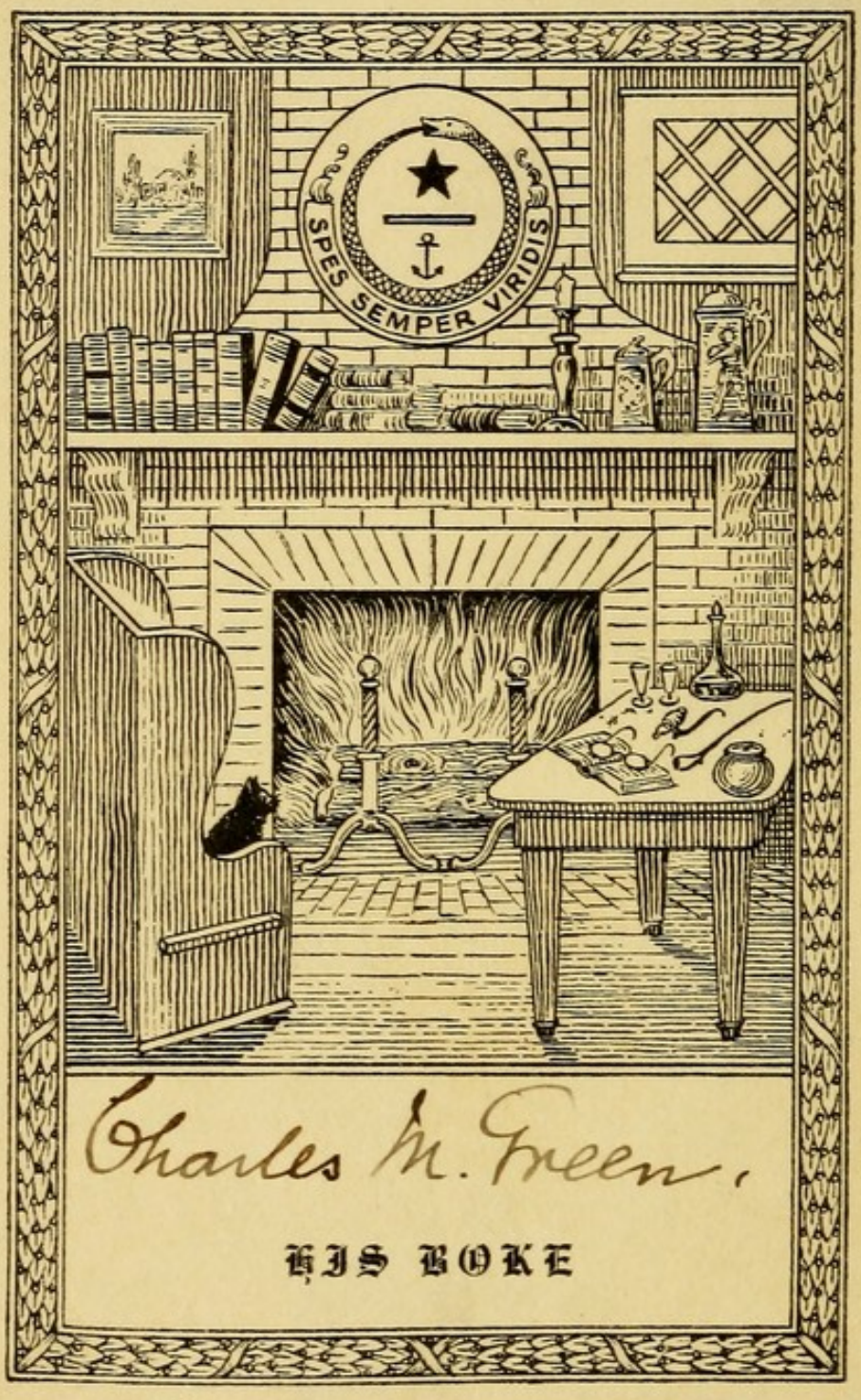
Compendium of percussion & auscultation : and of the physical diagnosis of diseases affecting the lungs and heart / by Austin Flint.

FLINT'S

PERCUSSION & AUSCULTATION.



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COMPENDIUM

OF

Percussion & Auscultation,

AND OF

THE PHYSICAL DIAGNOSIS OF

Diseases affecting the Lungs and Heart.

By Austin Flint, M.D.

Fifth Edition Revised.

New York:
WILLIAM WOOD & COMPANY.

1874.

