which follows an acute traumatic orchitis, the calcareous changes found in a muscle in myositis ossificans, or the hypertrophied bone surrounding an imbedded foreign body or bone abscess (sclerosis).

New Growths.—New growths may be structurally divided into *solid tumors* and *cysts*. Clinically they may be divided into *benign* growths and those which are *malignant* in character.

Solid growths may be divided into four classes based upon their histologic structure:

1. Connective tissue growths.
2. Epithelial growths.
3. Mixed growths.
4. Special or unclassified tumors.

Under connective tissue growths we may include:

Fibromata,	Neuromata,
Lipomata,	Gliomata,
Myomata,	Myelomata,
Myxomata,	Sarcomata,
Angiomata,	Endotheliomata.

Under epithelial growths are included:

Papillomata,
Adenomata,
Carcinomata { Spheroidal, / Cylindrical, / Epithelioma { Squamous, / Basal.

Under mixed growths may be mentioned:

Embryomata,
Teratomata.

Under the unclassified group may be included:

Simple hypertrophies,
Deciduomata (hydatidiform mole),
Chorionepitheliomata (syncytioma),
Hypernephromata,
Psammomata.

Cysts may be divided into those arising from distention of pre-existing cavities, as a cystic goiter, sebaceous cyst, ranula, or galactocele; those of new formation, as the serous cysts (hygromata); degenerative cysts (ganglia); those due to the action of a parasite (echinococcus cysts); and those of congenital origin, as dermoids, branchial or thyroglossal cysts, cysts of the urachus, etc.

On the following pages will be found a number of charts, to which reference has already been made.

The first four may be designated the *preliminary charts*, as they represent the simplest classification of the four primary groups of surgical lesions.

It is advisable that these should be used exclusively in the first few exercises until the student has become familiar with the methods

of history taking and physical examination, and has acquired the habit of deductive reasoning in making his diagnosis.

At a later period when more complicated clinical problems are presented it will be of advantage to employ some of the *regional charts.* Two or three types of the latter have been introduced, together with case histories illustrating their use. These charts are not intended to cover all regions, but are introduced rather to furnish examples of the different types which may be employed in solving the various diagnostic problems.

At the end of the pamphlet will be found a number of blank pages which will enable the student to preserve certain useful regional charts which he may have made himself during the progress of this course or copied from those made by the class. In fact, each student is urged to make many charts of his own, on the principle that a workman always does better work with tools of his own invention. In the latter part of the course the greatest latitude will be allowed in the making of charts to encourage original work.

The following three cases will illustrate the use of the preliminary charts:

Case 1.—A middle-aged man applied to the Roosevelt Hospital for the relief of a painful swelling on the left side of his neck. Two weeks before admission he had suffered from sore throat with moderate fever. These symptoms subsided under appropriate treatment, and four days later he noticed a tender swelling below the angle of the jaw. The swelling gradually increased in size, and was later the seat of a throbbing pain. On the morning of admission he noticed that the skin in the region of the swelling was red, hot, and tender. There was difficulty in moving the head, and he was unable to go to his work.

Examination.—Examination revealed an area of redness about the size of a silver dollar, which was elevated, was hard to the touch, and was exquisitely tender. Careful palpation revealed a distinct area of fluctuation in its center. Temperature 101°; pulse 96.

The absence of any history of injury, the short duration of symptoms, and the presence of heat, swelling, redness, and pain clearly led us to classify the affection as an inflammation.

Turning to Chart III we exclude the noninfectious types by the presence of fever and other constitutional symptoms, all chronic infections, by the short duration of symptoms. The demonstrated fluc-

tuation enabled us to affirm the presence of pus in the center of the mass, and this, with the absence of any signs of a spreading process, led promptly to the diagnosis of a localized suppurative inflammation of the skin and subcutaneous tissues: acute abscess.

Case II.—A married man, 63 years of age, had been aware for some six months of a slowly growing, elevated nodule on the lower lip, which had caused him no inconvenience except an occasional bleeding when it was rubbed by a towel.

Examination.—On inspection a dull red oval tumor was seen growing from the vermillion border of the lip, just to the right of the median line. It was somewhat irregular in shape, and presented a small area of ulceration on its upper surface.

On palpation the mass felt hard, and at the point of its implantation on the mucous membrane of the lip it was surrounded by a somewhat denser ring of induration. Two small, hard nodules were felt in the submental region. The absence of any history of injury, the duration of the malady, its slow growth without pain or other signs of inflammation led us to classify it as a new growth.

Turning to Chart IV we were able to exclude all cysts by the density of the mass and by the entire absence of fluctuation. Its characteristic appearance and the fact that it apparently had its origin in the mucous membrane led us to regard it as an epithelial growth. As an adenoma practically never has its origin from pavement epithelium, and as a papilloma never infiltrates the submucous tissues, both of these were excluded.

As the only variety of carcinoma growing from the surface of the mucous membrane of the lip is epithelioma, and as the type of these growths is invariably squamous, our diagnosis was squamous cell epithelioma of the lip.

Case III.—A boy thirteen years of age, while riding a bicycle, was thrown violently to the ground, striking the lower part of the left chest against an oval rock. He experienced a sharp local pain, and for a period of five or ten minutes felt slightly nauseated and faint. He walked home, however, a distance of over a mile, wheeling his bicycle by his side. After reaching his home he complained of pain in the upper left quadrant of the abdomen, and at the request of his mother went to the accident room of the hospital for advice and treatment. On examination there was seen a slight ecchymosis over the lower left ribs, marked tenderness to palpation over the

area of ecchymosis and over the entire upper left quadrant of the abdomen. The muscles were rigid in this region. There was no vomiting, no distention of the abdomen, no shifting dulness, and no fever. The pulse was 110, temperature normal, and the face and mucous membranes slightly pale. He was advised to remain in the hospital for observation. This he refused to do, and returned to his home. The following morning he again visited the hospital and applied for admission. He was immediately placed in bed, and the following notes taken: Well marked pallor of face and lips, pulse 120 and soft, temperature 101°, respiration shallow and moderately painful. Examination of the heart and lungs was negative, except for a few dry râles over the lower lobe of the left lung, thought to be pleural friction sounds. No crepitus or extreme tenderness over the lower ribs. Examination of the abdomen revealed a moderate distention, marked muscular rigidity over the entire left half, most noticeable in the upper quadrant. Moderate tenderness over the right half and lower left quadrant, and extreme tenderness in the upper left quadrant. Flatness in the left flank, which partly disappeared on turning patient on the right side. Urine negative. No blood examination made.

