

PART III

DISEASES OF THE RESPIRATORY TRACT

GENERAL DISCUSSION

Certain structural peculiarities determine the character of the diseases to which the respiratory tract is subject. The air should, normally, pass into the lungs by way of the nasal passages. These are tortuous and are lined with a moist ciliated epithelium. Thus the air is cleaned, warmed and moistened before reaching the more delicate tissues of the lungs.

In the upper respiratory tract the mucous membrane is attached rather loosely to the underlying bones. It is highly vascular and the blood vessels are controlled from the vasomotor centers in the upper thoracic spinal column, by way of the cervical and cranial sympathetics. The lymph-flow depends upon the circulation. The nutrition of all these tissues is controlled by the same nerve mechanism.

Bacteria and dust are usually expelled through the action of the cilia and of the secretions. Infectious agents may, however, gain entrance by way of injuries, or as the result of impeded circulatory conditions. Bony lesions of the cervical and upper dorsal region are important factors in modifying the circulation and lowering the resistance to infection.

"The nerve mechanisms in the respiratory field, from their complexity and comparatively close relations to grosser structures, are more susceptible to lesion, and will show greater pathological effects from lesion of slight degree, than perhaps any other part of the body. The cranial and upper spinal nerves, cervical and dorsal, are affected by slight derangement of vertebrae or ribs or their muscular or ligamentous attachments. The sympathetic chain lies in close relation to the anterior aspect of the lateral spinous processes, and the heads of the ribs, and in the dorsal region is bound down by the pleura to the spinous processes and to the heads of the ribs. Nearly all these nerves contain fibers of vasomotor function, which are rather widely distributed in a sort of 'cross-reference' manner. . . . A lesion at any point may affect any one of a number of structures, or a given pathological condition may be due to lesion at any one of several points."—C. M. T. Hulett.

"The lungs receive vasomotor impulses by way of the following structures: The white rami communicantes leaving the cord with the second to the fifth dorsal nerves (probably chiefly the third and fourth), then through the lateral chain of sympathetics to the cervical ganglia, in one of which a relay is made; then by gray fibers to the vagus, with which they are carried to the pulmonary plexus. Vaso-constrictor impulses may be increased reflexly by the stimulation of sensory nerves ending in the tissues near the second to the fifth dorsal spines. Vaso-constrictor impulses may be decreased by lessening the sensory impulses by steady pressure upon the same tissues.

"Osteopathic inhibition imitates the condition produced by the bony lesion and the muscular contraction; hence the influence of these in producing chronic pulmonary congestion."—Pearl A. Bliss.

The nervous control of the circulation through the upper lobes of the lungs is from the second to the fourth spinal segments and for the lower lobes, from the third to the fifth. Diseases affecting the upper lobes of the lungs give reflex muscular contractions of the upper thoracic segments, while diseases of the lower lobes give reflex muscular contractions involving the fourth to the seventh thoracic segments. A certain degree of localization of the injured area may be made in this way.

The circulation through the lungs is profoundly modified by variations in the systemic blood pressure. When any great area of the systemic arterial system is dilated, as for example, the splanchnics, the lungs are left comparatively ischemic. The place of abdominal congestions in modifying the circulation and the nutrition of the lungs is thus evident.

The activities of the respiratory center are modified by variations in the circulating blood and by emotional states. Both these factors may be important etiological factors under certain conditions. The turgidity of the nasal membranes during the influence of emotions is well known, and, under repeated or constant emotional excitement, may become effective in promoting mouth-breathing, with resulting irritation of the lower respiratory tract and various disturbances of the nasal membranes. Whenever respiratory variations are noticed, an investigation of the habits of the patient, especially of those habits usually associated with emotional stress, should be carefully made, and treatment of such cases should include the correction of bad habits as well as of faulty bodily structure.

CHAPTER XVIII

DISEASES OF THE NOSE

ACUTE RHINITIS

(Acute nasal catarrh; acute coryza; "cold in the head")

Acute rhinitis is an acute catarrhal inflammation of the nasal mucous membranes characterized by headache, slight fever, sneezing, and dryness of nasal membranes, followed by abundant secretion.

Etiology. The most common etiological factor is muscular contractions along the spine. These may be caused by cold draughts on the back of the neck, gastro-intestinal irritation, etc., or by subluxations of the upper cervical, third to seventh dorsal, or the lumbo-sacral vertebrae. Infection by the micrococcus catarrhalis is responsible for epidemics. Staphylococcus or streptococcus or both, may be present. It must be remembered that the symptoms of acute rhinitis occur in the initial stages of certain other acute infectious diseases.

Diagnosis. The condition is preceded by lassitude, weariness, more or less headache, and sneezing, these followed by chilliness, then slight fever, 100° to 101° F., and dryness of the nares. This stage is followed by abundant watery saline secretion from the nostrils and a sense of fullness in the nose, which may be momentarily relieved by blowing the nose.

The anterior nares are red and the eyes are suffused. Later, the discharge becomes purulent. The voice is peculiar, nasal and muffled. When the attack is nearing recovery, hard crusts form on the septum and turbinates and are expelled with difficulty. The complications vary in intensity. Labial, more rarely nasal, herpes may occasion considerable discomfort. Extension of the inflammation to the accessory sinuses and adjacent tissues is frequent. If to the frontal, ethmoidal, or sphenoidal sinuses, there is severe headache; if to the antrum of Highmore, tenderness over the cheeks; if to the Eustachian tubes and middle ear, temporary deafness results; if to the pharynx or larynx, cough results. Conjunctivitis is less frequent. Chronic rhinitis is apt to follow repeated attacks.

Treatment. Correct lesions of the cervical spinal column especially; correct mandibular lesions. Careful work over the superior cervical glands promotes drainage. Stimulating treatment over the branches of the fifth nerve, springing the mandible, and pressure over the upper part of the nose, suddenly relieved, are all

useful palliative measures. In some cases of streptococcus infection the treatment may be tedious.

If the accessory sinuses become infected expert consultation may be required, though many cases clear up by careful osteopathic treatment.

"Secure temporary relief from the general contractions in the spinal musculature. For this, the familiar 'Dana bend' may answer or any forcible hyperflexion of the spine carefully and gradually applied. * * * Relax general spinal contractions; treat regional contraction apparently involved; relieve the head congestion by securing relaxation of the supra- and infrahyoid muscles; treat upper cervical articulations; avoid sudden force; leave no contractions; vary the order of procedure if any one contraction group fails to relax. If a muscle is hurt or an important irritable lesion is overlooked, failure is usual."—J. A. MacDonald.

A few meals omitted, a fruit or milk or very restricted diet, plenty of hot drinks to promote diaphoresis and cleansing of the bowels, out-door life, moderate exercise, plenty of sunshine promote speedy recovery and prevent relapse.

Prognosis. If taken early, one treatment often suffices to relieve the condition and complete recovery follows within a short time. In very young infants, loss of flesh and strength may follow from inability to nurse.

CHRONIC RHINITIS

(Chronic coryza; chronic nasal catarrh)

Chronic rhinitis is chronic inflammation of the nasal mucosa producing structural changes and characterized by a feeling of fullness in the nose, "hawking," and the discharge of a thick muco-purulent secretion.

Etiology. Repeated attacks of the acute form; continued inhalation of irritating vapors or dust; chronic subluxations of the cervical and upper dorsal vertebræ, the ribs, and the mandible are the most frequent causes.

Diagnosis. Three forms are recognized, which are often three stages in the progress of the disease in one person.

Simple chronic catarrh is an early stage marked by liability to "take cold," when the mucous membrane speedily becomes congested and swollen. Occasionally stenosis follows, and an overabundant thick secretion. If it persists, it develops into the second stage, **hypertrophic rhinitis**. In this form the lower turbinates are swollen and enlarged, there is a constant "hawking" to remove the thick secretion, and the patient becomes more or less a mouth-breather. The pharyngeal and adenoid tissues may become coincidentally affected (**naso-pharyngeal catarrh**). The voice becomes nasal and varying degrees of deafness occur.

Atrophic rhinitis may follow the hypertrophic, but is not necessarily a sequence. The mucosa is shrunken and atrophic pro-

ducing an abnormal roominess in the nasal cavity. Crusts of disgusting odor (*ozena*) are frequently present. In any of these forms, sudden change in the weather is liable to cause an acute exacerbation. Rhinoscopic examination shows the characteristic structure of the membranes.

Treatment. "There are two principles of treatment in catarrhal conditions: First, removal of the cause of overgrowth of tissue and overstimulation of function. Second, the institution of measures to absorb some part, if possible, of the excessive connective tissue already formed, and to restore normal function to such cells of higher type as have not suffered irreparable injury. The hygiene of the individual demands careful attention. This includes the closest investigation of the habits of relaxation, bathing, sleeping and dress. Sexual perversions are to be considered, bearing in mind the reflexes from an adherent clitoris or prepuce. Elimination must be carefully watched and the kidneys, liver, pancreas, and intestines may have much to tell.

"The first hint of diabetes or Bright's disease may be given by the dry, scratchy feel of the mucous membrane of the throat. * * * Relaxation can be maintained by aid of either hot or cold compresses or warm bottles, while wet packs of various temperatures and full baths are often useful to promote elimination. Local douches of normal salines are indicated at times, especially in ozenic and atrophic conditions with crust formations. Their use is rarely justified in acute, non-purulent discharges. * * * Copious drinks of water, either hot or cold, sometimes distilled and often acidulated, are indicated for eliminative reasons. Fruit juices are also helpful.

"To control the negative pressure conditions, conservative surgery must be employed when indicated.

"After the correction of all abnormal physical relations and the application of such remedial measures as are indicated in each case, the next step is the education of the patient in correct habits of sitting, standing, walking, and breathing, with prescription of special exercises for the correction of weak structural conditions."
—Mary S. Croswell.

Prognosis. Recovery is to be expected in the simple catarrhal form. Symptomatic recovery may occur in the hypertrophic and atrophic forms, though very often the pathological tissues remain a source of irritation through life. The disease does not seem to shorten life, but it very materially lessens the comfort and efficiency of the patient, and it is an important cause of deafness.

NASAL POLYPS. These are pedunculated tumors which grow from the nasal membranes, and restrict the air passages. They are called fibrous, mucous or serous, according to the preponderance of connective tissue, serum, or mucous secretion within their sacs.

The membranes of the nasal passage are rather loosely bound to the underlying bones, are highly vascular, and both the membranes and the vessels are freely supplied with sensory and sympathetic nerves. Disturbed innervation or nutrition of the membranes or vessel walls permits an overfilling of the lymph spaces and the blood vessels; these factors are due to repeated attacks of rhinitis; the inhalation of irritating gases or dust; and especially to bony or other lesions of the mandibular, hyoid or cervical areas. When there is a loss of tone of either vessels or membrane, the weight and the negative pressure thus established permit further dropping, the loosened membrane fills constantly, and this weight acts as further irritant. Whether the tumor merely fills with lymph and blood serum, or whether mucous cells are plentifully included in the affected tissue, or whether the connective tissue cells, having excellent opportunity, unduly multiply, is due to structural relations of the particular areas affected.

When the polyp has become recognizable, its surgical removal is indicated. If this is all that is done, later growths are very apt to appear. But if the factors responsible for the growth are removed—bony lesions, especially—the growth of successive crops of polyps should be prevented. After any polyp has been removed, osteopathic treatment for the removal of lesions as found should follow immediately, and the patient should be examined at intervals for a year or more, in order that further injury to the membrane may be avoided.

RED NOSE. The nose is subject to considerable variation in circulation. Sometimes the dilatation of the blood vessels, especially near the end of the nose, causes great annoyance to the patient. Normally, the nose is rather paler than the rest of the face, even during blushing. The most common cause of red nose is the use of alcohol; and this fact, which is generally recognized, is responsible for much of the discomfort that attends the presence of red nose in temperate individuals.

Other common causes of red nose include: gout; nephritis; sexual disturbances; over eating of any one article of diet, as sweets, starches, meats, pastries; the use of excessive amounts of spices, tea, coffee, tobacco, and "soft drinks," especially of the sweet varieties; chronic rhinitis, and certain local affections, as eczema, etc. Occasionally no cause can be found, though the nose is as red and rough as in habitual alcoholics.

The place of the bony lesion in these cases has been found important in a few cases. The structural changes associated with red nose are so profound, however, that the correction of the lesions is effectual in leading to relief of the condition only in mild cases.