JOHN F. TROW & SON,
PRINTERS AND BOOKBINDERS,
205-213 *East 12th St.*,
NEW YORK.

PREFACE.

This little compendium was prepared several years ago, by request of a medical friend who intended it for insertion in an annual Physician's Visiting-Book. The latter publication was abandoned, and the compendium was published by itself. It has been found convenient in aiding to memorize physical signs, by the private pupils of the writer, and by others, and it has been reprinted in compliance with a demand for this purpose. It is designed, not as a substitute for works treating of auscultation and percussion, but, on the contrary, to promote the study of treatises which consider fully these and the other methods of physical exploration, together with the diagnosis of diseases affecting the respiratory organs and the heart.

The importance of examinations of the chest

in healthy persons cannot be too strongly enforced on the student entering upon the study of Percussion and Auscultation. A practical acquaintance with the signs in health is essential as preparatory for becoming acquainted with the signs of disease. The study of the healthy chest, as regards the respiratory system, should embrace the following points: 1. The characters of the normal resonance on percussion; a comparison with reference thereto of the two sides of the chest, and of different regions on the same side, together with the variations in different healthy persons. 2. The characters of the normal vesicular murmur of respiration, and in contrast, those of the normal laryngeal and tracheal respiration, the characters of the normal vocal resonance, and of the normal bronchial whisper; a comparison, in like manner, with reference to these respiratory and vocal signs, of the two sides of the chest and of different regions on the same side, together with the variations in different healthy persons. Familiarity with the characters of these signs, and with the

normal variations referred to, is indispensable. The characters which distinguish some of the important morbid signs can be studied on the healthy chest.

As preliminary to the study of the cardiac signs of disease, the student must become practically familiar with the characters of the normal sounds of the heart, and with the anatomical relations of the heart and of the large vessels to the walls of the chest, and to the lungs. The mechanism of the heart-sounds should also be understood.

COMPENDIUM

OF

PERCUSSION AND AUSCULTATION,

AND OF

THE PHYSICAL DIAGNOSIS OF DISEASES AFFECTING THE LUNGS AND HEART.

By AUSTIN FLINT, M.D.

SUMMARY OF PULMONARY SIGNS OBTAINED BY PERCUSSION AND AUSCULTATION, THEIR DISTINCTIVE CHARACTERS AND SIGNIFICANCE.*

PERCUSSION.

Normal Vesicular Resonance.—The resonance obtained by percussing the healthy chest. Its intensity varies much in different persons; the pitch is low; the quality is peculiar and distinguished as vesicular. The resonance is

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*For a fuller exposition of the distinctive characters and significance of the signs obtained by percussion and auscultation, *vide* the work of the writer, entitled "*A Practical Treatise on the Physical Exploration of the Chest and the Diagnosis of Diseases affecting the Respiratory Organs.*"—*2d Edition.*

greater, the vesicular quality is more marked, and the pitch is lower at the left, than at the right, summit of the chest in front.

ABNORMAL MODIFICATIONS OF THE NORMAL VESICULAR RESONANCE.

Diminished Resonance, or Dulness.—The resonance less and the pitch higher than the normal vesicular resonance. Denotes that the proportion of solids, or of liquid, over air within the chest, is greater than in health. Incident to partial solidification of lung in pneumonia, tuberculosis, etc., to pulmonary congestion, to moderate or small pleuritic effusion, to moderate œdema of lung, and to collapsed lobules.

Absence of Resonance, or Flatness.—Resonance wanting, *i.e.*, complete abolition of sonorousness. Denotes absence of air within the part of the chest percussed. Incident to complete solidification of lung, to liquid effusion, to great œdema of lung, and to tumor within the chest.

Tympanitic Resonance.—A resonance wholly devoid of the vesicular quality which distinguishes the normal vesicular resonance. *The intensity of the resonance may be either greater or less than in health.* It is invariably higher in pitch than the normal vesicular resonance. It proceeds from air in the pleural sac, or in pulmonary cavities, or in the large bronchial tubes sometimes on percussion over the upper lobes; and it may be conducted from the stomach or colon by solidified lung. Incident to pneumo-thorax, to some cases of solidified lung, and to tuberculous excavations.

Amphoric Resonance.—A variety of tympanitic resonance, characterized by a musical intonation like that produced by blowing over the open mouth of a phial. Incident to some cases of pneumo-thorax, and to tuberculous cavities; occasionally produced over solidified lung.

Cracked Metal Resonance.—Another variety of tympanitic resonance. Incident to tuberculous

cavities, but occasionally produced over solidified lung, and sometimes in the infra-clavicular region of young subjects in health.