In considering the diagnostic possibilities in this case it was evident that we had to do with an injury to the left half of the trunk. The injury surely involved the skin and soft parts, and possibly the ribs and viscera. Turning to Chart I we considered first the three primary classes of injury: to the soft parts, bones, or viscera. We recognized the presence of contusion of the skin and muscles with some extravasation of blood, but could exclude from the history and examination all other lesions of the soft parts. Taking up next the possible injury to the bony skeleton, we at once excluded all lesions of joints on account of the location of the trauma. Wounds of bone or compound fractures are excluded by the absence of a broken skin, simple fracture of the lower ribs is excluded by the absence of any one point of extreme tenderness, and by the absence of crepitus on pressure or during a deep inspiration.

Considering the possibility of visceral injury, the presence of marked tenderness and muscular rigidity strongly suggested peritoneal irritation; the pallor, high pulse rate, and rising temperature suggested hemorrhage. The shifting dulness in the flank might be due to free fluid in the peritoneal cavity or to fluid feces in the left colon.

These facts were sufficient to establish the probable diagnosis of visceral injury. From the location of the injury in the left upper quadrant of the abdomen, and the chief signs, pain, tenderness, muscular rigidity, a soft, rapid pulse, pallor, and possibly free fluid in the peritoneal cavity, we must consider:

1. Rupture of the stomach or intestine.
2. Rupture of the diaphragm.
3. Rupture of the liver.
4. Rupture of the spleen.
5. Laceration of the mesentery or omentum.

Rupture of the stomach was excluded by the absence of acute pain at the time of injury, as the acid gastric juice invariably produces a high degree of peritoneal irritation. Moreover, any perforative lesion of the alimentary canal would have given definite signs of a rapidly spreading peritonitis after twenty hours.

Rupture of the diaphragm was excluded by the comparatively moderate degree of trauma, the absence of respiratory embarrassment, and the absence of signs in the chest other than the few friction sounds.

Rupture of the left lobe of the liver was excluded by the location of the trauma and also by the fact that the small left lobe is rarely ruptured except as a result of a severe crushing injury.

Rupture of the spleen could not be excluded, as it was the organ most likely to be injured by such a blow, and it would in all probability give rise to a progressive hemorrhage. While lacerations of the mesentery or omentum are often accompanied by large extravasations of blood they practically never occur as a result of a blow over the lower ribs.

As a rupture of the spleen was the lesion which would best explain the symptoms and signs, and as the other four possible injuries could be excluded, this was the diagnosis recorded. Laparotomy revealed an extensive fissure about the middle of the spleen, extending from the external surface to the hilum. There was also found a liter or more of fluid and clotted blood in the peritoneal cavity. The patient recovered.

CHART I

INJURIES

SOFT PARTS

- **Contusion**
  - Rupture of blood vessels (ecchymosis, hematoma)
  - Rupture of muscular fibers
  - Traumatic gangrene
- **Wound**
  - Contused
  - Incised
  - Punctured
  - Lacerated
  - Gun-shot or stab
- **Burn**
  - From flame or hot object
  - From steam or hot liquid (scald)
  - From chemical action, X-ray, electricity, etc.
- **Frost Bite**
  - Exposure to low temperature
  - Contact with cold substance—snow, ice, liquid air

BONY SKELETON

- **Bone or Cartilage**
  - Contusion—sub-periosteal hematoma
  - Wound
    - Incised
    - Gun-shot
  - Fracture
    - Simple
    - Compound
- **Joint**
  - Contusion
    - Hemarthrosis
    - Traumatic synovitis
  - Sprain
    - Stretching or rupture of ligaments, tendons or capsule—ecchymosis
  - Wound (penetrating)
  - Dislocation
    - Complete, incomplete
    - Simple, compound
  - Injury or dislocation—semi-lunar cartilage of knee

VISCERA*

- **Contusion**
  - May result in suspended or irregular function, hematoma formation, etc.
- **Rupture**
  - Often violent hemorrhage, if of solid viscera;
  - Extravasation of contents of hollow organs
- **Wound**
  - Gun-shot, stab, punctured, etc., generally giving rise to hemorrhage, extravasation or altered function

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*Of the organs liable to be injured we have in the *Cranial cavity*, the brain, membranes, vessels, sinuses; *Spinal canal*, the cord, cauda equina, membranes, vessels; *Thorax*, lungs, heart, pleura, pericardium, trachea, esophagus, great vessels, thoracic duct, nerves, plexuses; *Abdomen*, stomach and intestine, liver, gall bladder and ducts; spleen, pancreas, kidneys, ureters, and bladder; uterus and adnexa; mesentery, omentuma; great vessels, receptaculum chyli.