The treatment consists in the removal of the causative factors, for the most part. Local applications of soothing ointment and very mild astringents may give some relief. It is necessary to avoid anything irritative, lest the later condition be worse than the first.

HAY FEVER

(Rose or June cold; autumnal catarrh)

Hay fever is an affection of the upper air passages due to the effects, probably toxic or anaphylactic, of certain pollens acting upon a hypersensitive mucous membrane, characterized by sneezing, increased lachrymation, headache, and a watery nasal discharge.

Etiology. It seems to be a neurotic idiosyncrasy manifested as a morbid sensitiveness of the nasal mucosa to the action of the pollen of grasses and of certain plants, sometimes of dust. Subluxations and contractions are found from the atlas to the fifth

dorsal vertebræ and the upper three ribs, and clavicle. Local disease of the nasal membrane may be responsible.

Diagnosis. The condition begins as an ordinary cold; sneezing is very frequent; there is more or less headache and distress; the patient becomes low-spirited; cough is common; the eyes are watery, with itching and smarting especially at the inner canthus; asthmatic attacks are common and may alternate with the hay fever. Taste, smell, and hearing are impaired. An attack usually lasts four to six weeks.

Treatment. The care of each individual must be based upon the results of personal study. Probably no two people are affected in exactly the same way, nor is the etiology the same in any great number of cases. The etiological factors must be removed as found, if recovery is to be permanent. Correction of the cervical and upper thoracic bony lesions results in recovery in certain individuals; removal of nasal deformities is necessary when these exist; some cases are essentially neurotic, and the treatment must be dependent upon the constitutional findings; in every case it is necessary to find the essential cause of the neurosis, if possible. There are many people who can only be sent to a pollen-free locality every year. Relief of the attack may be secured very often, by special manipulations.

"Treatment consisted in traction to left for freeing right nasal artery and traction to right to free left artery. This gave local relief, though I have regarded freeing tension around axis and atlas as the curative treatment."—Ella R. Gilmour.

"I firmly believe the typical case will never fail in responding to the vasomotor reflex existing between the tenth dorsal and the Schneiderian membrane. This reflex I excite by having the patient lie on stomach on table, and exerting deep steady pressure over tenth dorsal spinous process (straddling process with end of thumb, and first finger flexed at first distal joint)."—A. M. Smith.

"While treating hay fever this season, I found that fifty per cent of the attacks could be arrested by soft palate manipulation alone; and in those cases which did not respond, the condition was immediately relieved by a dilatation of the epi-naris, with the intra-nasal technique. . . . However, both of the local treatments were supported by a daily normal saline irrigation of the nasopharynx, and the adjustment of the osteopathic lesions."—J. D. Edwards.

J. Deason reports excellent results from nasal irrigation with hot 1% solution of salt, borax and soda, 3-2-1, beginning at 108° F. and raising to 117° or even higher. One to five quarts of water should be used at each irrigation, and a non-irritant lubricant, as chondrus jelly, applied after the irrigation.

"Digital treatment of post-nasal region through pharynx is good. Pressure over terminals of fifth and other sensory nerves—one finger in nares, thumb on outside—controls attacks."—J. Deason.

Prognosis. When the treatment can be begun before the symptoms have appeared, the prognosis is good for prevention. After the characteristic symptoms have appeared, relief may be secured. In very obstinate cases, change of climate for one or two summers may be necessary. Persistent treatment in the intervening months should result in obviating this need.

CHAPTER XIX

ADENOIDS AND TONSILS

ACUTE TONSILLITIS

(Acute amygdalitis; follicular tonsillitis; parenchymatous tonsillitis; herpetic tonsillitis)

This is an acute inflammation of one or both tonsils, affecting variously the tonsillar layers, and resulting in more or less permanent injury to the tonsil affected. The inflammation is of a simple parenchymatous type with marked congestion of the glands, hyperplasia of the lymphoid elements, exudation and desquamation of the epithelium.

Etiology. Predisposing causes are lesions of the cervical vertebræ, either as a constant condition or the result of trauma. Mouth breathing and malnutrition of any kind lower resistance to infection. Exciting factors are pyogenic bacteria, exposure to cold, and trauma.

Diagnosis. The onset is usually sudden, with chilliness or chill, fever (102° to 103° F.), full frequent pulse, headache, often frontal, tongue coated, breath fetid; throat, hot and dry. The glands at the angle of the jaw are enlarged and there is pain on moving the jaw or swallowing. Reflex contractions affect especially the hyoid group of muscles, the anterior cervical group, and the upper thoracic spinal muscles. The skin of the neck and over the angles of the jaw, as well as the tissues associated with the muscles named, are hypersensitive to pressure and to cold.

Inspection reveals the tonsils greatly swollen and red, covered with a creamy mucopus, or, in the **follicular form**, the surface is covered with yellowish rounded masses of secretion protruding from the mouths of the follicles.

In some cases the tonsil may be covered with a dirty-yellow membrane which strips off readily. The fever usually subsides by crisis on the third or fourth day and resolution takes place. Occasionally sequelæ follow as pneumonic or rheumatic fever, acute nephritis, endocarditis, pericarditis, and otitis media.

Cultures should be made to distinguish this disease from diphtheria. In **herpetic tonsillitis**, vesicles appear on the surface of the tonsil. The pain is very severe, and the constitutional symptoms are intense, apparently out of proportion to the local lesions.

Leucocytosis is usually present in all forms of tonsillitis.

Treatment. "Adjust the inferior maxillary bone. See that the structures between it and the upper cervical vertebræ are

set free on both sides of the neck. * * * Adjust whatever slight irregularities you find in the cervical and upper dorsal regions. Bring your clavicles well up and forward. Look carefully to your upper four ribs, and see that they are perfectly adjusted to your sternum and spine. Free the hyoid bone from any contracted muscles which could bind it. * * * Then go to the lumbar region and treat there to open up the excretories. See that the lumbar vertebræ are in line, and that the floating ribs are well up and in their proper place. Do all your work in the neck region from the outside."—A. T. Still.

"The first effort at treatment was directed to the relaxation of cervical and dorsal musculature; then gentle, careful effort was made to secure movement at fifth cervical.

"Next, light local treatment was given to each tonsil. Besides removing obstruction to the lymphatics and other vessels, the local treatment forced from the crypts considerable of the muco-purulent material, patient clearing throat after each attempt. Each tonsil was treated in this way three times. A cold compress was placed around the throat and patient was advised to gargle with hot normal salt solution several times during the night, if awake; he was directed to take all the water he wanted, but no food. . . . Instructions were given for colon irrigation, patient afterward saying that considerable black, offensive smelling feces was passed. Urine was normal. . . . Later, more normal motion was secured at points of bony lesions; patient felt very well.

The local treatment to the tonsils with the removal of infectious material lodged in the crypts, is important. Treatment to the lesions present was very light and non-irritating."

"In all acute infections such as tonsillitis, I pay very close attention to the lower dorsal region, with a view to normalizing the vaso-motor control to the adrenal bodies, believing as I do that the liberation of their secretion greatly augments the auto-protective forces of the body. I am thoroughly convinced that tonsillitis both acute and chronic is often secondary to diseased teeth and gums. The lymphatics from the teeth and peri-dental structures drain by way of the tonsils."—E. C. Bond.

"It is a mistake to think that strenuous manipulative measures are necessary in relieving tonsillary conditions. We have to do with a tissue condition sensitive and inflamed, contra-indicating rough manipulative measures, and it is remarkable how nicely the soft cervical tissues can be handled if no strong irritation is produced while treating. It is not uncommon to reduce the congestion within a few moments' time sufficiently for the patient to be able to swallow with some degree of comfort.

"It is well to remember that the tonsil is a lymphatic structure and should not be directly treated as a rule. If so, with the greatest care. It is not always the tonsil that we feel on palpation, but the lymphatic glands and tissues over the tonsil. A careful correction of maxillary, cervical and dorsal lesions is sufficient, as a rule, to reduce the congestion, although gentle treatment is sometimes beneficial over the tonsil."—F. P. Millard.

Prognosis. Recovery is the rule, unless complications arise. To prevent recurrence, the patient must be instructed in general hygiene, and if he feels the slightest indication of trouble to immediately see his osteopathic physician. Each attack increases the danger of permanent injury to the tonsil.

PERITONSILLAR ABSCESS

(Quinsy)

Sometimes an attack beginning as acute tonsillitis takes a severer form. The uvula, soft palate, and parts around the tonsil appear edematous, swallowing is excessively painful, articulation is difficult, and the voice is nasal. The constitutional symptoms are more severe than in the simple form. In from two to six days; fluctuation can be felt, usually in the soft palate. Quinsy is probably due to the presence of a more malignant infectious agent than simple tonsillitis.

Treatment. In addition to the treatment given under acute tonsillitis, incision may be made with a curved bistoury guarded nearly to the point, making the incision from above downward parallel with the anterior pillar. If this is not done the patient suffers longer and the abscess ruptures anteriorly or toward the tonsil, with immediate relief of the symptoms and gradual recovery.

In rare cases, if the swelling produces symptoms of suffocation, excision or tracheotomy may have to be done.

CHRONIC TONSILLITIS AND ADENOIDS

(Hypertrophy of the tonsils; aprosexia; naso-pharyngeal obstruction; mouth-breathing)

This is a chronic inflammation of the tonsils and related lymphoid tissues, characterized by hypertrophy of the tissues affected, and symptoms referable both to mechanical obstruction of the respiratory passages and to the toxic effects of infection.

Etiology. The condition is most frequent before and during puberty; in boys more often than in girls; in children with tubercular or syphilitic ancestry; in those who live under insanitary conditions, especially those kept within doors; and in those subject to recurrent acute tonsillitis. Upper thoracic lesions are practically invariably present; lesions of atlas and axis are usually present. Other lesions often found include the first and second ribs, the clavicle, the hyoid and mandible, and vertebrae from occiput to mid-thoracic. This widespread area of probable etiological relationships is due to the peculiar vasomotor innervation of the tonsils.

Pathology. Both tonsils are usually involved. There may be increase in the lymphoid elements with or without increase in the stroma; distension of the crypts with plugs of cheesy yellowish material of peculiar offensive odor—Dittrich's plugs. The latter may become infiltrated with lime salts, thus forming concretions.

Associated with hypertrophied tonsils is usually an overgrowth of the pharyngeal lymphoid tissue. This may be papillomatous with a lymphoid

parenchyma, may appear as masses from a small pea to an almond in size, or may be sessile or pedunculated. The tissue is reddish in color, of moderate firmness, contains numerous blood vessels, and is most abundant over the vault of the pharynx in line with the fossa of the Eustachian tube, or the masses may lie posteriorly in the fossa of Rosenmüller, or upon parts parallel to the posterior wall of the pharynx.

Diagnosis. Chronic tonsillitis with adenoids is responsible for "mouth-breathing." This appears at first at night; the child is restless, awakes with "night terrors," and snores often. A short dry cough may be present, due partly to the nervous irritation and partly to the effects of the mouth-breathed air upon the respiratory passages. Recurrent bronchitis, pharyngitis, laryngitis, stuttering, asthma, digestive difficulties and various functional nervous disturbances may be the more or less direct results of chronic tonsillitis and adenoid growths. Such children have lowered resistance to infectious diseases.

The face of the mouth breather is characteristic. The open mouth and the loose hanging jaw give an expression of stupidity which may or may not be deserved. The lips are usually thick and dry; the nose is broad, the nostrils have diminished opening, and the edges look paler and somewhat waxy. The "pigeon-breast" or "chicken-breast" may be present. A thick voice, often hoarse, slight constant headache, slight or pronounced deafness, and some mental torpor are constant in those who have been mouth-breathers for any length of time.

These symptoms should lead to an examination of the patient. The diagnosis is made upon palpation and inspection, by means of which the enlarged tonsils and the adenoid masses in the nasopharynx are evident.

Treatment. Adenoids are abnormal, and should be removed whenever they are large enough to interfere with respiration. Tonsils are useful organs, and should be saved if possible. Often badly hypertrophied tonsils return to practically normal size after the removal of adenoids, and other indicated treatment given. When the tonsils are filled with pus, being practically destroyed already, or when they do not yield to careful treatment, interfering with respiration and being the seat of constant infectious processes, they should be removed by clean and complete surgery.

"The restoration of the normal blood supply and perfect drainage to and from the organs lessens the liability to contract colds or to the recurrence of the acute form of disease known as tonsillitis."—A. T. Still.