Vesiculo-Tympanitic or Exaggerated Resonance.—*The resonance of greater intensity than in health;* the character not vesicular as in health, nor purely tympanitic, but presenting the tympanitic and the vesicular quality mixed in variable proportions; the pitch raised in proportion as the tympanitic quality predominates. Incident especially to dilatation of the air-cells in emphysema, to lung containing air and floating on liquid within the chest, and to a healthy lobe when its fellow is solidified.

AUSCULTATION.

1. *Auscultation of the Respiration.*

Normal Vesicular Murmur.—The respiratory sound obtained by auscultation in health. The murmur produced by the act of inspiration is more or less intense, low in pitch, and has a peculiar quality distinguished as vesicular. The

murmur with expiration is not always present; when present it is much shorter than the inspiratory murmur, less intense, still lower in pitch, and it has a simple blowing quality. These characters vary considerably, within the limits of health, in different persons. The murmur with inspiration is more intense, more vesicular, and lower in pitch at the left than at the right summit of the chest in front. The expiratory sound is not infrequently prolonged at the right summit, especially in females, and it may be more or less high in pitch. (Normal broncho-vesicular respiration.)

ABNORMAL MODIFICATIONS OF THE NORMAL VESICULAR MURMUR.

Increased Vesicular Murmur.—Increased intensity of the murmur on the healthy side when the respiratory function on the opposite side is compromised by disease, as in cases of pleurisy with large effusion, pneumonia, etc. The characters of the murmur, irrespective of intensity,

not essentially changed; called, also, *supplementary* and *puerile* respiration.

Diminished Vesicular Murmur.—The murmur more or less weakened, but its distinctive characters otherwise not materially affected. Incident to dilatation of the air-cells or emphysema, to cases of bronchitis, to diminished expansion, from any cause, of either the whole or a part of the lungs, and to obstruction of larynx, trachea, or bronchi.

Suppressed Respiratory Murmur.—Absence of any sound with the respiratory acts. Incident to large pleuritic effusion, to some cases of solidification of lung, to tumor within the chest, to obstruction of larynx, trachea, or bronchi, and sometimes to dilatation of the air-cells or emphysema.

Bronchial or Tubular Respiration.—An inspiratory sound wholly devoid of the vesicular quality, and, in place thereof, a quality distinguished as tubular, the pitch higher than the

inspiratory sound in the normal vesicular murmur, and the intensity variable; an expiratory sound as long as, or longer than, the sound of inspiration, the pitch higher than that of the inspiratory sound, the intensity usually greater, and the quality, like that of the inspiratory sound, tubular. These characters of the bronchial, as compared with the normal vesicular respiration, are identical with the characters of the normal laryngeal and tracheal respiration. The bronchial respiration denotes complete or considerable solidification of lung, either from morbid exudation, as in pneumonia, tuberculosis, etc., or from condensation, as when compressed by liquid effusion, and in cases of collapse. A bronchial respiration may consist of an inspiratory, without an expiratory, sound, and *vice versâ*—the latter occurring oftener than the former.

Broncho-Vesicular Respiration.—The vesicular quality of the inspiratory sound more or less diminished, but not entirely wanting as it is in

bronchial respiration; the quality approaching the tubular in proportion as the vesicular quality is diminished, and the pitch raised in proportion as the tubular predominates over the vesicular quality. The expiratory sound more or less prolonged, its intensity increased, its quality tubular, and its pitch raised in proportion as the inspiratory sound has less of the vesicular and more of the tubular quality. This abnormal modification is distinguished, as the name implies, by the mixture, in various proportions, of the characters of the bronchial and the normal vesicular respiration. The presence of any of the vesicular quality in inspiration shows that the respiration is not bronchial, but broncho-vesicular. The characters may approximate, on the one hand, to the bronchial, or, on the other hand, to the normal vesicular respiration; and between these extremes there is every degree of gradation. The sign denotes partial solidification of lung. In proportion as the solidification approximates to an amount sufficient to give rise to the bronchial

respiration, the characters of the broncho-vesicular will approximate to the bronchial. On the other hand, the characters will approximate to the normal vesicular when the solidification is slight. By means of this sign, therefore, not only the existence of solidification, but its amount, may be determined. This has been called *rude*, *rough*, and *harsh* respiration. *Its intensity may be either greater or less than that of healthy respiration.* A broncho-vesicular respiration may consist of an inspiratory without an expiratory sound, and *vice versâ*. Normally, in some persons, the respiration at the summit of the chest, on the right, as compared with the left, side, is more or less broncho-vesicular.