CHART II

DEFORMITIES

- **CONGENITAL**
  - **Arrested Development**
    - **Clefts or Fistulæ**
      - Spina bifida
      - Meningocele (cerebral)
      - Harelip, cleft-palate
      - Branchial fistulæ
      - Thyroglossal fistulæ
      - Hypospadias, epispadias
      - Exstrophy of bladder
      - Patent urachus
      - Pseudohermaphrodism
      - Meckel's diverticulum
    - **Absence or malposition of organs**
      - Ectopic kidney
      - Single kidney
      - Fused kidney
      - Wandering spleen
      - Crypt-orchidism
      - High cecum
      - Transposition of viscera
    - **Abnormal and incomplete union of segments**
      - Hermaphrodism
      - Syndactylism
      - Atresia of vagina
      - Atresia or stricture of bowel
      - Hydrocephalus
  - **Intra-uterine pressure or constriction**
    - Club-foot
    - Club-hand
    - Congenital dislocation
    - Congenital amputation
  - **Fusion of two embryonic units**
    - Joined twins
    - Double headed monsters
    - Supernumerary limbs
    - Polydactylism
- **ACQUIRED**
  - **Traumatic**
    - **Soft parts**
      - Extensive loss of tissue
      - Cicatricial contracture
    - **Skeleton**
      - Angulation or shortening from vicious union of fracture
      - Pseudarthrosis
      - Unreduced dislocation
      - Traumatic anchylosis
  - **Pathologic**
    - **Neuropathic**
      - Paralytic
      - Spastic
    - **Inflammatory**
      - Arrested growth of bone from epiphyseal disease
      - Contractions from cellulitis or deep suppuration
      - Anchylosis of joints from sepsis, tuberculosis, or rheumatism
    - **Nutritive**
      - Acromegaly
      - Leontiasis
      - Osteitis deformans
      - Hypertrophies
      - Rickets
  - **Static**
    - Scoliosis
    - Flat-foot
    - Knock-knee
    - Bow-legs

CHART III

INFLAMMATIONS

- **INFECTIVE**
  - **Acute**
    - **Suppurative**
      - Localized (abscess)
      - Spreading

      White pus generally results from infection by the staphylococcus albus; yellow pus from staphylococcus aureus or citreus; blue pus from the pyocyaneus; green pus from the pneumococcus or gonococcus; thin, watery pus from the streptococcus; foul-smelling pus from the colon bacillus or proteus.
    - **Non-suppurative**
      - Catarrhal
      - Fibrinous

        Fibrinous and catarrhal inflammations may be caused by a variety of infections.
      - Diphtheritic — By the Klebs-Loeffler bacillus
      - Rheumatic — Probably by one of the streptococcus group
      - Emphysematous Gangrenous — Emphysematous gangrene may be caused by the bacillus aerogenes capsulatus, or the bacillus of malignant edema.
  - **Chronic**
    - Late stage of acute inflammation
    - Tuberculosis
    - Syphilis
    - Mycotic
      - Actinomycosis
      - Blastomycosis
- **NON-INFECTIVE**
  - **Acute**
    - Traumatic
    - Gouty
    - Neuropathic
  - **Chronic**
    - Hypertrophic
    - Fibrous
    - Calcareous

CHART IV

NEW GROWTHS

- **SOLID TUMORS**
  - **Connective tissue**
    - Fibroma
      - Hard
      - Soft
    - Lipoma
      - Circumscribed
      - Diffuse
    - Myoma
      - Leiomyoma
      - Rhabdomyoma
    - Angioma
      - Lymphangioma
      - Hemangioma
    - Myxoma
    - Chondroma
    - Osteoma
    - Neuroma
    - Myeloma
    - Sarcoma
    - Endothelioma
  - **Epithelial**
    - Adenoma
    - Papilloma
      - Spheroid-cell
      - Cylindrical-cell
    - Carcinoma
      - Epithelioma
        - Squamous
        - Basal (rodent ulcer)
  - **Mixed growths**
    - Embryoma
    - Teratoma
  - **Unclassified**
    - Simple hypertrophies
    - Deciduoma (Hydatidiform mole)
    - Chorionepithelioma (syncytioma)
    - Hypernephroma
    - Psammoma
- **CYSTS**
  - **From distention of pre-existing cavities**
    - Exudation cysts in organs without ducts
    - Retention cysts in organs or glands with occluded ducts
    - Extravasation cysts, hemorrhage into closed cavities.
  - **New formation**
    - Serous cysts
    - Degeneration cysts
    - Parasitic cysts
    - Implantation cysts or traumatic dermoids
  - **Congenital**
    - Dermoids
    - From persistent fetal clefts or ducts
      - Branchial
      - Thyroglossal
      - Urachal

After the class has been sufficiently drilled in the use of the four preliminary charts it is desirable to make use of the *regional charts.* By the employment of these we limit the number of pathologic conditions considered in each case, and also are able to arrive at a more exact and specialized diagnosis. For instance, when the lesion is evidently limited to one region, as the finger or hand, and is obviously an infection, and not an injury, malformation, or new growth, we may with advantage employ a chart dealing only with infections of the hand or upper extremity, as Chart V. By the use of this chart we are enabled not only to arrive at the conclusion that we have to do with an acute suppurative inflammation of the hand, but we go much further, and are able to make a definite specialized diagnosis of the various tissues involved in the process and the resulting lesions in each which the infection has produced. To illustrate the use of this particular chart, the following case, which recently came under the writer's observation, may be quoted:

A middle-aged man presented himself at the Roosevelt Hospital suffering from a painful and swollen index finger. Six weeks before admission he had been deeply pricked with a rose thorn, and as a result, an acute inflammation developed which involved the entire finger and extended for a short distance on the palm. There was at first constant throbbing pain, redness, marked edema of the part, with fever, anorexia, and general weakness. A few days later the family physician was called and made an incision in the flexor surface, evacuating a considerable amount of pus. From this time on there was much less pain and practically no fever, but the wound never healed and the finger remained swollen, stiff, and painful.

At the time of the writer's first examination there were marked edema on both the flexor and extensor surfaces as far back as the middle of the metacarpal bone, fluctuation over the head of the metacarpal bone in the palm, tenderness on lateral pressure over the first phalanx, tenderness, edema, and some induration over the flexor sheath, a discharging sinus leading to the sheath, and inability to flex the two terminal joints.

As a result of this examination, taken in connection with the history of the case, it was evident that we had to do with an acute septic infection of the hand, which had not been relieved by evacuation of the pus, and that some factor or factors were still in existence, which were interfering with or preventing resolution. Turning to

Chart V, on hand infections, under the acute variety we have three classes: infection of the soft parts, the joints, and in bone.

Regarding the soft parts, we see at a glance that the skin is involved, but, as the present condition of the finger could not be accounted for by a simple dermatitis, we will regard the skin lesion as a secondary involvement, and must look elsewhere for the essential cause of the present condition.