To secure this end, the neck and upper thoracic areas must be kept perfectly adjusted, the ribs normal in articulation at both ends and kept raised as much as can be secured. Every effort must be made to secure the coöperation of the child in taking prescribed exercises. Lifting the large tonsils and giving a very gentle circular motion at the same time assists in draining them. Care must

be taken not to touch the pharynx, as gagging will result. The hand and fingers are to be surgically clean; a finger cot is most easily sterilized, but it lessens touch sense.

After the adenoids have been removed, and after respiratory interferences due to enlarged tonsils have disappeared, there may still be difficulty in overcoming the mouth-breathing habit. Systematic breathing exercises are good to facilitate the return to the normal nose breathing. Exercises that retract and elevate the soft palate are beneficial; also forced expiratory exercises that affect the entire respiratory tract. Various mechanical appliances are now on the market for holding the mouth closed at night. These are annoying and should be used only as a last resort. Much living in the open, both during day and night, is of great value in securing the normal respiratory habits. It should be remembered that diseased tonsils are probably a frequent source of infections elsewhere in the body.

"The conclusions were that the adenoids present in the epipharynx of the child was the prime factor in the production of deviated septa, hypertrophied and other ways diseased turbinates and all forms of nasal blocking, also for acute and chronic catarrhal changes in the ear with all their sequelae, for enlarged tonsils and cervical glands; and, secondarily, by reason of the chronic inflammation induced throughout the entire area of mucous membranes of the head and throat, with the resultant lowered tissue resistance that the adenoid was responsible for the greater proportion of the exanthemata of childhood.

"Secondly, that the adenoid, in many, if not all instances, was the result of vasomotor perversion due to osteopathic lesions in upper dorsal and cervical regions occurring either in utero or during the first few years of life, and not due, as generally stated, to syphilis or lymphoid overgrowth following toxemia of various infectious diseases."—Mary S. Croswell.

"Briefly, enlarged tonsils are operative when they really contain an abscess, the operation simply consisting in lancing. They are also operative if chronically or at frequent intervals enlarged, and when osteopathic treatment has failed to reduce them. In this case clipping or guillotining is usually sufficient.

"In the very worst cases I enucleate, but in most cases I am perfectly satisfied with the lesser operation as it usually leaves them two good tonsils that do get smaller and still have good functions, while the dissection operation robs them entirely of the tonsils. The tonsil is a normal organ while adenoids, which I remove entirely, are abnormal.

"In those few cases where cutting off the top is a failure, they can still be dissected out and there has been no damage done and nothing lost."—Geo. Still.

"Undoubtedly surgery must be resorted to in specific cases. Repeated infection serves to transform the lymphatic tissue to a mere fibrous shell eliminating those factors essential to active phagocytic and anti-toxic power. Gaping remnants of follicles welcome invading bacteria that must penetrate to the cervical nodes before meeting resistance. Surgery is our one remedy, tempered with conservatism and judgment."—F. C. Farmer.

"Irregularities in the position of the cervical and upper thoracic vertebrae, the mandible, the hyoid, or the upper ribs, are probably efficient factors in the disturbed circulation and thus the increased tendency to abnormal tonsillar conditions and the growth of adenoids.

"The correction of these structural abnormalities is a necessary part of the treatment of the conditions, whether surgical interference is indicated or not.

"Every effort should be made to save normal tonsillar tissue. There is no reason for saving masses of diseased tissue which may have replaced the tonsils.

"Adenoids large enough to compel mouth-breathing should be removed. The growths are not apt to recur if the spinal conditions and the hygienic conditions are corrected."—P. C. O. Clinic Report.

"Adenoids and other abnormal nasal conditions are important causes of mental deficiency. An important drainage-way for the lymph from the anterior fossa of the skull, and thus from the frontal lobes of the brain, is by the perivascular and perineural lymph spaces of the cribriform plate. Any disease which interferes with this drainage-way must exert a malevolent influence upon the development of the frontal lobes of the brain; in the case of adenoids, this evil influence is most effective at the time of life when the frontal lobes are beginning their most rapid development.

"Mouth-breathing is another factor in promoting inefficiency. Not only does mouth-breathing cause mal-nutrition of the brain, as of the rest of the body, but the lax state of the jaw muscles seems to be associated with faulty development of the corresponding nerve cells in the cortex. The entire cerebral and somatic mechanism concerned in what is usually called "strong-willed personality" is weakened by the open mouth and the drooping mandible of the mouth-breather. For this reason surgical interference ought not to be too long delayed."—L. Burns.

CHAPTER XX

DISEASES OF THE PHARYNX AND LARYNX

GENERAL DISCUSSION

The pharynx includes several varying structures, which are variously subject to disease, but which are anatomically and physiologically related. The tonsils lie between the pharyngeal pillars; the respiratory path as well as the digestive path traverses the cavity of the pharynx. The membrane lining the pharynx, larynx, and the lower digestive and respiratory tracts is continuous, through this common cavity, with the membrane of the buccal and the nasal passages. This membrane is well supplied with blood vessels, lymphatic paths, lymph nodes, mucous and serous glands, and the sensory nerves which are concerned in several varieties of sensations, as well as the efferent nerves which govern the secretion of the glands, the caliber of the blood vessels, and the tension of the muscle fibers which lie beneath the membrane through a varying extent of its area.

The vasomotor nerves are derived, for the most part, from the superior cervical ganglion, and also from others of the sympathetic ganglia of the cranial and cervical region. These, in turn, derive stimulation from the spinal segments of the upper thoracic cord, and from certain visceral centers of the medulla, pons and mid-brain. All of these centers are active according to the impulses reaching them, which are ultimately sensory in origin. Vertebrae of the upper thoracic and the cervical segments, upper ribs and clavicles, the hyoid and the mandible, are all included in the bones whose disturbed relationship may be responsible for disturbed circulation through this pharyngeal area, as well as for disturbed secretions.

Without discussing whether or not infection of the normal mucous membrane occurs, it may be granted that the danger of infection is increased by those agencies which interfere with the normal circulation of the blood, and the normal course of nerve impulses through the governing centers. To these factors must be added those which lower the systemic immunity, such as the rigid lower thoracic spinal column, various disturbances of nutrition, and the effects of autogenous or extraneous poisons.

The treatment of the diseases of the pharyngeal region consists chiefly in the removal of the factors which cause or perpetuate the diseased condition.

ACUTE PHARYNGITIS

(Angina catarrhalis; sore throat; angina simplex; hyperemia; edema of the uvula)

An acute inflammation of the pharynx is usually associated with varying degrees of laryngitis and tonsillitis. The trouble begins as an acute hyperemia, which may terminate in recovery, with no further symptoms, may go on to serious forms of pharyngitis, or may persist as a chronic hyperemia. This disturbance is an important cause of the more serious inflammations, and permits the infection of the throat by bacteria which might have been unable to attack a throat otherwise normal.

Hyperemia of the pharynx is due to irritation by tobacco smoke, constant use of the voice, is a part of naso-pharyngeal catarrh; may be due to lesions of the mandible, upper cervical or upper thoracic region, either alone or associated with any of the first-mentioned causes.

The mucosa is reddened, and the venules may show distension. Distended veins may be due to valvular heart lesions or to pressure upon the superior vena cava. Hemorrhage is due to local causes, usually traumatic.

Edema of the uvula is not uncommon in debilitated conditions; in milder degree it may be associated with lesions especially of the mandible, less frequently the upper cervical vertebrae. The enlarged uvula may irritate the throat to such an extent as to cause chronic hyperemia or even tend to a pharyngitis; the voice may become husky as the result of the laryngeal involvement. When the edema persists an overgrowth of tissue may occur; it may thus become necessary to remove the superfluous tissue surgically.

When acute hyperemia persists, or as a result of exposure to cold, digestive disturbances, rheumatism and gout, or other sources of disturbance of mucous secretion, a more **acute inflammation of the pharynx** occurs. Cervical and mandibular, upper rib and clavicular lesions predispose to the disease.

Diagnosis. The trouble begins as uneasiness and soreness on swallowing, a feeling of tickling and dryness in the throat, a desire to hawk and spit, and stiffness of the neck. The cervical lymph glands are enlarged and painful. The process may extend to the Eustachian tube, producing slight deafness, and to the larynx with hoarseness. The constitutional symptoms are chilliness, fever of moderate degree, increased pulse rate, cough, and more or less nasal voice.

Inspection shows a general dry, red, congested condition of the whole throat with edema of the uvula. The tonsils may or may not become involved. The cervical muscles are irregularly contracted and painful when touched. The skin over the neck is

often hypersensitive. The secretion is thick, tenacious and opaque. The voice is usually affected, as a result of the associated laryngitis.

Treatment. "In treating pharyngeal diseases, I first adjust the clavicles at both ends. I also adjust all of the ribs of each side from the first to the fifth. Adjust the atlas and axis. * * * Then I see that the lower ribs from the eighth to the twelfth are all left in a normal condition. I am very careful to have a normal adjustment of the whole lumbar vertebræ."—A. T. Still.

Muscular contraction anywhere in the neck or upper dorsal region needs relaxation to prevent lesions and blood stasis. Especially is it necessary to relax around the hyoid bone. Careful treatment of the upper cervical lymphatics is effective. The diet should be liquid if there is much fever, or if solid food causes much irritation. As a gargle or a pharyngeal douche, a normal saline is better than anything else. The main purpose of a gargle is cleansing of the membrane from the abnormal and irritating secretions, which often contain pathogenic organisms.

Prognosis. Recovery is the rule, in a few days to a week or more. Each attack predisposes to later attacks, and to chronic pharyngitis.

PHLEGMONOUS PHARYNGITIS

(Acute inflammatory phlegmon of the pharynx; retropharyngeal abscess)

These diseases are practically the same in etiology, diagnosis and treatment, whether the location is in the walls of the pharynx or in the posterior sub-mucous tissue.

Etiology. Primarily, the disease is due to pyogenic micro-organisms. It may complicate scarlet fever, diphtheria, erysipelas, or syphilis.

Diagnosis. The disease begins with sore throat, dysphagia and hoarseness. Fever, dyspnea, and swelling of the cervical lymphatics are associated with considerable prostration. The pharyngeal mucosa is at first deep red, purple, swollen, tense, shiny and dry. Vesicles appear and the secretion becomes profuse; suppuration occurs speedily. The pus may be localized or may be diffusely scattered through the membrane.

The muscles of the neck, mid-thoracic region, and sometimes of the lumbar region are contracted and hypersensitive.

The blood shows leucocytosis in variable degree, according to the severity of the infection and the strength of the reaction to the invading organisms.

Treatment. An important factor in promoting the resistance to this, as to any infection, is to increase the mobility of the lower

thoracic region—from the sixth to the twelfth thoracic, with the corresponding ribs. Manipulation of the neck is difficult, yet, with care, muscles can be relaxed, bony and other lesions corrected, venous and lymph drainage facilitated. The ribs should be raised, the clavicles loosened, if they are found depressed or associated with tense muscles; the mandible and hyoid freed from tension. All treatment must be carefully based upon a recognition of the pathological changes occurring in each patient, as found on frequent examination.

When the pus accumulates it should be surgically evacuated at once. Incision must be made as indicated by the location of the pus, and by other local conditions. While there is little doubt that quite large collections of pus can be absorbed and carried away, sometimes without apparent injury, there is always the risk of rupture, with infection of the lungs or the digestive tract; septicemia may result from the invasion of the lymphatics or the veins by the infectious agent. Spontaneous evacuation during sleep may result in suffocation. The clean incision under ordinary surgical precautions with evacuation of the pus is much less dangerous.

Prognosis. With correct surgery and such other treatment as is indicated, practically all patients should recover. The prognosis of the underlying disease is to be considered; the outlook is always somewhat doubtful, in this as in all cases with pus formation, with the possibility of septicemia.

MEMBRANOUS PHARYNGITIS

(Croupous pharyngitis)

Membranous pharyngitis is due to infection by diphtheria (q. v.) or by any of the pyogenic organisms, rarely the pneumococcus or the bacillus coli communis; usually such invasions are upon pharyngeal membranes injured by direct trauma, or by the effects of circulatory disturbances. The condition may be associated with scarlatina, measles, typhoid, variola, etc. (q. v.). The treatment is that of the primary disease, plus the treatment of catarrhal or phlegmonous pharyngitis.