Cavernous Respiration. — An inspiratory sound, devoid of vesicular quality, not tubular, but blowing, and low in pitch; an expiratory sound, lower in pitch than the inspiratory. (Contrast these characters with those of bronchial respiration.) Heard within a circumscribed space, and not infrequently surrounded

by bronchial respiration. Denotes passage of air into and from a cavity with flaccid walls.

Broncho-Cavernous Respiration.—The characters of the bronchial and of the cavernous respiration mixed in variable proportions. This combination denotes a cavity with solidified lung in close proximity. A cavernous inspiration and a bronchial expiration are sometimes found in conjunction.

Amphoric Respiration.—A variety of cavernous respiration characterized by a musical intonation resembling the sound produced by blowing over the mouth of an empty phial. Denotes generally pneumo-thorax and perforation of lung, but sometimes due to a tuberculous cavity with rigid walls.

ADVENTITIOUS SOUNDS, OR RÂLES, PRODUCED WITHIN THE AIR-CELLS, BRONCHIAL TUBES, PULMONARY CAVITIES, AND THE PLEURAL SAC.

Crepitant Rale.—A *dry*, very fine, crackling sound, heard only with the act of inspiration,

and, if heard in only a part of this act, always confined to the latter part. Almost pathognomonic of pneumonia. Heard especially in the first stage of that disease. Occasionally incident to œdema of the lungs and to hæmoptysis. Produced within either the air vesicles or bronchioles. If the pulmonary structure be solidified, this râle is high in pitch, and it is comparatively low if there be no solidification.

Sub-Crepitant Rale.—A *moist*, fine, bubbling sound, conveying the idea of small bubbles, heard with either inspiration or expiration, or with both acts, and not infrequently intermingled with the crepitant râle. Produced within bronchial tubes of small size. Incident to capillary bronchitis. œdema of lungs, hæmoptysis, and heard in the resolving stage of pneumonia. This, like the crepitant râle, is high or low in pitch accordingly as the pulmonary structure is, or is not, solidified.

Moist Bronchial or Mucous Rales.—Bubbling sounds due to the presence of mucus or

other liquid in bronchial tubes of larger size than those in which the sub-crepitant râle is produced. They are called *coarse* or *fine*, according to the size of the tubes in which they are produced. Incident to some cases of bronchitis, and to other affections giving rise to the presence of liquid in the tubes. These râles are high in pitch if the lung be solidified.

Sibilant and Sonorous Rales.—Dry sounds, frequently musical, produced by narrowing of the calibre of bronchial tubes. If high in pitch, they are sibilant or whistling, and generally produced within small-sized tubes. If low, they are sonorous or snoring, and produced within large-sized tubes. Incident to asthma especially; also to some cases of bronchitis.

Cavernous Râle or Gurgling.—A moist sound produced by the bubbling and agitation of liquid within a cavity. The name *gurgling* is descriptive of the character of the sound. Its situation is circumscribed.

Pleural Friction Sound.—A sound of grazing, rubbing, or grating, due to the movements, in opposite directions, of the costal and pulmonary pleural surfaces with inspiration and expiration. The sound is more or less intense, dry, seeming to be near the ear, heard usually with both acts of respiration, and it conveys to the mind the idea of friction of roughened surfaces. The sound is generally not continuous, but interrupted; that is, there is a series of friction sounds with either inspiration or expiration, or in both acts. Denotes that the pleural surfaces are either roughened or made sticky by lymph or other morbid products. Incident to pleurisy, especially after the absorption of liquid effusion.

Metallic Tinkling.—A series of tinkling sounds, with expiration, or inspiration, or both acts; also produced by speaking and coughing. Denotes air and liquid within a space of considerable size. Incident chiefly to pneumo-hydrothorax; sometimes produced within a large tuberculous excavation.

2. *Auscultation of the Voice.*

Normal Vocal Resonance.—A diffused, distant resounding of the voice in health, generally accompanied with more or less vibration of the walls of the chest, or fremitus. Varies much in degree in different healthy persons. Always louder on the right than on the left side of the chest.