Furuncle, carbuncle, onychia, and paronychia can be excluded by simple inspection of the parts; phlebitis, lymphangitis, and spreading cellulitis, by the absence of any signs of extension to the arm. Tenosynovitis is evidently present, from the shape and extent of the area of edema and the disturbed function of the flexor tendons. Of joint infections we cannot exclude either a septic synovitis or arthritis of the metacarpophalangeal joint. In fact, the latter is rendered probable by the area of fluctuation on the palmar surface just over the head of the bone.

Of the possible bone lesions we must consider the probability of a septic osteomyelitis of the first phalanx on account of the tenderness to lateral pressure, which is not present over the two terminal phalanges. As the condition at present is evidently a chronic one, following on a frankly acute septic process, we can exclude at once all primary chronic infections occurring in the soft parts, joints, or bone. This leaves us as unexcluded possibilities a chronic septic tenosynovitis, probably kept up by the presence of necrotic tendons, chronic septic arthritis, and necrosis of the first phalanx from septic osteomyelitis. To verify the latter condition an X-ray plate was made, which showed a destruction of the normal bone trabeculæ, a thickened and partly calcified periosteum.

Amputation was advised, and at operation the first phalanx was found necrotic with purulent infiltration of the medullary canal; the metacarpophalangeal joint, the seat of a purulent arthritis, with a periarticular abscess in the palm; the tendon sheath full of indolent granulations, and both superficial and deep flexor tendons necrotic. The finger was amputated, the necrotic tendons removed, and the wound partly united and drained. The patient made a slow but complete recovery.

When the disease is limited to a given organ or region, but where the history and results of physical examination do not point definitely to one of the four primary surgical lesions, as injury, deformity, in-

flammation, or new growth, a regional chart may be employed in which several or all of these primary groups are considered. (See Charts VII, VIII, IX, X, XI, XII, XIII, XIV.)

To illustrate the use of these charts the following cases may be quoted:

Case I.—An unmarried woman 37 years of age consulted the writer, complaining of "a tight feeling about the throat" and the presence of two moderate-sized lumps just to the left of the trachea. The patient had first noticed the lumps six months ago, and is of the opinion that they have doubled in size during that period.

Examination.—On inspection there was a noticeable enlargement over the region of the left lobe of the thyroid gland, which moved upward and downward on swallowing. There was no exophthalmos and no sign of nervous excitement or agitation. On palpation the lumps were found to be oval in shape, of smooth contour, somewhat elastic to touch, but presented no evidence of frank fluctuation. They were not compressible, and no pulsation could be detected. Pulse 90, temperature normal.

In this case we evidently had to do with two tumors seated in the left lobe of the thyroid gland. Turning to Chart XIII, of diseases of the thyroid gland, we can exclude at once all injuries, malformations, and acute inflammations. Tuberculosis and syphilis can be excluded by the fact that the lesion is multiple and definitely circumscribed; fibrous goiter, by the absence of any previous history of acute inflammation. Simple parenchymatous or colloid hypertrophy can be excluded for the reason that the entire lobe is not involved, the apparent disease being limited to two small circumscribed areas. Exophthalmic hypertrophy can be excluded for the same reason, and also by the fact that there are no signs of exophthalmos, tachycardia, nervous restlessness, emotional disturbance, tremor, dyspnea, wasting, or excessive perspiration. Angioma may be excluded by the absence of pulsation or compressibility, by the circumscribed character of the lesions, and by the fact that we have two separate and distinct tumors. Carcinoma and sarcoma are excluded by the fact of there being two tumors, neither of which infiltrates the surrounding tissues, and, although an encapsulated sarcoma in this region has been known to exist, two such growths occurring in a single gland would be the rarest of surgical curiosities.

This leaves us with two unexcluded possibilities: multiple cysts

or adenomata. As these are among the commonest diseases of the thyroid gland, and as one cannot make a differential diagnosis between the two unless the tumor is large or situated near the surface, we were led to what was, in fact, our recorded diagnosis: multiple adenomata or cysts of the thyroid. On operation the two palpable tumors were found to be cysts. Deeper down in the gland, nearer the isthmus, was a third tumor which proved to be an adenoma.

The following rather obscure case is taken from the records of the Roosevelt Hospital:

Case II.—A married woman, 52 years of age, was admitted, complaining of a "thickening" of the left breast, which had been growing for six weeks. No history of injury. No lactation for twenty-two years. On examination the entire upper hemisphere of the left breast was densely hard but not tender. The skin over the indurated area was markedly reddened, thickened, and edematous, and seemed firmly adherent to the underlying mass. The breast moved freely on the chest wall, the nipple was not retracted, and no axillary lymph nodes could be felt.

The patient was a thin, active woman, denied syphilis, had a strong family history of tuberculosis, but had never suffered from chronic cough or prolonged ill-health. There had been no loss of weight. The temperature was normal. No blood examination was made. The short duration of the trouble, the redness and edema of the skin, and the massive induration without retraction of the nipple strongly suggested a chronic inflammation. Her age, the absence of any local infection, signs, or history of tuberculosis or syphilis led one to think of a rapidly growing tumor. Turning to Chart XIV, of diseases of the breast, we should first consider inflammations. All acute inflammations can be excluded from the duration of the lesion and by the absence of pain, tenderness, and fever. Chronic induration following an acute inflammation can be excluded by the absence of a history of previous acute mastitis, and the presence of edema of the skin. Tuberculosis might give the stony induration but not the redness and edema of the skin, unless a mixed infection were present, and in that event there would be pain and tenderness. Syphilis might give the redness and edema but not the stony induration. Actinomycosis and blastomycosis were excluded by the appearance of the lesion and by the fact that they almost never occur primarily in the breast. Chronic interstitial mastitis could be excluded by the

large area of massive induration and by the redness and edema of the skin.

As all of the chronic inflammatory lesions could be excluded, the tumor had to be regarded as a new growth. Of the epithelial tumors, papilloma and adenoma could be excluded by the size and shape of the lesion as well as by the redness and edema of the skin.