ANGINA LUDOVICI

(Ludwig's angina; cellulitis of the neck)

This disease is not very frequent in this country. It is caused by streptococcal infection, and is usually secondary to diphtheria or scarlet fever. The process is attended by swelling of the sub-maxillary glands of one side, spreads to the floor of the mouth, and to the front of the neck. The parts are dusky-red and present brawny induration.

Diagnosis. The symptoms are intense with much pain. Dysphagia, difficult mastication and articulation, and grave dyspnea may supervene from compression or edema of the glottis.

Treatment. When the pus does not accumulate, the treatment should be carefully devoted to securing better circulation through the infected area. So long as no necrosis occurs, there is little danger of septicemia from the circu-

lation of the blood through the infected area; when the pus accumulates and necrotic tissues are present, local manipulation should be limited to the surgical evacuation of the pus. Throughout the disease, the ribs should be freely raised, reflex muscular contractions corrected, and the mobility of the thoracic region secured by treatment as frequently given as may be necessary to secure these results.

VINCENT'S ANGINA

This form is due to the bacillus fusiformis and the spirocheta dentinum and is feebly contagious. There is superficial ulceration and the formation of a membrane, usually beginning on one or both tonsils and spreading to other parts of the pharynx.

Treatment. In addition to the corrective work advised for other forms of pharyngitis, the frequent use of a mild gargle is helpful and comfortable.

ULCERS OF THE PHARYNX

Follicular ulcers are usually small, superficial, and generally associated with chronic catarrh. **Syphilitic ulcers** are small, shallow, painless, rounded, yellow and sloughy, surrounded by a reddened zone, and appear upon the posterior wall. **Typhoid ulcers** are small, round or oval, and appear toward the close of an attack of typhoid fever. **Tuberculous ulcers** have irregular boundaries and a yellowish-gray floor, are intensely painful, and also appear upon the posterior wall. **Cancerous ulcers** have the usual characteristics of malignant disease.

The treatment of these is constitutional or surgical. Local application of 1 to 10% silver nitrate may clear up non-cancerous ulcers.

CHRONIC PHARYNGITIS

(Clergyman's sore throat; chronic follicular pharyngitis)

This is a disease characterized by a husky or muffled voice, and a tendency to clear the throat. Speaking becomes difficult, and the throat becomes tired when speech is necessary.

Etiology. The disease follows repeated acute attacks; improper or excessive use of the voice, especially with loud tones; excessive use of alcohol or tobacco or naso-pharyngeal catarrh. Perhaps the most important etiological factor is the presence of lesions of the third cervical or its neighbors, or of the occiput. The hyoid is frequently involved through muscular contractions. These lesions themselves tend to change the ease of vocalization; thus they act in at least two ways in the etiology of the disease.

Diagnosis. The symptoms and history are fairly pathognomonic. The examination of the throat shows the characteristic granular membrane.

The mucous membrane is more or less congested, numerous distended venules are seen, and the secretion is mucoid, mucopurulent, or purulent. Often dry scales of offensive odor are found. Hyperplasia of the lymph-follicles forms elongated rows in the lateral or posterior walls.

Treatment. The correction of faulty habits of speaking is important. Correction of the bony lesions found in each case is usually necessary to permanent recovery. A gargle of normal salt solution or of boracic acid or of hot water gives comfort and cleans the roughened membranes. Condiments, alcohol, tobacco, should be discontinued. Cauterization and astringents are dangerous and rarely give any relief. The scars left by these methods are often very annoying, and may lead to serious troubles later.

Prognosis. In early cases recovery may be expected within a few weeks. The time necessary for recovery depends upon the time during which the disease has been present, the obedience to the instructions concerning the use of the voice, to a correct dietetic and hygienic regime, and to the possibility of securing permanent correction of the lesions as found. There is a tendency to recurrence if the lesions recur, or if the voice is used improperly, or if the tobacco, alcohol, or other irritating factors are resumed.

ATROPHIC PHARYNGITIS

(Pharyngitis sicca)

In this type the secretion is scanty, the mucous membrane is reddish-brown in color, thin, smooth and shiny.

Diagnosis. There is a constant desire to hawk and spit, with a dropping of mucus from the upper pharynx, slight redness increased from various causes at times. On inspection, the mucous membrane of the posterior pharyngeal wall is seen a dusky-red and studded with the elongated lymph-follicles or is dry and glistening.

Treatment. The patient must be taught correct methods of phonation and articulation; the lesions as found must be corrected; the general health must be kept at high level. Complete rest of the voice may be found necessary in some cases.

Prognosis. Recovery is slow. It is not dangerous to life and may be greatly helped, if not entirely relieved, by long-continued, persistent treatment.

ACUTE CATARRHAL LARYNGITIS

(Acute laryngitis; sore throat; acute endolaryngitis)

Etiology. Acute laryngitis may be caused by the inhalation of irritating vapors or dust; by drinking irritating liquids; by over-use, or improper use of the voice; or by extension of inflammation from other areas. It is usually associated with pharyngitis, and often with tonsillitis and rhinitis. It often occurs during the course of the acute infectious fevers. Contraction of muscles and subluxations of bones in the cervical and upper thoracic areas are important causes; comparatively slight irritants cause severe inflammations when these structural perversions are already present. The hyoid and the axis are most often concerned in these cases. The

reflex muscular contractions caused by the irritant perpetuate the inflammation in many cases.

Diagnosis. The disease usually begins rather suddenly with sensations of dryness, pain and tickling in the laryngeal region, hoarseness increasing to aphonia, slight fever, painful deglutition, and a dry, noisy, hoarse cough. The laryngoscopic examinations reveal swelling of the mucosa, usually most marked in the ary-epiglottidean folds, with redness and swelling of the true vocal cords. The surface may be covered with a varying amount of mucus. Sometimes patches of erosion are found.

Treatment. Rest in bed, and absolute rest of the voice, is indicated. If it is necessary, the patient may whisper very faintly, but it is better for him to write his communications. Inhalations of steam, the ice bag to the neck, a cold pack, and a hot water bottle between the shoulders, are some of the things which give relief. Usually an accumulation of fecal material is found on palpating the colon; this should be removed by a moderately warm enema.

The important factors in treatment are the relaxation of the reflex muscular contractions, and the correction of whatever other lesions may be found. Carefully elevating the larynx and relaxing contiguous tissues are beneficial. Note the condition of the first ribs. It may not be advisable to do the corrective work until the local inflammation has begun to subside, but if further attacks are to be prevented, and if the patient is to recover and keep his voice, the corrections must be made. One or two treatments each day should be given, until the acute stage has passed; if one thorough treatment is given at the beginning of the attack it may be all that is needed. But the complete correction of structural perversions must not be neglected, even though the acute symptoms disappear completely, with or without palliative treatment.

Prognosis. Most cases recover in one or two days, if the treatment is given on the first appearance of the symptoms. Each day of delay in treatment means several days of delay in recovery. Recurrent attacks are to be expected, if the lesions remain or recur, or if the irritating agents persist or reappear. The repeated attacks lead to chronic laryngitis. (q. v.)

EDEMATOUS LARYNGITIS

(Edema of the glottis)

The infiltration of the tissues of the larynx and glottis may be a true inflammatory edema, or may be the result of diseases in other organs.

Etiology. It is rather more frequent in chronic laryngitis than in acute, and is especially frequent in acute exacerbations of the

chronic form. Subacute or chronic inflammations are often associated with edema—the husky voice in tubercular or syphilitic laryngitis is almost pathognomonic.

Noninflammatory edema occurs in angio-neurotic edema, which may affect the glottis; this may result in serious or even fatal asphyxia. Nephritis, and other diseases associated with edema, may affect the larynx; edema of the glottis thus produced may be serious.

Diagnosis. The onset varies according to the etiological factors. The dyspnea is urgent; dysphagia, aphonia, violent, ineffectual cough, stridulous breathing, and weakness are some of the more common symptoms. Death from asphyxia may occur at any time; sudden death without premonitory symptoms may occur.

The laryngoscopic examination shows very large, semitransparent, grayish yellow swellings, which involve the epiglottis and the true and false vocal cords.

Treatment. Vigorous treatment must be given to secure rapid drainage from the affected tissues. The cervical area and tissues around epiglottis must be relaxed and careful attention given to the upper dorsal vertebræ and ribs. An ice bag applied over the larynx and ice in the mouth are good. If relief is not speedily obtained, tracheotomy must be performed. Adrenalin spray may give temporary relief.

Prognosis. About half the cases terminate fatally. Patients are liable to die from exhaustion, sepsis, or pulmonary complications after the edema is removed. The duration is from a few hours to several days. Recovery depends upon early vigorous treatment.

CHRONIC LARYNGITIS

(Chronic catarrhal laryngitis; chronic endolaryngitis)

Chronic laryngitis may follow repeated attacks of the acute form, or it may begin insidiously, and be chronic from the first. It is often associated with granular pharyngitis.

Etiology. It is caused by the usual factors concerned in acute laryngitis; these may be mildly irritating through a long time, thus causing the chronic type; other causes include nasal obstruction and mouth-breathing; excessive and improper use of the voice (dysphonia clericorum), especially in the open air; excessive inhalation of tobacco smoke, and chronic alcoholism.

Diagnosis. The common symptoms are constant hawking and a desire to swallow; expectoration of a scanty mucoid or mucopurulent material or of small glairy balls or crusts; attacks of hoarseness or aphonia; and a husky, hoarse, rough voice. Very little pain is present. The general health is not affected. Laryn-

goscopic examination shows the mucous membrane slightly reddened, perhaps granular; the true cords grayish or slightly injected.

Treatment. Remove muscular contractures, and correct any bony lesions found, particularly those of the atlas, axis and third cervical vertebræ, the hyoid and the clavicle and the first rib. Removal of the cause is necessary. If the condition is due to overuse of the voice, rest absolutely; if to smoking or alcoholism, institute treatment to remove the habit; and if environmental or personal habits are faulty, secure their removal as far as possible. Plenty of fresh air, sponging the neck night and morning with cold water, avoidance of wrapping the neck too much, systematic throat exercises, and education in the use of the voice are some of the factors of general hygiene necessary in these cases.

Prognosis. Complete recovery is not common owing to the persistence of causes and the lack of coöperation on the part of the patient. If more favorable circumstances permit, the chances for recovery are good within a few weeks.

CROUPOUS LARYNGITIS

(Membranous croup; croup)

This disease is usually diphtheria. (q. v.) Occasionally other pathogenic organisms cause the formation of a false membrane, which usually peels off easily, without injury to the underlying mucous membrane. It may be due to any of the ordinary infections of childhood, and may accompany measles, scarlatina, or any of the exanthemata.

Diagnosis. Cultures should always be made; diphtheria is always to be suspected. The diphtheritic membrane is thick, yellow, tenacious, with necrotic areas; its removal leaves an injured, bleeding surface. The membrane due to other organisms is usually thin, bluish-white, semitransparent, and its removal leaves a hyperemic but intact mucous membrane. The membrane may be purulent and yellowish, tenacious and thick, when the infection is by the more virulent pyogenic organisms. The removal of such a membrane injures the underlying mucous membrane, as is the case in the true diphtheritic formation. The only distinction is found in the results of the culture taken from the throat, which is not absolutely reliable.

The symptoms are startling, and the disease is sufficiently serious. The onset is either sudden with an attack of spasmodic croup or gradual with acute catarrhal laryngitis. The voice becomes husky, smothered, whispering or suppressed; a prodromal "croupy" cough for a day or so becomes hissing, explosive and metallic during the attack; difficulty in breathing follows. The

child is unable to lie down. If quiet for a time, he starts up in fright, breathing heavily with a shrill inspiration. Expiration becomes difficult and noisy; suffocation seems imminent from spasm of the glottis. Cyanosis, profuse perspiration, and symptoms of asphyxia seem about to terminate in death, when the spasm ceases, and the child is fairly comfortable, though stupid for a time. Portions of the membrane may be expelled by coughing, during the intermissions. In cases tending toward recovery, the appearance of improvement is maintained between attacks, the paroxysms become less frequent and severe; expectoration of membrane is marked. The fever lessens and disappears.

In those cases tending toward fatal termination, the attacks become more frequent and severe; expectoration is absent; respiration is more frequent and shallow without whistling and stridor; stupor and insensibility deepen, and the child dies of asphyxia.

Treatment. The first thing is the relief of the dyspnea. Thorough relaxation of the tissues of the throat and neck usually give relief. The treatment for simple croup, especially the inhalation of steam from boiling water or slaking lime, are efficacious in promoting relaxation of the spasmodic muscles. Hot packs to the throat, if they can be used, are good. The room must be thoroughly well ventilated; the perspiring body of the child should be protected from drafts. A hot bath may be employed; this to be followed by vigorous rubbing of the skin.