Normal Bronchial Whisper.—A blowing sound heard with whispered words, at the upper part of the chest, in front and behind, and more marked in proportion as the ear approaches the site of the trachea and the primary bronchi. The sound varies considerably in intensity in different healthy persons. It is louder at the right than at the left summit of the chest; but the pitch is somewhat higher on the left side. It is comparatively feeble, and often wanting, over the middle and the lower third of the chest. Its characters correspond to those of the expiratory sound in forced breathing.

Normal Vocal Fremitus.—The sense of vibration generally perceived by the ear in auscultation, and by the hand applied to the chest, associated with vocal resonance. Like the latter it varies much in different healthy persons, and is always greater on the right than on the left side of the chest.

ABNORMAL MODIFICATIONS OF VOCAL RESONANCE, BRONCHIAL WHISPER AND VOCAL FREMITUS.

Bronchophony.—The voice concentrated, near the ear, raised in pitch, and more or less intense, intensity not being an essential character of the sign. Denotes solidification of lung, either complete or considerable. Normal bronchophony exists in some persons at the summit of the chest on the right side.

Whispering Bronchophony.—A high-pitched, tubular sound, with whispered words, near the ear, and more or less intense. The signification the same as bronchophony with the loud voice. This and the preceding sign are correlative with bronchial respiration.

Increased Vocal Resonance.—The resonance of the voice diffused and distant as in health, but its intensity abnormally more or less increased. Denotes a degree of solidification insufficient for the production of bronchophony.

Increased Bronchial Whisper.—A sound, with whispered words, abnormally intense, but not so intense, and not so acute nor so near the ear, as in whispering bronchophony. Has the same significance as exaggerated vocal resonance. This and the preceding sign are correlative with broncho-vesicular respiration.

Increased Vocal Fremitus.—The vocal vibration perceived by the ear, or by the hand, more or less increased. Denotes solidification of lung.

Pectoriloquy.—Transmission of the speech, *i.e.*, articulate words, to the ear. It may be either bronchophonic or cavernous. If the latter, it is unaccompanied by the characters of bronchophony. It is oftener obtained with the whispered than with the loud voice.

Cavernous Whisper.—A sound, with whispered words, notably low in pitch, and blowing or hollow in quality, as compared with whispering bronchophony. Denotes a cavity.

Amphoric Voice or Echo.—A musical sound like that produced by blowing into an empty bottle. It may accompany or follow the loud voice or whispered words. Incident especially to pneumo-thorax, but also occasionally to tuberculous cavities.

Ægophony.—A modification of bronchophony, consisting in tremulousness of the sound, or a bleating character, causing it to resemble the cry of a goat. Heard in cases of pleurisy in which the chest is partially filled with liquid, and in cases of pleuro-pneumonia.

Diminished and Suppressed Vocal Resonance.—The resonance either more or less abnormally lessened or wanting. Incident especially to pleuritic effusion, and to pneumothorax.

Diminished and Suppressed Vocal Fremitus.—The vibration perceived by the ear, or by the hand, either more or less abnormally lessened or wanting. Like the preceding sign, incident especially to pleuritic effusion and to pneumo-thorax.

PHYSICAL SIGNS INVOLVED IN THE DIAGNOSIS OF PULMONARY AFFECTIONS.

Bronchitis Affecting the Large Tubes.—Normal vesicular resonance on percussion. Sibilant or sonorous râles, or both, in the early stage, on both sides of the chest; feebleness of respiratory murmur. Temporary suppression of murmur over portions of chest. Subsequently mucous râles on both sides of the chest. The râles very variable, coming and going, changing their situation, and often wanting. The vocal resonance and fremitus normal.

Bronchitis Affecting the Small Tubes.—Absence of dulness on percussion except from collapsed lobules, and the resonance sometimes vesiculo-tympanitic. Subcrepitant râles on both sides of the chest. Weakened or suppressed

respiratory murmur. Normal vocal resonance and fremitus.

Asthma.—Resonance on percussion generally vesiculo-tympanitic. Sibilant and sonorous râles diffused over the chest, often loud enough to be heard at a distance. Normal vocal resonance and fremitus.

Pulmonary Emphysema.—Vesiculo-tympanitic resonance on percussion over both upper lobes, generally most marked at the left summit in front. Respiratory murmur feeble or suppressed. The inspiratory sound shortened (deferred). The expiratory sound frequently prolonged, but not tubular nor raised in pitch. Sibilant and sonorous râles frequently present. The superior and middle thirds of the chest, in front, bulging, and the lower part contracted, giving rise to a marked and characteristic deformity of chest in some cases. Vocal resonance and fremitus not affected. In marked cases sinking of soft parts above the clavicles, and contraction of lower part of the chest in the act of inspiration.