A rapidly growing carcinoma might give rise to the redness and edema of the skin by an extensive involvement of the cutaneous lymphatics. This diagnosis was also favored by the age of the patient and the density of the mass. On the other hand, the absence of palpable lymph nodes in the axilla, in the presence of so large a tumor, would argue against carcinoma. Retraction of the nipple would not necessarily be present in a rapidly growing cellular carcinoma. It therefore could not be excluded.

Of the connective tissue growths, all but sarcoma could be excluded by the rapidity of the growth and the redness and edema of the skin. Sarcoma of the breast, although rare, must be considered. It often grows rapidly and generally without lymph node metastasis, but it never produces lymphatic edema of the skin, and could therefore be excluded. Operation and microscopic examination of the specimen revealed a very cellular and exceedingly malignant carcinoma. There was extensive lymph node metastasis in the axilla, but the nodes were so soft that they could not be palpated through the skin.

Occasionally when one can be satisfied that a definite single lesion is present, as a chronic ulcer or hernia, and where it is only necessary to determine the variety, a chart dealing only with this individual lesion will be found useful. Two such charts (Nos. XV and XVI) have been introduced.

Chart XVI, dealing with hernia, it will be seen, is a double chart, giving two classifications, the anatomical and clinical. As it is exceedingly desirable in every case of hernia not only to recognize its anatomical variety, but also its clinical condition at the time of examination, whether reducible or irreducible, infected, obstructed, strangulated, etc., both divisions of this chart are to be employed in every case, first the anatomical and then the clinical.

CHART V (Regional)

HAND INFECTIONS

- **ACUTE**
  - **Soft Parts**
    - Dermatitis
      - Erysipelas
      - Erysipeloid
      - Dermatitis Venenata
    - Furuncle
    - Carbuncle
    - Paronychia
    - Onychia
    - Tenosynovitis—bursitis
    - Phlebitis
    - Lymphangitis—adenitis
    - Cellulitis
      - Localized—abscess
      - Spreading
  - **Joints**
    - Synovitis
    - Arthritis
      - Rheumatic
      - Septic
  - **Bone**
    - Osteomyelitis
      - Septic
      - Typhoid
- **CHRONIC**
  - **Soft Parts**
    - Chronic septic—necrotic tendons, etc.
    - Tuberculosis—secondary
    - Syphilitic—gumma
    - Mycotic
      - Actinomycotic
      - Blastomycotic
  - **Joint**
    - Chronic septic arthritis
    - Tuberculous arthritis
    - Syphilitic arthritis
    - Gouty arthritis
    - Rheumatoid arthritis
  - **Bone**
    - Chronic Osteomyelitis
      - Chronic septic—necrosis
      - Tuberculous—spina ventosa
      - Syphilitic—dactylitis
      - Typhoid
      - Osteomyelitis albuminosa

CHART VI (Regional)

BONE INFECTIONS—OSTEOMYELITIS

- **ACUTE**
  - Epiphyseal
    - Acute epiphysitis or acute septic arthritis of infants
  - Diaphyseal
    - Cortical
      - Sub-periosteal abscess with cortical necrosis
    - Central
      - Local—Brodie's abscess.
      - Spreading—Diffuse septic osteomyelitis
- **CHRONIC**
  - Epiphyseal
    - Chronic septic
    - Tuberculous
    - Syphilitic
  - Diaphyseal
    - Chronic septic
    - Tuberculous
    - Syphilitic
    - Typhoid
    - Mycotic
    - Osteomyelitis albuminosa

CHART VII (Regional)

INJURIES AND DISEASES OF THE JOINTS

- **CONTUSION**
  - Superficial, ecchymosis
  - Hemarthrosis
- **SPRAIN** —Stretching or laceration of tendons, ligaments, or capsule.
- **DISLOCATION**
  - Partial—complete
  - Regular—irregular
  - Simple—compound
- **WOUND**
  - Superficial, non-penetrating
  - Penetrating
    - Clean
    - Infected
- **SYNOVITIS**
  - Acute
    - Traumatic, hemarthrosis
    - Septic
      - Direct infection
      - Metastatic
    - Toxic
  - Chronic (Hydrops)
    - Foreign body or indurated synovial fringes
    - Injured or loose semilunar cartilages
    - Synovial tuberculosis
- **ARTHRITIS**
  - Acute
    - Traumatic
    - Septic
    - Toxic
  - Chronic
    - Tuberculous
      - Synovial
      - Bony
    - Non-tuberculous
      - Chronic septic
      - Syphilitic
      - Gouty
      - Arthritis deformans
      - Neuropathic (Charcot's)
- **ANCHYLOSIS**
  - Fibrous
  - Bony
  - Cicatricial

CHART VIII (Regional)

MALFORMATIONS, INJURIES AND SURGICAL DISEASES OF THE SKULL AND BRAIN

- **MALFORMATION**
  - Congenital
    - Microcephalism
    - Hydrocephalus
    - Meningocele, encephalocele
  - Acquired
    - Rickets, cranio tabes,
    - Acromegaly, leontiasis
- **INJURY**
  - Contusion
    - Birth palsies; epilepsy, idiocy, etc.
    - Acquired trauma; concussion
  - Penetrating wound—gun-shot
  - Fracture of Skull
    - Simple
    - Compound
    - Depressed
    - of vault or of base; may result in
      - Concussion
      - Laceration
      - Hemorrhage
      - Edema
      - Thrombosis of vessels
      - Compression
      - Infection
- **INFLAMMATION OR DISEASE**
  - Infection
    - Acute
      - Traumatic,
      - Extension from neighboring focus,
      - Metastatic, resulting in
        - Meningitis
        - Encephalitis
        - Brain abscess
        - Hydrocephalus
        - Edema
        - Compression
    - Chronic
      - Tuberculosis
        - Meningitis
        - Tuberculoma
      - Syphilis
        - Endarteritis
        - Gumma
  - Arterial Degeneration
    - Hemorrhage
      - Cortical
      - Ventricular
      - Basilar, apoplexy
    - Softening
      - Embolic
      - Thrombotic
  - Infective granulomata
    - Tuberculoma
    - Syphiloma
- **NEW GROWTH**
  - Fibroma, generally at cerebello-pontine angle
  - Angioma
  - Lipoma
  - Glioma
  - Sarcoma
  - Carcinoma, secondary
  - Endothelioma
  - Cysts—hemorrhagic, dermoid, parasitic