During the intervals, if the child is not asleep, washes or gargles very soft and aseptic are good; care should be taken to avoid injury to the mucous membrane. No attempt at antiseptics is of any avail, but the washes should be aseptic—should carry no new germs into the injured throat. Restricted diet or none is permitted. Fruit juices, especially pineapple juice, are refreshing.

A child with any sickness should be kept from other children, especially is this true with fevers, and in cases which bear clinical resemblance to the acute infections, even though the actual infectiousness cannot be demonstrated, it is much better to secure as complete isolation as possible.

The prognosis is doubtful in all cases; most patients recover in six to ten days, but there is always the danger of asphyxia, and of more extended invasion of the tissues by the organism concerned.

SPASMODIC CROUP

(Including spasmodic laryngitis; simple croup; false or pseudo croup; catarrhal croup; laryngitis with spasm; spasm of the glottis; Miller's, or Kopp's, or thymic asthma; child-crowing; tetanic croup; laryngismus stridulus)

This is essentially a nervous disturbance with symptoms due to the spasmodic tension of the vocal muscles, with closure of the

larynx. The tension is often present in membranous laryngitis and in many forms of acute and chronic laryngitis, pharyngitis, and sometimes tonsillitis, rhinitis, bronchitis, and pneumonia.

Etiology. The patients are almost always children of neurotic make-up, not often more than seven or eight years old, rarely less than one year. Cases have been reported of very small infants, and of adults and senile patients. Reflex causes include worms, overeating, irritating and improper foods; chronic tonsillitis, and adenoids; bad teeth; rachitis, marasmus, or other malnutrition; exposure to sudden cold, or to dampness; emotional storms, frights, unwise attempts at discipline, and other shocks to the nervous centers.

Diagnosis. The symptoms vary according to the etiological factors. Usually it is of sudden nocturnal onset; the child is well or suffering from the causal condition, sleeps a few hours and wakes suddenly with a metallic, resonant respiration and great dyspnea, with stridulous inspirations from narrowing of the glottis by spasm, and wheezy stridulous expirations ending with a high-pitched, inspiratory crowing sound on relaxation of the spasm.

In severe cases all the accessory respiratory muscles are called into action during the attack. The lips and nails are blue, the surface cold, the countenance anxious, the inferior portion of the chest drawn in instead of expanded during inspiration, and there may be carpopedal spasms. General convulsions, strabismus, and involuntary discharge of feces and urine sometimes occur.

The attack lasts from a few minutes to an hour or more, and may return after a few hours' sleep or on the following night. During the day there may be a slight cough. There is little or no fever or hoarseness. It often recurs at the same hour on successive nights.

Treatment. To relieve the spasm, treat the upper part of the chest and diaphragm, especially through the phrenic nerve and its spinal relations, third to fifth cervical, and treat the eighth to tenth ribs anteriorly. Correct any subluxations found.

A hot bath, with cold sponging to the chest and back, is a good emergency measure. This may be repeated if the spasms are persistent. The air of the room is best kept moist by steam from boiling water. Emesis may be produced by tickling the fauces with the finger. This often relieves the spasm very quickly. After an attack, the general health and diet must be regulated. Any irritating environmental condition, or personal habits, must be attended to promptly.

The **prognosis** is favorable for recovery. Death rarely occurs during the paroxysm in very young or debilitated children.

CHAPTER XXI

DISEASES OF THE BRONCHI

ACUTE BRONCHITIS

(Acute bronchial catarrh; tracheo-bronchitis)

Acute bronchitis is an acute catarrhal inflammation of the larger and middle-sized bronchi, occurring at all ages, but particularly at the extremes of life, characterized by slight febrile reaction, substernal pain, cough and expectoration.

Etiology. Among the **predisposing** causes are insufficient food and improper clothing; excessive confinement in warm rooms; subluxations of vertebræ from occiput to seventh dorsal, of the ribs from first to sixth, and the clavicle; and interscapular and anterior thoracic muscular contractions.

Among the **exciting** causes are exposure to cold or wet, recurring rhinitis, certain infectious diseases, inhalation of irritant vapors and dusts, and many micro-organisms among which are pyogenic cocci, pneumococcus, and micrococcus catarrhalis.

Diagnosis. The condition is usually ushered in with nasal or laryngeal catarrh or both, chilliness with aching pain in the limbs, joints, and trunk, a sense of constriction about the chest, pain of a raw, burning, tearing character behind the sternum aggravated by deep inspiration or coughing, a sense of languor and weariness out of proportion to the fever.

At first, the **cough** is hard and dry with little expectoration; in a day or so it becomes looser and the sputum more abundant. The breathing is embarrassed, noisy or whistling. The temperature is not high, 100° to 103° F., but the skin is moist; the pulse accelerated according to the fever. The more acute symptoms subside in a week or so according to severity and convalescence becomes slowly established.

Bronchial fremitus may be felt in thin chests. Percussion gives a clear resonance except when broncho-pneumonia and atelectasis complicate; hence the chest should be examined daily. During the first stage, there is harsh breathing with bilateral diffuse, piping, sibilant, or sonorous rales which are shifting and affected by coughing. After a few days, the breathing is puerile with prolonged expiration, profuse moist bubbling rales. Breath sounds are suppressed over collapsed areas if a portion of the tube becomes plugged with secretion.

Increased respiratory rate, cyanosis and dyspnea indicate involvement of small tubes, or **bronchiolitis**.

Urine is febrile, of the ordinary type.

The **sputum** during the first two days is almost pure mucin, is tenacious, viscid, frothy, and transparent. It contains a few leucocytes and red blood cells, few ciliated cells, a few mononuclear leucocytes, and a few myelin drops of the simpler types. After this, the cough loosens, the sputum is increased in amount, is less viscid and tenacious, frothy, with whitish and sometimes bloody streaks. This is followed by muco-purulent secretion of nearly uniform yellow color, containing many pus cells. Later, it becomes almost purely purulent, 100 to 200 cc. daily; contains much myelin; cells mainly polymorphonuclears and fat in large masses.

Treatment. Most cases yield without treatment if patient will take a hot foot or full tub bath and go to bed after freeing the bowels, though time can usually be saved the patient by following with a thorough general treatment with special attention to the upper respiratory areas until a definite reaction is secured. If the disease persists, relax the muscles of the spine and chest, raise the ribs, correct any subluxations found, secure free elimination by bowels and kidneys. The room-air is best kept moist, the patient in bed, plenty of water administered, acidulated with lemon juice if preferred, and a liquid diet prescribed for a few days. Treat once or twice each day until acute stage passes.

The **prognosis** is favorable for recovery within a few days or weeks. In young children and the aged, the course is more protracted, the symptoms more severe, and complications are more apt to occur, but recovery is the rule. The very aged and the feeble may rarely succumb, or chronic bronchitis supervene.

CHRONIC BRONCHITIS

(Chronic bronchial catarrh; secondary bronchitis; "winter cough")

Chronic bronchitis is an inflammation of long duration, affecting the larger and middle-sized bronchi, very common in the elderly and associated with chronic cardiac, pulmonary, and renal diseases, characterized by cough with no change in the general health.

Etiology. The chronic follows repeated attacks of acute bronchitis; occurs as an occupational disease among those working in much dust and smoke and in irritating vapors, in gout and rheumatism and in the chronic cardiac, pulmonary and renal cases.

Diagnosis. There is cough of a paroxysmal nature, often more troublesome at night and in the morning, with either scanty or copious expectoration depending upon the variety. Sometimes

shortness of breath is noticed upon exertion. The condition does not usually impair the general health except during acute exacerbations. There are usually some associated structural changes as emphysema, or bronchiectasis.

Many cases are associated with chronic catarrhal gastritis. The cough is often absent in the summer.

There are four general varieties.

Mucous Catarrh is the most common during the winter, and marked by more or less violent paroxysms of coughing and the expectoration of yellowish mucus.

Dry Catarrh has a harsh, distressing cough with a feeling of soreness or rawness under the sternum, and the expectoration of small globular masses. This occurs particularly when associated with emphysema, gout, rheumatism, or asthma.

Bronchorrhea is associated with bronchial dilatation, occurring most commonly in the elderly and marked by severe coughing, followed by copious expectoration of greenish-yellow, often fetid mucus (four to six pints in twenty-four hours).

Fetid Bronchitis is often associated with bronchiectasis and marked by excessively fetid odor of breath and sputum. The decomposition of the secretion within the bronchi may cause gangrene of the mucosa, or even of the lung itself.

Percussion is normal in simple, uncomplicated cases. If bronchiectasis is present, then there are diffused spots of amphoric or tympanitic sound. If emphysema is associated, there is hyper-resonance.

The respiratory murmur is roughened, harsh, less intense than normal, with expiration prolonged and forcible or wheezy. There are diffuse, bilateral, sonorous, sibilant or moist rales of all sizes, often crepitant at the bases, depending upon the amount of secretion. If dilatation is associated, there is broncho-cavernous breathing, with large and small gurgling rales. If emphysema is present, the sounds are modified according to the extent.

Subluxations are present from the occiput to the sacrum. Among the commoner ones found are atlas, axis, third cervical, second to fifth dorsal vertebræ, first rib and clavicular luxations, curves anterior or posterior of the upper dorsal area and contractions of the deep spinal muscles.

Urine may be highly acid and slightly albuminous in those cases with a decided acidemia. In chronic bronchitis always examine the urine on account of the liability of a primary kidney condition.

Sputum. In some cases is a very small amount of tenacious yellowish viscid mucus; in others a white sticky mucus. In the chronic cases, the amount is more abundant, yellowish, mucopurulent, separates into three layers, a mucous layer, brownish-gray serum, and a muco-purulent sediment.

In fetid bronchitis, the sputum is usually thin, grayish-white, separating into layers; the upper is covered by a frothy mucus, and the lower is a thick sediment where may be found pea-sized gray or yellow masses—Dittrich's plugs, bacteria, pus, leptothrix, and fatty acid crystals.

Treatment. A careful examination is necessary to determine whether there is an underlying organic disease. Relaxation of all contracted muscles and correction of the lesions found is of first importance; and the eliminative organs should be kept active. The general hygiene is important and must be carefully supervised. The clothing should be sufficient but not too warm. Room temperatures should be kept even.

The diet should be liberal, nutritious, and mixed, including plenty of water, fresh vegetables, and fruits.

Instruction in breathing and exercises to strengthen the chest muscles are important in the younger patients. A change to a warm climate for the winter is often beneficial.

The **prognosis** is never dangerous to life unless associated with other diseases.

FIBRINOUS BRONCHITIS

(Chronic idiopathic bronchitis; membranous, croupous, diphtheritic or plastic bronchitis)

Fibrinous bronchitis is an inflammation, usually chronic, marked by paroxysmal cough, difficult breathing, and the expectoration of fibrinous casts of the larger and middle-sized bronchi.

Etiology. The direct cause is unknown. It is associated with asthma, emphysema, typhoid fever and tuberculosis, and is usually a disease of adults.

Diagnosis. The symptomatology is not different from the catarrhal forms, until the expectoration of the false membrane. A violent paroxysm of coughing precedes or accompanies the expectoration which relieves the dyspnea. After more or less of the membrane has been raised, a muco-purulent, blood-stained sputum is present for several days. There may be a slight febrile reaction.

There are acute, subacute and chronic forms, the attacks recurring at intervals of days, weeks or years, the same bronchus being involved each time.

There is diminished fremitus and lessened respiratory murmur over the portions of lung supplied by the obstructed tube. When the casts are dislodged, the murmur becomes slightly roughened. In the unaffected portions of lung the sounds are normal. If collapse of the lung follows, there is dullness. The upper portions of the lungs are the oftener affected.

Spine. See chronic bronchitis.

The **sputum** is mucus, the casts being rolled up and mixed with it, but the true nature is shown when the sputum is shaken in water, appearing as little tubes, from the size of a bodkin to almost as large as the finger. The larger ones are hollow and the smaller, solid, with a tree-like appearance. They are nearly structureless, of fibrillated base with pus and mucous corpuscles, a few gland cells, occasionally a blood cell in the outer layers, many eosinophilic cells; Charcot-Leyden crystals and Curschmann's spirals are sometimes present. Instead of the definite casts, there may be shreds, lumps, or patches of membrane.