Pleurisy with Effusion and Empyema.—If the pleural sac be filled either with lymphoserous liquid or pus, universal flatness on percussion over the affected side. Generally absence of respiratory sound except over the compressed lung at the summit, and, here, bronchial respiration. Enlarged dimensions of the affected side, if the liquid be sufficient to dilate the chest, as shown by mensuration and inspection. Deficient respiratory movements or immobility. The intercostal spaces on a level with the ribs, and sometimes bulging. Dislocation of the heart, its site being shown by the impulse or sounds. Normal vocal resonance diminished or suppressed. Vocal fremitus wanting. Exceptionally, the bronchial respiration emanating from the compressed lung is more or less diffused, and it may extend over the whole of the affected side.

If the chest be partially filled, flatness or dulness on percussion from the base of the chest, extending upward to a horizontal line denoting the level of the liquid when the patient

is sitting or standing, unless the lung be adherent, on one side, below the level of the liquid. Resonance extending below this line, in front, in some cases, when the patient lies on the back, owing to a change of level of the liquid. Vesiculo-tympanitic resonance frequently over the lung above the level of the liquid. Diminution or absence of respiratory sound below the level of the liquid. Above the liquid the respiration broncho-vesicular, and sometimes bronchial near the liquid. Vocal resonance and fremitus diminished or wanting below the level of the liquid, and both may be exaggerated above the liquid. Bronchophony or ægophony sometimes near the level of the liquid. Diminution of intercostal depressions may be apparent when the chest is partially filled. Increased vesicular murmur on the healthy side when the chest is partially, and still more when it is completely, filled. Pleural friction râle sometimes prior to and with liquid effusion; frequently during and after absorption of liquid. A characteristic contraction of the

chest on the affected side follows chronic pleurisy with large effusion.

Pneumo-Hydrothorax. — Tympanitic resonance extending either over the whole of the affected side, or a certain distance from the summit downward, when the patient is sitting or standing, with dulness or flatness extending below to the base of the chest. The boundary line between the dulness or flatness and the tympanitic resonance changing when the patient lies on the back, owing to change of level of the liquid. The tympanitic resonance sometimes amphoric. Amphoric respiration and voice frequently present, also metallic tinkling. Splashing sound on succussion, and this sound frequently amphoric. Suppression of respiratory murmur and of vocal resonance and fremitus. Dilatation of the affected side in certain cases, with deficient motion, and abolition of intercostal depressions. The heart removed from its normal situation, as in cases of pleurisy with large effusion.

Hydrothorax or Dropsical Pleural Effusion. The signs denoting presence of liquid in both pleural sacs; the amount of liquid often greater in one side. The evidence of liquid afforded by its change of level with changes of position of the patient is almost always available.

Pneumonia.—In the first stage, slight or moderate dulness over the affected lobe, and frequently, but not invariably, the crepitant râle, which, if present, is almost pathognomonic. In the second stage, marked dulness, and sometimes flatness, over a space corresponding to that occupied by the affected lobe or lobes. If the affection do not extend over an entire lung, the boundary line of dulness or flatness corresponds to the situation of the interlobar fissure. Vesiculo-tympanitic resonance over the upper lobe if the lower lobe be alone affected, and over the lower lobe if the upper lobe be alone affected. The boundary line between resonance and dulness or flatness not changing with changes of the position

of the patient. Bronchial respiration generally present in this stage, and usually bronchophony with the loud voice, together with whispering bronchophony. Persistence of crepitant râle in some cases. In the stage of purulent infiltration, dulness or flatness continuing, with mucous râles. During resolution, progressive diminution of dulness, the bronchial respiration giving place to the broncho-vesicular, the latter approximating to, and at length eventuating in, the normal vesicular murmur. During this period, sometimes a return of the crepitant râle, and frequently a sub-crepitant râle. Bronchophony, during resolution, giving place to exaggerated resonance, and the latter diminishing and ending in the normal vocal resonance.

Collapse of Pulmonary Lobules in Connection with Bronchitis, especially in Children. —Dulness on percussion, greater or less and more or less diffused, oftenest on the posterior surface of chest on both sides, with either dim-

inution of respiratory murmur or feeble bronchial respiration. Mucous or sub-crepitant râles on both sides.