CHART IX (Regional)

MALFORMATIONS, INJURIES AND SURGICAL DISEASES OF THE SPINAL COLUMN AND CORD

MALFORMATION

- Congenital
  - Spina bifida
  - Meningocele
  - Meningomyelocele
  - Syringomyelocele
- Acquired
  - Scoliosis
  - Kyphosis
  - Deformity following fracture
  - Arthritis deformans
  - Paget's disease

INJURY

- Contusion or forced flexion
  - Concussion
    - Spinal hemorrhage
      - Extradural
      - Subdural
      - Hematomyelia
- Gun-shot wounds, with or without injury to cord.
- Fracture, Dislocation, or Fracture-dislocation, causing
  - Contusion of cord
  - Pressure from displaced fragment
  - Partial crushing lesion
  - Complete crushing lesion

INFLAMMATION OR DISEASE

- Osteomyelitis of vertebra
  - Acute—Septic
  - Chronic
    - Septic
    - Tuberculous (Pott's disease)
    - Syphilitic
    - Mycotic
      - Actinomycosis
      - Blastomycosis
- Meningitis
  - Acute (septic)
  - Chronic (tuberculous)
- Myelitis
  - Diffuse
  - Transverse
- Syphilitic, meningomyelitis
- Infective granulomata
  - Tuberculoma
  - Syphiloma

NEW GROWTH

- Of Spinal Column
  - Osteoma
  - Chondroma
  - Cysts (echinococcus)
  - Sarcoma
  - Secondary Carcinoma
- Of Meninges and Cord
  - Fibroma
  - Lipoma
  - Angioma
  - Sarcoma
  - Endothelioma

CHART X (Regional)

SURGICAL DISEASES OF THE UPPER ABDOMEN

- **INFLAMMATIONS**
  - **Acute**
    - Peritonitis (septic)
      - Localized
      - General, spreading, from
        - Penetrating Wound
        - Perforation of the stomach or intestine
        - Cholecystitis
        - Pancreatitis
        - Diverticulitis
    - Gastritis (phlegmonous)
    - Pancreatitis
      - Hemorrhagic
      - Gangrenous
      - Suppurative
    - Splenitis, abscess
    - Liver abscess
      - Solitary (amebic)
      - Multiple (septic)
    - Cholecystitis
    - Cholangitis
    - Subphrenic abscess
  - **Chronic**
    - Cholelithiasis of
      - Gall-bladder
      - Cystic-duct
      - Common duct
        - Floating
        - Impacted
    - Gastric or duodenal ulcer
    - Chronic pancreatitis
    - Chronic peritonitis
      - Fibrous
      - Tuberculous
- **TUMORS**
  - **Benign**
    - Inflammatory tumors about pylorus, gall-bladder and pancreas
    - Distended gall-bladder (hydrops)
    - Pancreatic, splenic, renal or adrenal cysts
  - **Malignant**
    - Carcinoma of
      - Gall-bladder or ducts
      - Stomach
      - Pancreas
      - Liver
    - Sarcoma or endothelioma
      - Liver
      - Spleen
      - Stomach
      - Small intestine
      - Lymph nodes
- **OBSTRUCTION OF THE ALIMENTARY CANAL**
  - Gastromesenteric ileus
  - Pyloric stenosis
    - Congenital
    - Acquired
      - Inflammatory
      - New growth
  - Intestinal obstruction
    - Acute
    - Chronic

CHART XI (Regional)

SURGICAL DISEASES OF THE LOWER ABDOMEN

- **INFLAMMATIONS**
  - **Acute**
    - Peritonitis
      - Local
      - Spreading, from
        - Penetrating wound
        - Perforation of intestine
        - Appendicitis
        - Septic uterus or adnexa
        - Diverticulitis
        - Rupture bladder, ureter or kidney
    - Appendicitis
    - Salpingitis
    - Enteritis
    - Colitis
    - Diverticulitis
      - Congenital (Meckel's)
      - Acquired, of colon (sigmoiditis)
  - **Chronic**
    - Tuberculosis
    - Syphilis
    - Actinomycosis
    - Blastomycosis
    - Chronic septic, of peritoneum or any of the viscera
- **NEW GROWTHS**
  - **Benign**
    - Adenoma
      - Intestinal
      - Uterine
    - Cysts
      - Ovarian
      - Mesenteric
    - Papilloma
      - Papillomatous cyst of ovary
      - Peritoneal (secondary)
    - Fibroids of uterus, ovaries or tubes
  - **Malignant**
    - Carcinoma
      - Uterus
      - Ovaries
      - Bowel (large intestine)
    - Sarcoma
      - Uterus
      - Ovaries
      - Bowel (small intestine)
      - Lymph nodes
    - Endothelioma of peritoneum
- **OBSTRUCTION OF BOWEL**
  - **Acute**
    - Paralysis from acute peritonitis
    - Bands or adhesions (Meckel's diverticulum)
    - Intussusception
    - Volvulus
    - Enteroliths
    - Internal or external hernias
    - Mesenteric thrombosis or embolism
  - **Chronic**
    - New growths, generally of colon
    - Pressure of tumors of the other organs
    - Enteroliths
    - Adhesions from chronic peritonitis
    - Impaction of feces in lower colon
    - Hirschsprung's disease

CHART XII (Regional)

INJURIES, MALFORMATIONS AND SURGICAL DISEASES OF THE KIDNEY

- **MALFORMATIONS**
  - Ectopic kidney
  - Single kidney
  - Fused kidney
  - Double ureter
    - Complete
    - Incomplete
- **INJURIES**
  - Subparietal
    - Contusion
    - Rupture
  - Wounds
    - Stab or gun-shot wounds
    - Crushes
  - Aneurism of renal artery, following injury
- **INFLAMMATIONS**
  - Hematogenous infections
    - Septic
      - Unilateral
        - Acute
        - Chronic
      - Bilateral
        - Acute
        - Chronic
    - Tuberculous
      - Bilateral
      - Unilateral

