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TREATMENT OF CROUPOUS PNEUMONIA IN CHILDREN.*

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The present conception of pneumonia is that it is the localized lesion of a specific infection by the micrococcus lanceolatus.

The lesion and the symptoms are commonly commensurate. There may be an extensive lesion with minor symptoms, or, a lesion so circumscribed as to afford no physical sign may be expressed by severe symptoms, *i.e.*, profound infection.

Ineradicable, manifold variations have root in the type of the epidemic; in individual resistance of infection; susceptibility to infection, and the physical state of the patient.

Is the treatment of pneumonia symptomatic, or is there a scientific treatment, which has as its basis physiology; the *progress* of morbid changes in the lung, the character of the epidemic, the individuality of the patient?

ANATOMICAL ESSENTIALS.

Pneumonia is croup of the alveolar walls.

These walls are densely pervaded by very fine, very superficial capillaries. The pulmonary arteries in their course along the bronchi to their finest ramifications do not anastomose; in the air-sacs they anastomose freely. After anastomosis they distribute branches to

* Read before the Society of Alumni of Bellevue Hospital, Nov. 7, 1906.

the interalveolar septa. Septal vessels project in loops into the alveoli, and sometimes cross the middle of an alveolus. Direct course of vessels to air-sacs without anastomosis, richness of anastomoses in alveoli, and their total divestment of lateral support, are conditions for consummate bedside reflection when combating *progress* of morbid alterations.

Receiving vessels for this network are much less capacious than vessels of supply, and are destitute of valves,—of much moment when circulation is quickened and pressure accentuated.

Lymphatics lie in contact with pulmonary arteries and veins and sometimes completely invest them—*over-distended vessels arrest lymphatic absorption*. Subpleural lymphatics arise in connection with interalveolar lymphatics—*pleural accumulation results from suspended absorption*.

Interlobular tissue is more abundant in infants than adults.

Abundance of interlobular, perilobular, and subpleural tissue, is an element in predisposition to spreading of pulmonary inflammation in infants and of pleural involvement and empyema.

MORBID ANATOMY ESSENTIALS.*

The first change is acute distention of pulmonary capillaries. Capillaries in walls of air-sacs and interalveolar septa become suddenly dilated, elongated, tortuous, bellying into interior of alveoli. Divested of lateral support, they tear under blood-pressure. Engorgement and laceration lasts twenty-four to thirty-six hours—auspicious period for efficacious therapeutics. Other changes are secondary, consequent, minor.

Red hepatization is result of stagnation and hemorrhage from turgid, tortuous, lacerated capillaries.

*“So far as morbid anatomy contemplates *disease in progress*, and scrutinizes and explains its organic processes, its value is very great.”

Virchow insists on distinctly hemorrhagic character of red hepatization.

Complete solidification occurs with pouring out of fibrinous lymph into alveoli, including bronchi to one-fifth of an inch. Croupous exudate fills alveoli and bronchi as a clot. The stage of hepatization is four to five days.

TYPICAL FEATURES.

Sudden accession, usually with vomiting, quite as uniformly as scarlet fever; often in young children a convulsion, the frequency of which varies with the type of the epidemic; at one period many of the cases will have one or more convulsions; at another only those with individual predisposition.

Somnolence is marked from the first. At the first visit temperature will be 103.5° to 104° , pulse 120 to 130, respirations 50 to 60.

Vomiting, high temperature, somnolence, one respiration to two pulse beats instead of one to three or four, are first-day characterizations.

The second day cough usually appears. Absence of cough is rare. Often in the consulting room I have been told there is no cough, when the child has coughed repeatedly during my examination. The slight hack fails to attract attention. On second day temperature continues high, but a very constant and characteristic remission occurs. The temperature falls from 104 or 105° to 101 or 102° , but remains so for only a few hours. From second day fever is of remittent type.

RESPIRATORY PAUSE REVERSED.

In health there is a pause in respiratory act at end of expiration. In pneumonia pause is at end of inspiration. In health, inspiration is followed immediately by expiration, at end of expiration there is a pause. In pneumonia, expiration is followed immediately by inspiration, at end of inspiration there is a pause.

Inverted respiratory pause is unequivocally, absolutely diagnostic of pneumonia.

At end of expiration there is usually a slight moan.

Abrupt onset, high temperature, pungent heat of skin; somnolence; alteration of pulse—respiration ratio; misplacement of respiratory pause; short, quick, audible expiration; remittent type of fever, make a clinical picture to be unmistakably labeled, pneumonia.

With every physical sign absent, these symptoms betray central pneumonia—sudden abridgment of alveolar area.

Pause at end of inspiration and audible expiration, even in the absence of any physical sign, make a diagnosis of pneumonia.

These symptoms abide four to six days when inflammation usually ceases, terminating either by lysis or crisis. In a child far oftener than in adults by lysis; this is fortunate, as crisis in a child is exceedingly grave.

PHYSICAL SIGNS.

Puerile breathing abates with inception. Exaggerated vesicular breathing, a health-characteristic in a child, is curtailed with first anatomical alteration. Abbreviation of puerile quality is due to distention of vessels, narrowing of alveoli, diminution of respiratory space. Functionally the involved area is practically non-existent. Impairment of vesicular murmur is diagnostic. To appreciate it compare corresponding points on opposite sides during *one inspiration on each side*.