The **treatment** is that of chronic bronchitis. The vapor from alkaline solutions seems to help dislodge the casts.

The **prognosis** is favorable if not associated with tuberculosis, pneumonia, or emphysema. In young children it not infrequently proves fatal.

BRONCHIECTASIS

(Dilatation of the bronchi)

Bronchiectasis occurs primarily from traumatism or, secondarily, from chronic pulmonary conditions whereby the walls of the bronchi dilate so that sacs are produced, and clinically marked by cough and abundant expectoration.

Etiology and pathology. In the secondary form, contraction of the supporting lung tissue causes the walls to yield from lack of support. The cylindrical form is often produced by violent coughing. Until the cavity is infected, the membrane lining the cavity is smooth with very thin walls. It is much more frequent in the lower lobes than in the upper. The condition very frequently follows an attack of "grippe." It may be widespread or a single cavity.

Diagnosis. The cough is usually absent during the day, occurring mainly in the morning. The mode of expectoration is characteristic, the patient usually raising an enormous quantity of greenish-yellow sputum in the morning upon arising, or upon arising from the recumbent position. If a single large dilatation occurs, there are the physical signs of cavity.

When diffuse, the physical signs are those of the causative disease, usually tuberculosis. Fatal hemorrhage may occur from rupture of an aneurysm in the wall of the cavity.

The physical signs disappear as the cavity fills with secretion, to reappear upon coughing and expectoration. These are tympany, cracked-pot sound, bronchial breathing, with rales, bronchophony, and increased vocal fremitus. The **sputum** is a grayish-brown, or greenish-yellow color, separating into a brownish frothy top, a thin mucoid zone, and a sediment of almost pure pus, showing, microscopically, pus cells, epithelial debris, large fatty acid crystals;

sometimes cholesterin occurs; valerianic and butyric acids and H^2S produce the horrible odor. Cerebral abscess is a very frequent complication.

Treatment. Is that of the primary condition, or if itself primary, that of chronic bronchitis.

Prognosis. It is incurable but has a protracted course. The acute form is unfavorable.

BRONCHIAL ASTHMA

(Spasmodic asthma)

Bronchial asthma is a neurosis marked by paroxysms of expiratory dyspnea during which all the accessory respiratory muscles are used; the diaphragm is fixed and there is a peculiar loud noisy wheezing.

Etiology. It often occurs in neurotic families; may be a result of bronchial irritation, direct or indirect, through the blood or nervous system; in children it occurs from imperfect recovery from naso-pharyngeal conditions, measles, whooping-cough, or capillary bronchitis.

There are three main theories of its formation: That it is a neurogenic spasm of the involuntary bronchial muscles; a hyperemia with swelling of the mucous membrane; an inflammation of the smaller bronchioles. Acidosis is also to be considered.

"The etiological factors found vary considerably, and include:

"Contraction of the cervical muscles, probably due to lesions of cervical vertebrae and exerting irritation to the trunk of the vagus;

"Pleuritic adhesions;

"Lesions of the first, second and third thoracic vertebrae, with slightly approximated ribs;

"Reflex effects from distant organs include: eye-strain; contracted sphincter ani, itself apparently due to anterior coccyx; scar tissue in cervix uteri; nasal polyps; cardiac disturbances, especially functional; gastrectasis and other conditions with accumulations of gas."—P. C. O. Clinic Reports.

Diagnosis. There may be premonitory symptoms as coryza, bronchial irritation, thoracic constriction, gastric disturbance, depressing emotions or worry, or the passage of a quantity of pale limpid urine.

The Attack. During the night, the patient awakens in great distress, feels as if there were no air in the room; assumes a characteristic attitude grasping some support; fixes the shoulder girdle and uses all the accessory respiratory muscles. Expiration is prolonged and accompanied by a peculiar loud noisy piping or wheezing. The face is flushed or cyanosed, covered with sweat, and the neck muscles are prominent; inspiration is short; respiration is not accelerated, and little air enters the lungs. A paroxysm of coughing

and expectoration gives relief, and may even terminate the dyspnea; sleep intervenes, or a slight lull occurs before another paroxysm. The dyspneic attack may last for an hour or be prolonged, with more or less severity, for several days. The patient is left more or less exhausted and with a cough for several days. During the attack the thorax is expanded and fixed; the diaphragm only slightly moves; the spinal muscles are rigid; inspiration is short and expiration is prolonged; the face pale, anxious in expression; speech is impossible, and later, the face is covered with perspiration. Dry, loud, wheezing, whistling, sibilant and sonorous rales are heard on expiration; later, bubbling rales and vesicular breathing, when the air enters more freely. During the height of the attack, vesicular breathing is hidden under the louder sounds.

Percussion shows a marked hyper-resonance over both lungs, due to an acute emphysema, or a vesiculo-tympanitic note (band-box tone of Bamberger). Cardiac and hepatic dullness are diminished but return to normal at end of attack. After many recurrences, the condition tends to merge into a permanent and chronic emphysema.

During the intervals there are the usual signs of bronchitis, or very little change from normal.

Subluxations are apt to be found from the occiput to the coccyx but those of the third to fifth cervical, second to fifth dorsal, and of ninth and tenth dorsal are particularly common. During the attack the whole spinal musculature is firmly contracted. There are changes in the natural curves of the spine, asthmatic hump-back, a posterior condition of the lower neck and the upper dorsal is frequent, or there are irregular short curves, the whole spine being stiff and the chest nearly immovable.

The blood shows a great increase in the eosinophilic leucocytes, often to 20% of the actual leucocyte count. Very high eosinophile counts are reported. The blood pressure is generally reduced. The **sputum** is expelled with difficulty and is distinctive, consisting of ball-like gelatinous masses (pearls of Lænnac), which can be unfolded and found to be casts of the small bronchioles; contains Curschmann's spirals of two sorts, one of spiral threads with eosinophilic leucocytes entangled in the meshes, and the second with a clear central filament surrounded by a spiral network of strands of mucus. Later in the condition, the filaments are replaced by octahedral phosphatic crystals (Charcot-Leyden crystals) in the now muco-purulent sputum.

Treatment. In a few cases, adjustment of the upper thoracic vertebræ and related ribs gives permanent relief, especially when this is done during the intervals of the attack. Occasionally the same work done during an attack gives immediate and permanent relief.

"During the attack, raising the first, second and third ribs may give relief."
—Meacham.

"Heavy movements, springing the spinal column generally, and raising the ribs, freeing the neck structures, with the patient first upon the side, then upon a stool, gives immediate relief."—S. C. Edmiston.

In the intervals, the general health must be built up by nutritious, easily digested foods, the personal habits regulated if necessary. It is often necessary to teach the patient a more rational view of life and its accidents so as to prevent emotional storms.

Prognosis. The disease may be intractable. Recovery is more frequent under osteopathic care; the paroxysms are relieved more quickly and the patient does not have to recover from the effect of drugs. Death seldom occurs from pure asthma.

Sequelæ. The condition results in emphysema of greater or less degree, dilatation of the right heart with subsequent dropsy, chronic bronchitis, or cerebral embolism. Sequelæ are best prevented by early attention to the asthma and, if possible, its permanent relief.

BRONCHO-PNEUMONIA

(Catarrhal pneumonia; lobular pneumonia; capillary bronchitis; suffocative catarrh)

Broncho-pneumonia is an acute catarrhal inflammation, affecting the extremes of life, limited to the mucosa of the smaller and terminal bronchial tubes or bronchioles, and the alveoli, caused by the pneumococcus, bacillus tuberculosis, or a mixed infection; characterized by fever, impeded and increased respiration, impeded circulation, short cough, scanty expectoration, symptoms of non-aeration of the blood, and great depression. Both lungs are affected.

Etiology. It often occurs as an extension of bronchitis and infection by a mixed bacterial flora; follows the infectious fevers, particularly measles, pertussis, and influenza; attacks those suffering from tuberculosis, rickets, and other debilitating diseases; and may be an infection by the bacillus of tuberculosis.

An acute primary form attacks children under two years in good health, and is probably a pneumococcus infection. There are aspiration and deglutition forms, and it also occurs after ether anesthesia.

Diagnosis. It is usually preceded by a mild bronchitis, the onset being gradual with chilliness or chills, rise of temperature 102° to 104° F. of a typical remittent character; the pulse rate increased, 100 to 120 per minute, somewhat compressible; the skin is hot, the face flushed, the head, neck, and upper part of the body may be covered with perspiration. The breathing becomes rapid, 40 to 80 per minute, shallow, and difficult with an expiratory moan,

dilating *alæ nasi*, and use of the accessory muscles. Inspiration may be easy or difficult but is always imperfect. There is a progressive dyspnea with orthopnea, followed by the onset of cyanosis, with inspiratory retraction of the base of the sternum and lower costal cartilages. The cough is dry, short, hacking, painful, and soon followed by more or less copious muco-purulent expectoration. Occasionally in children, the symptoms are predominantly gastro-intestinal or cerebral.

As the cyanosis develops, the pulse becomes feeble and flickering; the cough is slight and suppressed; general venous congestion is indicated by the livid countenance; lips and nails, blue; surface, cold and often covered with a clammy perspiration; the mind, dull. In children, stupor and convulsions rapidly supervene. The expectoration is scanty, viscid, and difficult to raise; the little patient usually swallowing what sputum it does raise; or it almost ceases. Death follows from apnea and depression.

The unfavorable symptoms are pale and livid countenance, bluish lips, dull eyes, restlessness giving place to apathy and a progressively increasing somnolence. Defervescence is by lysis and is rapid, although several weeks may elapse before complete recovery. The duration is from one to three weeks; rarely to three months.

Suppuration and gangrene often follow the aspiration and deglutition forms. A fibroid change is the common termination when the causal agent is the *bacillus tuberculosis*.

Increased vocal fremitus is present if large areas are involved. The intervening healthy lung gives a more or less hollow or tympanic note; there is increased resistance; when portions of lung are collapsed, there are circumscribed areas of dullness, these being sometimes shifting. The changes are most marked in the lower lobes posteriorly, and there may be compensatory emphysema in the upper lobes. During the first part of the disease, there is a feeble, high-pitched respiratory murmur which becomes distant and harsh as the disease progresses, or there may be a diffuse, or basic vesiculo-bronchial breathing. Expiration is lengthened, jerky, harsh and grunting. Persistent subcrepitant double rales are heard over limited areas, particularly on either side of the spine, followed in severe cases by large mucous rales. There may be undefined mucous clicks on forced inspiration. Sometimes there are patches of tubular breathing. Vocal resonance is increased. The urine is febrile.

The sputum is mucoid or muco-purulent, glairy and viscid, and may be somewhat rusty or blood-streaked. It is difficult to raise and almost never typically rusty, ceasing with failing strength.

Subacute and chronic forms are known, presenting the same general and physical symptoms but marked by longer duration and greater exhaustion.

Treatment. The patient is confined to bed in a well-ventilated room of even temperature, 65° to 68° F., the air being moistened by steam. The position should be changed frequently in the aged and in the very weak.

"Feed milk, eggs, broths, ice cream and gruels freely; also give plenty of water to drink, and keep the organs of elimination wide open. Look carefully for upper dorsal lesions above the eighth, also the corresponding rib lesions, which are so often found in conjunction. Protect the chest by a cotton batting jacket, but I prefer to omit the antiphlogistine. Ice bags over the chest give comfort. In cases with high fever, sponge the patient or apply the wet pack. Keep close watch on the heart for signs of failure, and give general relaxation to assist the circulation and raise the left ribs to relieve the heart."—W. H. Bedwell.

Reduction of the temperature is best secured by deep, steady pressure in the suboccipital fossa, or in the mid-thoracic region. During convalescence, the child must be carefully guarded to prevent relapse, and be built up by tonic treatment.

Prognosis. In the primary cases, it is good, recovery following prompt and thorough treatment.

In feeble and debilitated children and in the aged, it is unfavorable, although recovery may occur in apparently very serious cases. In weakly subjects, it may terminate fatally after a protracted course or develop into tuberculosis. The aspiration and deglutition forms are usually fatal.

CHAPTER XXII

DISEASES OF THE LUNGS

CONGESTION OF THE LUNGS

Active congestion is an early stage in many pulmonary affections, although this may include some of the abortive forms seen during epidemics of the infective lung diseases. It is marked by initial chill, pain in the chest, dyspnea, moderate cough, temperature 101° to 103° F.; the physical signs being defective resonance, feeble sometimes bronchial breathing, and fine rales. Simple congestion clears while the more serious diseases increase in severity.