    All varieties of infection may give rise to
    - Pyelitis
    - Pyelonephritis
    - Pyonephrosis
    - Perinephritic abscess
  - Ascending infections
    - Septic
      - Unilateral
      - Bilateral
    - Tuberculous
      - Unilateral
      - Bilateral
  - From open wounds, or extension from neighboring foci
  - Calculus disease
    - Renal
    - Ureteral
- **NEW GROWTHS**
  - Epithelial
    - Adenoma
    - Papilloma of pelvic mucous membrane
    - Carcinoma of parenchyma
    - Epithelioma of pelvis
  - Connective Tissue
    - Myoma
    - Lipoma
    - Angioma
    - Sarcoma
    - Endothelioma
  - Special: Hypernephroma
  - Cysts
    - Multiple
      - Polycystic kidney,
      - From chronic nephritis.
    - Solitary
      - Simple
      - Parasitic
    - Extrarenal

CHART XIII (Regional)

INJURIES, MALFORMATIONS AND SURGICAL DISEASES OF THE THYROID GLAND

- **INJURY**
  - Contusion, hematoma
  - Wounds—punctured, incised, gun-shot, etc.
- **DEFORMITY**
  - Congenital absence or atrophy (cretinism)
  - Accessory thyroids
    - Lateral
    - Median
    - Intratracheal
  - Thyroglossal fistulæ
    - Median
    - Lateral
- **INFLAMMATION**
  - Acute
    - Acute thyroiditis
    - Abscess
  - Chronic
    - Tuberculous
    - Syphilitic (gumma)
    - Fibrous goiter
- **HYPERTROPHY**
  - Parenchymatous (simple struma),
  - Colloid (colloid goiter),
  - Exophthalmic (Graves' disease).
- **NEW GROWTH**
  - Adenoma
    - Single
    - Multiple
  - Angioma
    - Single
    - Multiple
  - Cyst
    - Single
    - Multiple
  - Carcinoma
  - Sarcoma

CHART XIV (Regional)

SURGICAL DISEASES OF THE BREAST

- **INFLAMMATIONS**
  - Acute
    - Cellulitis
      - Superficial
      - Deep; submammary abscess
    - Acute Mastitis
      - Suppurative; abscess
      - Non-suppurative; caked breast
  - Chronic
    - Induration from acute mastitis
    - Tuberculosis
    - Syphilis
    - Actinomycosis
    - Blastomycosis
    - Chronic interstitial mastitis
- **HYPERTROPHIES**
  - Virginal, simple
  - Senile parenchymatous (Schimmelbuch's disease)
    - Cystic
    - Adenomatous
- **NEW GROWTHS**
  - Epithelial
    - Papilloma
      - Superficial
      - Intracanalicular adenopapilloma
    - Adenoma
    - Carcinoma
      - Scirrhus
      - Duct cancer
      - Encephaloid
  - Connective Tissue
    - Fibroma
      - Fibroadenoma
      - Fibrocystoadenoma
      - Intercanalicular fibroma
    - Lipoma
    - Myxoma
    - Angioma
    - Sarcoma
    - Endothelioma

CHART XV

ULCERS

- **TRAUMATIC**
  - Wound or abrasion
  - Chemical—strong acids, alkalies, etc.
  - Thermal—burns, scalds
  - Electrical
  - X-ray, radium, etc.
- **INFECTIVE**
  - Pyogenic, infected wound, cellulitis, abscess
  - Infectious granulomata
    - Syphilis
    - Tuberculosis
    - Mycotic
      - Actinomycosis
      - Blastomycosis
- **CIRCULATORY**
  - Pressure decubitus
  - Embolic ischemia
  - Thrombotic ischemia
  - Venous stasis
  - Arterial sclerosis
- **TROPHIC**
  - Nerve section
  - Neuritis
  - Tabes
  - Syringomyelia, hematomyelia and cord injury
- **CONSTITUTIONAL DISEASES**
  - Scurvy
  - Diabetes
  - Nephritis
  - Typhoid and other grave infectious diseases
- **NEW GROWTHS**
  - Epithelioma
    - Pavement cell
    - Basal cell, rodent ulcer
  - Carcinoma
  - Sarcoma

CHART XVI

EXTERNAL HERNIA

ANATOMICAL CLASSIFICATION

- **Inguinal**
  - **Direct**
    - External
    - Internal
  - **Oblique**
    - **Bubonocele**
      - Congenital type
      - Infantile type
      - Adult type
      - Sliding
    - **Scrotal**
  - **Interstitial**
    - Properitoneal
    - Subaponeurotic
    - Subcutaneous
- **Femoral**
  - Crural (femoral sheath)
  - External (over vessels)
- **Ventral**
  - **Median**
    - Fatty hernia of linia alba
    - Diastasis of recti
    - Post-operative
  - **Lateral**
    - Hernia of linia semilunaris
    - Post-operative
- **Lumbar**
- **Sciatic**
- **Obturator**
- **Perineal**
  - Inguinoperineal
  - True perineal

CLINICAL CLASSIFICATION

- **Contents**
  - Epiplocele (omentum)
  - Enterocele (intestine)
  - Visceral, appendix, ovary, bladder, etc.
- **Reducibility**
  - **Reducible**
  - **Irreducible (incarcerated)**
    - Obstructed
    - **Inflamed**
      - Traumatic
      - Infected
    - Strangulated
- **Special types**
  - Littre's hernia
  - Richter's hernia

It is to be hoped by the end of the first half of the session that the class will have employed each of the foregoing regional charts a sufficient number of times to have become thoroughly familiar with the surgical lesions in these particular regions.

It is also hoped that each student will have made for himself a large number of other similar charts, dealing with the surgical conditions to be found in other organs or regions, for in the writer's opinion there is no better way of acquiring the faculty of instantly calling to mind a complete list of the various surgical lesions possible in a given organ or region, when a clinical problem is presented for solution.

During the latter part of the session, and especially in the fourth-year courses, when more difficult and complicated cases are presented for diagnosis, it will be found desirable in most instances to make *individual charts* suited to each case. Often it will be found, after all available data have been collected, that only three or four conditions need be considered.