Pulmonary Œdema.—Dulness or flatness on percussion more or less diffused over the posterior surface of the chest, on both sides. Subcrepitant, sometimes intermingled with crepitant, râle. Absence of respiratory murmur, or feeble broncho-vesicular respiration. No change as regards the situation of dulness or the space over which it extends, with changes in the position of the patient.

Pulmonary Gangrene.—Dulness or flatness on percussion over a space more or less circumscribed, oftenest over the scapula. Absence of respiration within this area, or bronchial respiration, together with, in some cases, either bronchophony or increased vocal resonance. Mucous or subcrepitant râles within the area of dulness or flatness and its neighborhood. Cavernous signs may be present after the sloughing away of a circumscribed portion of lung. The signs

of pneumo-hydrothorax become developed if perforation of the lung take place.

Pulmonary Apoplexy.—Dulness or flatness on percussion within a circumscribed space or in circumscribed spaces. Absence of respiratory murmur within the limits of the extravasations, or bronchial respiration. Mucous or subcrepitant râles.

Carcinoma of Lung.—The signs of solidification, greater or less in degree, and more or less diffused. Sometimes contraction of one side and lessened respiratory movement.

Phthisis.—If there be considerable tuberculous solidification, dulness on percussion at the summit of the chest on one side, with bronchial or broncho-vesicular respiration, bronchophony or exaggerated vocal resonance, whispering bronchophony or exaggerated bronchial whisper, and increased vocal fremitus. Frequently, depression below the clavicle, and diminished respiratory movements in that situation. The signs of so-

lidification may show a less amount of disease at the other summit. Exceptionally, the signs may denote tuberculous solidification at the base. A cavity, or cavities, may be shown by cavernous respiration, amphoric respiration and voice, cracked metal or amphoric resonance on percussion, and gurgling.

If the tuberculous solidification be small or moderate, slight dulness on percussion at the summit on one side, or sometimes a vesiculo-tympanitic resonance due to emphysematous lobules, with diminished respiratory murmur, or broncho-vesicular respiration, increase of vocal resonance, and increased bronchial whisper.

Accessory signs important in determining the existence of phthisis, when the amount of disease is small or moderate, are, mucous or subcrepitant râles limited to the summit on one side; a friction-murmur, crumpling or cracking sounds, interrupted or jerking respiration, limited in like manner; also, abnormal transmission of the heart-sounds, and a subclavian bellows murmur.

Diaphragmatic Hernia. — Tympanitic resonance on percussion not otherwise explicable, with suppression of respiratory murmur, and the presence of the characteristic intestinal sounds.

SUMMARY

OF

PHYSICAL SIGNS INVOLVED IN THE DIAGNOSIS OF AFFECTIONS OF THE HEART.

Aortic Obstructive Lesions.—An organic endocardial murmur accompanying and following the first sound of the heart (systolic); loudest at, or limited to, the base of the organ; generally propagated into the carotid arteries; its maximum of intensity in the second intercostal space on the right side near the sternum, provided the normal relation of the aorta to the chest walls be preserved and the lungs are not diseased; the aortic valvular sound of the heart, as heard in

the situation just designated, weakened or lost, if the aortic valves be damaged.*

Aortic Regurgitant Lesions.—An endocardial murmur accompanying and following the second sound of the heart (diastolic); loudest just below the base of the heart on the left side of, or over, the sternum, propagated thence downward toward the ensiform cartilage. The aortic valvular sound weakened in proportion as the aortic valves are damaged. This murmur is frequently conjoined with the aortic direct murmur.

Mitral Regurgitant Lesions.—An endocardial murmur accompanying and following the first sound of the heart (systolic); loudest at, or limited to, the apex of the organ; extending

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* An aortic direct murmur may be inorganic or anæmic. This is to be inferred when the murmur is variable in its intensity, or intermittent, unaccompanied by weakening of the aortic second sound, the heart not enlarged, and when murmurs heard in the large arteries and in the veins of the neck.

more or less to the left of the apex laterally around the chest, and often heard at the lower angle of the scapula; not propagated into the carotids. The aortic valvular sound of the heart weakened in proportion to the amount of regurgitation, and the pulmonic valvular sound (heard in the left second intercostal space near the sternum) intensified in proportion to the amount of hypertrophy of the right ventricle induced by the mitral lesions. A mitral murmur, beginning with the first sound of the heart, and limited to a circumscribed space at the apex, does not always denote mitral regurgitation. Such a murmur may be distinguished as a mitral systolic murmur, or an intra-ventricular murmur.