Passive congestion occurs from three classes of causes: Mechanical congestion is found whenever there is any obstacle to the return of the blood from the lungs to the heart or, more rarely, from the pressure of tumors; and is marked by dyspnea, cough, frothy, often blood-stained, sputum containing "heart disease cells." Passive congestion occasionally results from injury or organic brain disease. Hypostatic congestion is found in long-continued fevers and adynamic states, the bases of the lungs being deeply congested partly as a result of gravity, but chiefly by the weak heart action, the general symptoms being absent. The physical signs of passive congestion are slight bilateral dullness, feeble, sometimes blowing, breath sounds, the bases posteriorly being particularly affected, moist rales, and sometimes increased vocal fremitus.

Treatment. This is the same as the treatment of the first stage of pneumonia (q. v.).

PULMONARY HEMORRHAGE

(Hemoptysis; broncho-pulmonary hemorrhage; bronchorrhagia)

Hemoptysis is the expectoration of blood, pure or mixed with air, usually bright red in color, following the act of coughing.

Etiology. Pulmonary hemorrhage may be caused by tuberculosis and other pulmonary diseases; excessive cardiac action, particularly in the presence of mitral lesions, when it may be profuse and recur at intervals for years; aneurysm rupturing into the bronchial area; cancer or ulceration of the larynx, trachea, or bronchi; gangrene or infarction of the lungs; traumatism or excessive bodily exertion; in hemophilia, purpura, and scurvy; rarely as an attempt at vicarious menstruation; recurring hemoptysis in arthritis subiects; endemic hemoptysis (see under animal parasites).

Diagnosis. The hemorrhage occurs suddenly, is rarely preceded by epistaxis, cardiac palpitation, or some difficulty in breathing; begins with a warm sensation under the sternum, tickling in throat, sweetish taste in the mouth and coughing to remove these sensations. It is followed by a warm, saltish, bright red, frothy, alkaline liquid, gushing from the mouth and nose, composed of blood mixed with air and mucus.

The appearance of the blood depresses the patient; he becomes pale, and often faints. The attack may subside within a half hour or several hours, returning for several days, the sputum being either bloody or blood-streaked. There may be a slight febrile reaction and chest pains afterward as a result of inflammation at the site of bleeding.

Auscultation reveals coarse, bubbling rales in circumscribed areas. It is usually better not to examine the chest until the hemorrhage is stopped.

Diagnosis must be made from epistaxis by absence of air bubbles and by inspection of fauces and nasal cavities; from hematemesis, by the blood being vomited instead of expectorated, and being dark-colored, clotted, mixed with acid stomach contents, and followed by black tarry stools, with absence of rales in the chest. The exceptions are when the blood from the lung is swallowed and then vomited; and when a large gastric artery is eroded by ulcer, but the raising of such blood is preceded by epigastric pain and the blood is rarely frothy.

Treatment. The patient should be put to bed in the dorsal semi-recumbent position, or lying flat upon the affected side (denoted by the bubbling rales). The blood can be diverted from the lungs by giving steady pressure at the sides of the eighth to the twelfth thoracic spinous processes; by applying ice bags to the affected side; by applying heat to the extremities and the abdomen; or, less effectively, usually, by bandaging the arms and legs to delay venous return. Certain drugs, as morphine, may quiet the patient and diminish bleeding, but the danger of these is great; the throat reflexes are lost, the patient may drown in his own blood, or he may succumb to atelectasis or pneumonia. No food or liquid should be given for about six hours after the hemorrhage stops, and should then be only small amounts of very cold liquids, or ice cream. Prevention of later attacks depends upon finding and removing the cause of the hemorrhage.

PULMONARY APOPLEXY

(Hemorrhagic infarct; diffuse hemorrhagic infiltration)

This is an uncommon form where the blood is effused into the alveoli and interstitial tissues. It occurs in chronic heart disease, particularly mitral lesions,

in thrombus or embolus of the pulmonary artery in septicemia, pyemia, malignant fevers, and in certain brain diseases. The symptoms are indefinite, usually those of pulmonary embolism and thrombosis. If the injury is very large and in the lower lobe, there are signs of consolidation with blowing, breathing and pleuritic friction.

Treatment. Perfect rest in bed with the head and shoulders elevated, with absolute quiet insisted upon, the patient being turned upon the affected side, if it is known, is essential. The first thing to do is to reassure the patient. Then deep steady pressure from the second to the fifth dorsal vertebrae decreases the cardiac action. Pressure near the ninth and tenth lowers blood pressure, the blood is drawn into the abdominal veins. No corrective work should be attempted until the bleeding is controlled. As soon as possible after the hemorrhage, correction of the subluxations found, usually at the third dorsal, sometimes from second to the seventh dorsal vertebrae, clavicles, upper ribs, or in the cervical region, will assist in preventing a recurrence. The diet must be bland and non-irritating, with cool drinks, and ice to dissolve in the mouth. The success of treatment depends upon the primary disease, and measures must be used to combat it.

PULMONARY EDEMA

(Dropsy of the lungs)

Pulmonary edema is an accumulation of serous fluid in the air vesicles, bronchioles, and interstitial tissues of the lungs, associated with conditions favoring hypostatic congestion, and clinically marked by dyspnea, cough, and expectoration of frothy, blood-streaked sputum.

Etiology. It is associated with morbid blood states as Bright's disease, anemias, alcoholic excesses, and with conditions favoring hypostatic congestion, as cardiac valve lesions, malignant fevers, paralysis, and long-continued lying on the back. It may occur after the use of pilocarpin. The condition may also follow aspiration of the thorax. Upper thoracic and rib lesions predispose.

Diagnosis. The onset is usually sudden with dyspnea or orthopnea; the breathing is hurried, laboring and rattling; all the accessory muscles are used. Pain in the chest, sense of oppression and anxiety are extreme. The cough is short, constant, and harassing, followed by expectoration of copious, foamy, serous, blood-streaked sputum. The cardiac action is tremulous or feeble. The face is flushed at first, but as the left ventricle fails, or if the effusion into the alveoli prevents the entrance of sufficient air, symptoms of cyanosis rapidly follow, as shown by the feeble pulse, cold surface, shallow hurried breathing, suppressed cough, restlessness replaced by stupor, which soon deepens into coma.

Percussion is not resonant at first, soon becoming dull at the bases posteriorly. The breath sounds are deficient, weakened, with subcrepitant and bubbling rales of an unusually liquid character. The second pulmonic cardiac sound is accentuated. Hypertension usually precedes the edema.

The treatment is that of the cause, by removing the obstruction to the circulation and securing free elimination. Relaxation is indicated; raise the ribs and clavicles to relieve the dyspnea. Inhalations of oxygen may be necessary in severe cases.

Prognosis. Pulmonary edema may prove fatal within a short time, or be relieved to recur later. It is especially grave when complicating pneumonia, and in cardiac or renal diseases. In the majority of cases it is a terminal affection.

COLLAPSE OF THE LUNG

Collapse of the lung is a part of other diseases, but is associated with definite physical signs, and is of several types.

Congenital collapse, or atelectasis, occurs in weakly new-born in whom the inspiratory power is not sufficient to properly inflate the lungs.

Cases due to pressure from without, as in pleural or pericardial effusion or pneumothorax, may present collapse of the whole lung.

Cases are sometimes due to wounds of the chest wall and perforation of the pleura.

Ordinary or lobular collapse often occurs in those cases of bronchopneumonia which complicate or follow measles, whooping cough, or other conditions.

Collapse may be due to paralysis of the respiratory muscles, the elastic recoil of the lung tissues being aided by absorption of air by the blood vessels.

Diagnosis. If an extensive area is involved, any existing dyspnea becomes increased, the pulse more rapid, and cyanosis may follow. In slight cases, the symptoms of the primary disease only are present—the “grippy chest” of milder cases of bronchopneumonia. If the area is extensive, dullness and possibly tubular breathing are present.

Auscultation discloses subcrepitant rales and weakened respiratory murmur.

Treatment. The primary disease must receive first attention. The patient must be taught full breathing, holding the lungs full of air for progressively lengthening periods. If the heart is good, cold shower baths, or having cold water poured upon the back of the neck, stimulates the respiratory organs. Care must be used, lest the shock to the heart be serious.

Prognosis. When the condition is due to pressure, as in emphysema, the outlook is very grave. When the area involved is not great, and no active infectious agent is present, symptomatic recovery may be expected.

EMPHYSEMA

(Alveolar ectasis)

This term is applied to several rather widely different conditions, all of which are characterized by the presence of abnormally large air spaces in the lungs. Two classes are recognized—interlobular and vesicular.

Interlobular or Interstitial Emphysema is the presence of air spaces outside the lung cavity, in the interstitial tissues, or rarely entirely outside the organ. It is due to rupture of the alveolar walls during violent expiratory effort. The causes include: violent coughing, as in whooping-cough or bronchitis; urgent straining, as in parturition, defecation, muscular effort, or hysterical fits; and injuries to the lung, as stab or gunshot wounds, etc. The air usually escapes upon the anterior aspect of an upper lobe; if it escapes from other areas, it is apt to work upward through the mediastinum, until it reaches the neck region, when its further progress is impeded. One of my cases (Burns) had a sac as large as a walnut, upon the upper aspect of the left superior lobe. Unless bacteria are carried in with the air, no harm results. No treatment is required.

Vesicular Emphysema is due to dilatation of the alveoli. Several types of this are recognized, each with certain peculiarities.

Compensatory or Inspiratory Emphysema is a condition in which a portion of the lung expands to take the place of a collapsed portion, as in bronchopneumonia, pleuritic adhesions, or in an area of old tubercular cicatrice.

Atrophic or small-lunged emphysema is due to primary senile atrophy of the lungs, the chest and lungs being small.

Hypertrophic, substantive, or expiratory emphysema, which is the usual form, is due to those causes which keep up a more or less persistent high intra-alveolar tension, such as playing on wind instruments and glass-blowing; occupations involving severe strain or heavy lifting; chronic bronchitis; heredity, probably depending upon congenital weakness of the elastic tissues of the lung. Any of these causes produces overdistension of the vesicles; atrophy of their walls; obliteration of the blood vessels and a consequent diminution of the oxygenating area; changes in the chest contour; changes in the right heart; general changes due to imperfect oxygenation; and often an associated bronchiectasis. The condition is clinically marked by the physical signs, dyspnea, and a chronic bronchitis.

Diagnosis. The general symptoms are not many until the condition is well advanced and consist of dyspnea and cyanosis from the deficient aeration. These are greatly increased on exertion, and

the patient is able to go about with cyanosis of an extreme grade; more or less cough from associated bronchitis; retention of waste products within the blood causing various disagreeable symptoms; the temperature is subnormal; the surface of the body, cool; and the pulse is weak. Hypertrophy and dilatation of the right heart with its symptoms of general venous stasis follow.

The chest is large, barrel-shaped, with round shoulders; the dorsal curve of the spine is increased and rounded; the scapulæ are almost horizontal, there are prominent sternum, clavicles, and sterno-mastoid muscles, a deep sternal fossa; the intercostal spaces are widened, the vertical diameter is elongated. The neck veins are distended. The auxiliary muscles are used. Prolonged expiration with a short inspiration is noted. A zone of dilated venules may be found along the line of attachment of the diaphragm.

Vocal fremitus is diminished, the cardiac impulse is depressed and nearer the sternum, the apex being only rarely palpable. Epigastric pulsation may be present.

There is a drum-like note to the hyper-resonance which extends to the seventh and eighth rib anteriorly and to the twelfth posteriorly, if the whole lung is involved. The areas of cardiac and hepatic fullness are encroached upon; the margins of the lung are fixed in the position of full inspiration from the disappearance of elastic tissue. The vesicular murmur is soft and weak, even absent, depending upon the amount of bronchitis present. The breath sounds are wheezy and harsh on expiration. The first cardiac sound is lessened in intensity and duration; the second sharply accentuated.

Treatment. The bronchitis often associated with emphysema must receive attention. Whatever other causative factors are found must be removed, if this is possible. During expiration, an attendant should exert pressure upon the thorax, relaxing as inspiration occurs. Inspiration against pressure upon the ribs gives exercise to the inspiratory muscles, though this is of less importance. A nurse can be taught to give this manipulation, and the exercises should be selected after due study of the patient's condition, and especially the positions of the ribs. It is best to see that rib lesions have been well corrected before any strenuous measures are advised. Cardiac lesions are to be suspected, and no violent exertion permitted until the suspicion has been allayed.