The following obscure case, which was recently seen by the writer, will illustrate the use of an individual chart of this kind:

A boy of twelve, suffering from acute abdominal pain and high fever, was seen by the writer, in consultation, thirty-two hours after the beginning of the attack. There had been two previous attacks of a similar character during the past six months. In each of these there was a sudden onset of abdominal pain, nausea, vomiting, and fever. In one of these attacks the patient had been confined to his bed for four days, and for several days thereafter he was conscious of an indefinite feeling of soreness in the right iliac fossa.

The present attack had been preceded by headache and general malaise for two days. Just before the onset of the abdominal pain he developed symptoms of a "cold" and had taken some tablets with a view to aborting the supposed attack of bronchitis. Shortly following this he experienced a moderate pain in the epigastrium, with some nausea. He felt cold and weak, but the temperature was not taken.

Later the abdominal pain increased; there were slight distention and a moderate generalized tenderness to palpation. Recognizing the possibility of an acute abdominal infection, his physician stopped all food, withheld cathartic medication, and transferred him to a neighboring hospital.

On admission to the hospital, twenty-four hours after the beginning of the acute symptoms, his temperature was found to be 104.8°; pulse, 132; respiration, 28. He complained bitterly of abdominal pain and was exceedingly restless. On examination the abdomen was moderately distended, of a board-like rigidity, and everywhere tender. Examination of the heart and lungs was negative. Urine negative. Blood count, 14,800 leukocytes, 86 per cent. polynuclears. The attending surgeon, believing that the case was one of a spreading peritonitis following a perforative appendicitis, advised immediate operation. A delay of twelve hours was however insisted upon by the parents to enable them to be present.

At the end of this period the writer saw the case, in consultation with the attending surgeon. At that time the temperature was 103.8°; pulse, 124; respiration, 30; the face was flushed and the patient moderately restless.

On examination, the abdomen was slightly distended, muscular rigidity was everywhere present, but more marked in the left upper quadrant. There was generalized tenderness, but that also was greatest in the upper left quadrant. Patient stated in answer to questions that the abdominal pain was less severe than when he entered the hospital; that it was more marked at the end of a deep inspiration than at any other time; that this inspiratory pain was increased by any abdominal pressure, but that pressure did not give rise to much pain when he held his breath. Liver and spleen not palpable. Moderate costovertebral tenderness on the left side. Examination of the heart and lungs negative. Rectal examination showed no pelvic tenderness and no rigidity of the pelvic floor.

At the end of this examination we both agreed that the case was an exceedingly obscure one, and that at the moment no positive diagnosis could be made. The four most prominent factors in the case, abdominal pain, rigidity, tenderness, and fever, certainly pointed strongly to an abdominal focus of infection. On the other hand, the point of maximum tenderness and rigidity was in the upper left quadrant and costovertebral angle and not over the appendix area, where the great majority of abdominal infections originate.

While the history of the two previous attacks strongly suggested an infection of the appendix, the temperature, nearly 105°, was against this diagnosis, as it only rarely reaches that point in the last stages of a general peritonitis; and practically never, when the process

remains localized. The onset, two days of headache and general malaise, suggested typhoid fever; the sudden high fever and costo-vertebral tenderness made one think of an acute hematogenous infection of the kidney or a pneumonia.

After discussing the case at some length we agreed that only the five following conditions need be considered:

1. Typhoid fever.
2. Acute appendicitis.
3. Diverticulitis.
4. Acute septic infarcts of the left kidney.
5. Pneumonia.

Typhoid fever we ruled out on account of the leukocytosis and the marked character of the abdominal symptoms occurring so soon after the onset of the disease.

Appendicitis we thought to be improbable for the reasons enumerated above, and also for the reason that on rectal examination there was no tenderness or rigidity of the pelvic floor, but we were not at that time willing positively to exclude it.

Diverticulitis was excluded, as the congenital variety (Meckel's) never occurs in the upper left quadrant, and in a child of that age the acquired variety is so rare as to constitute a veritable surgical curiosity.

Acute septic infarcts of the kidney would account for the local pain, tenderness, and high fever, but not the early generalized pain, tenderness, and rigidity; also the absence of albumin and red cells in the urine would argue against that diagnosis.

Pneumonia of the lower lobe with diaphragmatic pleurisy might easily give the abdominal pain, muscular rigidity, and high fever, but the absence of cough, increased rapidity of respiration, and physical signs was certainly unusual. The fact, however, that the abdominal pain during palpation was seemingly more influenced by his respiration than the point or degree of pressure was significant and pointed toward a thoracic lesion.

We were therefore able to exclude only two of the five possibilities, typhoid and diverticulitis, which left appendicitis, pneumonia, and a septic kidney to be considered. As we thought the chance of an appendicitis remote, and as we regarded pneumonia as highly probable, we decided, therefore, to postpone operation for a few

hours at least, until we could obtain another blood count and urinary analysis.

The following morning the temperature, pulse, and respiration were practically unchanged; the abdominal pain, tenderness, and rigidity, while still present, were certainly less marked, and in the right lower quadrant there was neither rigidity nor tenderness to pressure. The urine contained only the faintest trace of albumin, and a carefully centrifuged specimen showed no red corpuscles and only a few white cells.

A second careful examination of the chest revealed a distinct area of consolidation, just below the angle of the scapula on the left side, and settled the question of diagnosis.

The method of diagnosis followed in this case and in the case recorded in the opening paragraphs of this book, in which a double chart was used, is the one which eventually should be employed in the majority of instances.

The use of the *preliminary* charts teaches the beginner how best to classify his surgical lesions; the use of the *regional* charts, consisting as they should of all the surgical lesions of a given type, or of all types occurring in a certain region or organ, fixes in the mind of the student the habit of orderly arrangement, and enables him in a moment to recall the various pathologic possibilities in a given diagnostic problem.

The use of the *individual* chart, in its simplest form, will be found to be most serviceable to the advanced student or practitioner after he has acquired a broad knowledge of regional surgery.