Mitral Obstructive Lesions.—An endocardial murmur not connected with the second sound of the heart, but preceding the first sound (præ-systolic), and abruptly arrested at the occurrence of the first sound; the murmur limited

to a circumscribed space around the apex of the organ; the character generally peculiar, resembling the sound caused by throwing the lips or tongue into vibration with the breath of expiration. The pulmonic valvular sound of the heart intensified, if the mitral lesions have led to hypertrophy of the right ventricle. The aortic valvular sound weakened in proportion to the amount of the mitral obstruction. This murmur is frequently associated with the mitral regurgitant. It does not denote mitral lesions, in all cases, when it is associated with aortic regurgitant lesions.

Tricuspid Regurgitation.—An endocardial murmur with the first sound of the heart (systolic), heard within a circumscribed area at the lower part of the sternum. Frequently, if not generally, associated with pulsation or undulation in the jugular veins.

Lesions at the Pulmonic Orifice.—An endocardial organic murmur with the first sound of the

heart (systolic), at the base of the organ, in the left second intercostal space; not propagated into the carotids.*

Endocarditis in Cases of Articular Rheumatism.—An endocardial murmur, loudest at the apex of the heart, *i.e.*, a mitral systolic murmur, and developed (*i.e.*, not having existed previously) in connection with articular rheumatism.

Pericarditis.—A pericardial friction murmur (exocardial), which is distinguished from an endocardial murmur by the following points: Giving the idea of rubbing or friction; apparently superficial; usually two sounds for each beat of the heart; varying in intensity and character during auscultation; its relation to the heart sounds not definite, or the rhythm irregular; not

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* A pulmonic direct murmur is frequently inorganic or anæmic. This is to be inferred when the circumstances are present which have been mentioned in connection with an inorganic aortic direct murmur.

propagated much, if at all, beyond the limits of the heart, and frequently limited to the superficial cardiac space; intensified notably by firm pressure with the stethoscope; disappearing, in some cases, during the stage of pericardial effusion, and finally ceasing after pericardial adhesions have taken place. Generally associated with endocardial murmur or murmurs.

The existence and amount of pericardial effusion are shown by increased dulness or by flatness in the pericardial region within a triangular or pyriform space corresponding to the size and figure of the distended pericardial sac; the base or lower boundary of this space at or below the sixth rib, and the summit extending toward or quite to the sternal notch; the præcordia sometimes projecting, with the intercostal depressions pushed out; the impulse of the heart lost, or, if appreciable, raised to the fourth or third intercostal space; the heart-sounds weakened and distant; the first sound short and valvular like the second sound.

In chronic pericarditis, with large effusion, the dilatation of the pericardial sac is shown by dulness or flatness extending laterally, more or less, from the præcordia, on both sides of the chest, together with the other signs just mentioned.

Hypertrophy of Heart or Enlargement with Predominant Hypertrophy.—The apex-beat lowered from the fifth intercostal space to the sixth, seventh, or eighth, according to the amount of enlargement, and often removed to the left of its normal situation one, two, or three inches. The apex-beat in some cases notably strong, but in other cases weak in consequence of the change in form of the heart. Impulses in the intercostal spaces above the apex-beat, and these notably strong. Heaving movement of the whole of the præcordia, with more or less power. Enlargement of the superficial cardiac space, as shown by percussion, and the degree of dulness within this space notably greater than in health. The left margin of the heart extend-

ing without the left nipple, as determinable by deep percussion. The intensity, length, and booming quality of the first sound of the heart, over the apex or body of the organ, increased.

If hypertrophic enlargement exist without valvular lesions, absence of organic murmur.

Enlargement of the Heart with Predominant Dilatation.—The enlargement and its degree determined by the same signs as when enlargement is due to predominant hypertrophy. The predominance of dilatation shown by feebleness of the apex-beat and of other impulses, by absence of heaving of the præcordia, by diminished intensity of the first sound, and by its being short and valvular like the second sound. Absence of organic murmur if valvular lesions do not coexist.

Fatty Degeneration of the Heart.—Persisting feebleness of the apex-beat not otherwise explicable; weakness of the first sound over the apex, with shortening, and valvular quality like

the second sound, these signs not being referable to dilatation.

Functional Disorder of Heart.—Absence of organic murmur and of enlargement, and the heart-sounds normal in all respects save intensity and rhythm.*

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* For a fuller exposition of the physical signs, etc., of affections of the heart, *vide* a practical treatise on the diagnosis, pathology, and treatment of these affections, by the writer. 2d edition, 1870.