Breathing in compressed air, and breathing out into negative pressure, tends to remove the superfluous air, and to give exercise to the muscles of respiration. Raising the ribs and clavicles often gives relief.

The general health must be maintained in every way. The hygiene, exercise, diet, are those of the underlying cause, plus the measures indicated in chronic bronchitis. Sudden attacks of

dyspnea may occur, and these, though rarely fatal, are serious. In such cases oxygen may be required for relief.

The **prognosis** is clouded. Patients seldom die from the condition. When the emphysema is associated with asthmatic attacks, the prognosis is more serious. Cardiac changes are frequent, and death may be due to injury to the right heart. General edema may terminate the condition.

PULMONARY GANGRENE

Infection of the diseased tissue by any of the proteolytic organisms may result in gangrene of the lungs. It may follow abscess or pneumonia, especially in very old people, or those in whom the bodily resistance is greatly lowered for any reason. The most important distinctive diagnostic symptoms are the odor of the breath and the general symptoms of toxemia. Treatment of this disease is of very little use. Death usually supervenes within a very few days.

ABSCESS OF THE LUNGS

Pulmonary abscess results from the infection of the lungs by any of the pyogenic organisms. *Staphylococcus* or *streptococcus* are the most frequently found. These may infect tissue already diseased by pneumonia or tuberculosis.

"**Cold Abscess**" may be due to infection by the tubercle bacilli, or by *actinomyces*. Abscess of the liver may penetrate the diaphragm and drain through the lungs. In this case, the presence of bile in the sputum gives the diagnosis.

Treatment. Drainage through the bronchi may be sufficient, and recovery occur spontaneously. If drainage is not complete, the treatment is the surgical evacuation of the pus. Resection of one or more ribs may be necessary.

In any case the treatment should include a careful examination of the condition of the liver and the kidneys. The circulation through these organs and the spleen should be kept very free, in order that the normal bactericidal conditions of the body may not be interfered with.

The **prognosis** is grave in any case.

PNEUMOKONIOSIS

This term is applied to the condition of the lungs almost universally present in the cities, or even in country places, where soft coal is burned. The inhalation of particles of soot is inevitable. These are taken up by the white blood corpuscles, or are passed

through the alveolar epithelium into the lymph channels. The connective tissues are colored dark gray or black, and the bronchial lymph nodes are very deeply colored. The alveolar cells themselves may be permeated with the black particles.

When this discoloration is due to particles of coal, as in miners, the term "**anthracosis**" is used.

Those who work in stone and breathe the fine particles of this dust suffer from "**chalicosis**."

Those who work in iron and breathe the fine particles of this dust suffer from "**siderosis**."

In all of these cases, the resisting capacity of the lungs is diminished appreciably. The injury to the epithelium lowers the resistance to infections, and thus, pneumokoniosis must be considered one of the causes of pneumonia, tuberculosis and other less common disorders.

RARE PULMONARY CONDITIONS

Hydatid Cysts may be found in the lungs.

It is possible to diagnose this condition only when the hooklets are found in the sputum which, in such cases, is usually thin and watery. Lung stones are rarely found.

Bronchial Calculus. C. C. Wright reports a case of bronchial calculus with recovery. The calculus was "a hard, jagged stone of a dirty white color, nodular coral-like surface, and under strong glass looked like bone. Its dimensions were 12 by 9 by 6 m.m., and weight 10 grains. No blood followed it and no soreness preceded or followed its expulsion."

Primary Carcinoma is very rare in the lungs. It is usually found in the upper lobe of the right lung, and it may attain great size. Secondary carcinoma is usually from mammary carcinoma, though it may follow similar growths anywhere else in the body. These secondary tumors are usually small and very numerous.

Sarcoma is usually secondary, and its most frequent origin is in the pulmonary lymphatic glands.

Diagnosis. Pulmonary neoplasms are rarely suspected ante mortem. The X-ray may give the diagnosis. The only treatment is symptomatic, and the prognosis is extremely grave. Death usually occurs within a few months after the first symptoms are noticed.

PLEURISY

(Pleuritis)

Etiology. Inflammation of the pleura is usually the result of inflammation of the lungs. It is almost invariably present in pneumonia, tuberculosis, bronchitis, or in almost any other pulmonary

inflammation. The few primary cases are due either to trauma or to severe exposure to cold and wet. Repeated attacks indicate pulmonary tuberculosis.

Systemic diseases, such as rheumatism, nephritis, alcoholism, may cause pleurisy with little or no lung involvement. The right pleura may be inflamed in cases of hepatitis. Three forms of pleurisy are described: the acute, subacute, and chronic.

Acute fibrinous pleurisy, dry pleurisy, or acute plastic pleurisy is the most common condition. The disease begins with a sense of discomfort, followed by dyspnea and pain in one side of the trunk, "stitch in the side." There is a little cough, which is suppressed on account of the pain which it produces. A slight fever may be present. The symptoms may be very mild and the attack last only a few days. At other times, the symptoms are much more severe and acute, and may last for several weeks, or may terminate fatally.

Treatment. The most important part of the treatment is the relief of the pain. Painful areas may be strapped with bands of adhesive tape. Rib lesions should be corrected at the beginning of the disease, if this is possible. It is frequently impossible to correct the rib lesions after the inflammation has become pronounced. Hot and cold applications may relieve the pain. Counter-irritation may be indicated. Rest in bed is always necessary during the acute symptoms.

Prognosis. Most cases recover in a few days unless there is some marked pulmonary disease. Every attack predisposes to further attacks. When the inflammatory process does not disappear, the condition may pass into the subacute or the chronic form.

Subacute pleurisy, pleurisy with effusion, sero-fibrinous pleurisy, may follow the acute attack, but it usually begins with a much slower sequence of symptoms. After a day or two of pain, slight cough, dyspnea, the normal secretions begin to be considerably increased. The fluid may accumulate to such an extent as to exert compression upon the lungs or the heart. Dyspnea is progressively more marked. The cardiac disturbances may be very severe.

The diagnosis rests upon the area of dullness which may change with the changing position of the patient. The normal heart and breath sounds are muffled by the fluid over them.

Diaphragmatic pleurisy is associated with nausea, vomiting, pain in the pit of the stomach, and other symptoms of gastrointestinal disturbances. The X-ray may be helpful in diagnosis.

Encysted effusion is due to the adhesion of the inflamed pleural membranes around an accumulation of fluid which may increase in quantity through a considerable extent.

Interlobar pleurisy occupies the region between the lobes of the lungs and may drain into a bronchus. **Hemorrhagic pleurisy** is due to the extravasation of blood into the pleural exudate.

About three-fourths of the cases of subacute pleurisy are tubercular in origin, though the tubercle bacilli are rarely found in the fluid. The condition may be a part of the symptoms of acute articular rheumatism.

A fever of usually not more than 103° F. may be present. The whole course of the disease is slow and convalescence is usually greatly retarded. Tubercular cases often recover from the pleurisy, though the pulmonary disease may follow its usual course.

One of the most important factors in the cause of pleurisy is the existence of rib lesions. The inflamed area may be covered by the ribs or may be on a side of the thorax opposite the ribs, whose adjustment is imperfect. It must not be forgotten, however, that the reflex muscular contractions due to the inflamed pleura cause the approximation of the ribs and the disturbance of their structural relations.

Chronic adhesive pleurisy may follow any of the other types of pleurisy mentioned. It may or may not be associated with considerable effusion. Sometimes both forms are found present at the same time; that is, the two layers of the pleura may be adherent with connective tissue bands of varying strengths, while the areas not adherent are engaged in pouring out an abundant fluid. This form is especially frequent in chronic rheumatism and in nephritis. The pain is well localized and is increased by movements of the thorax, or the arms, by deep respiration, or by coughing. The effusion may embarrass the respiration and the heart's action to a considerable extent.

Paracentesis is necessary when the accumulation of fluid becomes great enough to interfere with the respiration and the circulation to any great extent. It may have to be repeated many times. Occasionally a single draining is followed by adhesion of the pleural membrane.

This form does not usually shorten life, but it predisposes to other diseases, and may make life a very uncomfortable matter.

EMPHYEMA

(Purulent pleuritis or pleurisy; pleuritic abscess)

The infection of a pleuritic exudate may result in empyema. The infectious agent may gain entrance into the bronchial cavity by careless paracentesis, or it may be carried from an infectious area elsewhere in the body by means of the blood stream. Direct extension from pulmonary abscesses or from the liver or any other abdominal abscess through the diaphragm is rare. An examination

of the pus may show any of the pyogenic organisms singly or in combination.

Diagnosis. The dull area is usually rather less in extent than is the case in pleurisy with effusion. The pain may or may not be very severe. The constitutional symptoms are much more marked than in other forms of pleurisy. The fever may reach 107° F. The blood shows marked leucocytosis. Peptonuria and indicanuria are usually present. Gastro-intestinal symptoms are those ordinarily associated with the fever.

Pulsating empyema (pulsating pleurisy, empyema necessitas), is due to the presence of considerable amounts of pus, walled off and circumscribed by adhesions of the two pleural layers around it.

Treatment. The pus should be evacuated and the wall of the cavity thoroughly cleaned as soon as a diagnosis is made. Resection of one or more ribs is often necessary in order to provide sufficient drainage.

With early drainage, rest in bed and the treatment of such symptoms as may complicate the case, recovery should be expected. In old people, or in those in whom the vitality is greatly lowered for any reason, the prognosis is very serious.

Sequelæ. The danger of metastatic abscesses must be kept in mind. The pus or bacteria may be carried in the blood to the liver, the brain, kidneys, or any other organ in the body. With septicæmia, the prognosis is most serious.

PNEUMOTHORAX

Puncture of the thoracic wall, or as the result of an injury to considerable of the alveoli, may permit air to enter the intrathoracic cavity after pulmonary abscess. This condition is called pneumothorax. Rarely, aerogenic organisms may infect the pleural cavity. The treatment is surgical.

HYDROTHORAX

(Dropsy of the pleura; thoracic dropsy)

The accumulation of non-inflammatory fluid in the pleural cavity is due to the same condition which causes dropsy elsewhere in the body; that is, nephritis, cirrhosis of the liver, valvular lesions of the heart, etc. The treatment is that of the underlying disease. Paracentesis may be necessary.

DISEASES OF THE MEDIASTINUM

The diseases of the mediastinum are not very frequently found. Lymphadenitis may be present. Abscess in the mediastinum is due

to about the same causes as before mentioned for empyema. Either abscess or tumors may extend into the mediastinum from the esophagus, bronchi or lungs. Hemorrhage of the mediastinum is due to rupture of a thoracic aneurysm.

The symptoms produced by these tumors are mostly due to pressure. In metastatic growths the diagnosis rests upon finding the original tumor. In certain lymphomatous tumors, excising a small gland from the neck for microscopical examination may give useful information.

Compression of the aorta may give murmurs like those of aortic stenosis. Unequal pulse in the two radials is apt to follow compression of the left subclavian or the innominate artery. When the esophagus is affected, dysphagia and pain result. The bougie or X-ray examination, especially with thick barium paste, should show the cause of the symptoms. Pressure upon the phrenic may give obstinate attacks of hiccough. Pressure upon other nerves gives varying pain, weakness, pupillary disturbances, gastric symptoms, hyperidrosis and other symptoms referable to the function of the affected nerves.

The position and shape of the mediastinum varies normally during respiration, and abnormally as the result of pathological changes in its neighboring organs. Pleural or pericardial effusions, pneumothorax, and other variations in the size or the shape of the lungs or the heart, may cause marked variations in the size and form of the mediastinum. Inflammatory changes may result in cicatricial thickening and this may lessen the normal elasticity of the mediastinal walls; the contraction of this new tissue may pull the mediastinum into a distinctly lateral position.

Neoplasms of the mediastinum include those from lymph nodes, as in Hodgkin's disease or lymphadenosis; sarcoma, which may be primary or secondary; carcinoma, which is probably always secondary, or the peculiar thymus-sarcoma or thymus-carcinoma. Dermoids may be found in the mediastinum. Supernumerary thyroid masses may be found; these cause no symptoms unless they undergo hypertrophy or hyperplasia, as in goiter. Echinococcus cysts, tubercles, gummy masses, are not often found.

In all these cases, diagnosis is difficult or impossible and treatment extremely doubtful. The X-ray may be of value in diagnosis. The prognosis is always very serious.