Prolonged auscultation for delicate signs is confusing.

Only by comparing corresponding points quickly are slight differences detected and impressed.

In a young child vesicular murmur is so intense (loud) that medical students constantly mistake it for bronchial.

Subdued, abbreviated, curtailed vesicular murmur is diagnostic of distended vessels encroaching on alveolar spaces.

When croupous exudate plugs and distends alveoli, a second physical sign appears—slight prolongation of expiratory sound.

In a young child there is practically no expiratory sound in health. It is so short, so slight, that much care is required to detect it. When a fibrinous exudate is poured into the alveoli a slight indistinct blow is heard at *beginning of expiration*. This elusive sign will be overlooked unless the auscultator listen with utmost concentration during a single *expiration* on each side and at identical points.

With complete solidification and no intervening uninvolved lung, high-pitched tubular breathing is heard during whole of expiratory act.

RÂLES.

Fine crepitations, typical in adult, are seldom heard in a child. Imperfect development of intercostal muscles; circular thorax; horizontal direction of ribs; abdominal respiration with slight lateral expansion, smallness of alveoli (less than half the adult size) are anatomico-physiological conditions inimical to production of crepitations. With resolution râles are abundant.

Short, dull percussion note is diagnostic, but is only present when inflammation comes to surface and no uninvolved lung intervenes.

Bronchial voice, like dull percussion, is a late sign—late signs have no value for patient.

Examination during sleep is an element in early diagnosis—to note frequency of respirations, short, quick, audible expiration, reversed respiratory pause, altered pulse-respiration ratio. With care and gentleness auscultation with phonendoscope may be accomplished without disturbing sleep.

Examination is not complete without immediate auscultation, the ear being applied to the bared chest.

With the child upright on nurse's knee, by placing

the hand at the scrobiculus cordis and pressing upward and backward arresting descent of diaphragm and compelling lateral expansion, physical signs of central pneumonia may be elicited which would otherwise remain undiscovered. Listen high in axilla with phonendoscope and stethoscope for central pneumonia. With ear to skin and hand at scrobiculus cordis compel crying to bring out signs in obscure cases—final recourse.

LATENT PNEUMONIA.

Pneumonia in infants often remains circumscribed at root of lung and affords no physical sign. Prolonged sitting in judgment on symptoms is designatory in cases otherwise undecipherable.

Owing to remittent type of fever these cases are frequently denominated malaria.

In two cases fantastic diagnosis of suppurative pyelitis was made. Recovery was prompt and complete in both. Natural history of disease negatived this absurdly absurd diagnosis.

Naked science has no value. Science which connotes with natural history of disease; science illuminated and enlightened by experience; science tethered by common sense has great and indispensable value for practitioner and patient. It is mischievous when it severs the moorings of sense.

Analysis of symptoms and natural history of disease are the most trustworthy and the least fallible factors of diagnosis.

TREATMENT.

Nervous shock and state of pulmonary vessels are paramount. At onslaught nervous shock is often as profound and pervading as after surgical operation. If there is the least restlessness; if there is not almost continuous uninterrupted sleep, opium should be administered the first visit.

For a child of two years:

℞ Pulv. opii..... gr. i.
Pulv. ipecacuan..... gr. i.
Potass. sulph..... gr. viij.

M. In. Chart. No. 30 div.

Sig.—One q. 2 hrs. until three are given, when the patient should be seen again and order continuance or discontinuance, according to indication.

This felicitous combination by Dr. Dover is a febrifuge inducing free perspiration.

Forged preparation foisted by drug trade has reverse effect—it is noxious.

During stage of distention and laceration of vessels, pulse is high-tension, full, bounding. Tension should be lowered; *pressure in turgid vessels lessened*.

The measures adopted compass an ulterior design—mitigate and abbreviate exudative consequents.

Brownish tenacious exudate of early stage, and fibrinous exudate of second stage, are moderated by control and regulation of arterial pressure—cardiac inhibition is a therapeutic mandate.

Aconite stimulates cardiac inhibition, slows pulse, lessens distention, diminishes alveolar encroachment, relieves respiratory embarrassment, abets oxygenation.

During first twenty-four to thirty-six hours, aconite must be given in such doses as will make pulse slower, softer, and low tension.

For a child of two years:

℞ Tr. aconite..... gtt. iij.
(Fleming's tincture—Squibb)
Aq. destillat..... $\frac{3}{4}$ iij.

M. Sig.—One drachm every fifteen minutes for two hours; then every half-hour for four hours, and then every hour.

Dilatation of cutaneous capillaries relieves pulmonary pressure—equalizes circulation. Envelop body in light flannel, induce cutaneous transpiration—potent, safe febrifuge.

The surface fully and adequately protected; crib lined with flannel and placed where it will be secure from

air-currents; room is kept at 65° F. Ventilation by means of open windows, must supply abundant oxygen.

Relieve nervous shock, subdue arterial tension, promote diaphoresis and diuresis; sufficient catharsis for adequate emunctioning by intestines and liver, proper temperature and ventilation, are the safeguards which science vouchsafes a pneumonia patient during aggressive inflammation.

When fibrinous casts distend alveoli and small bronchi, exerting mechanical lateral pressure on vessels, aconite is pathologically interdicted.

During the four or five days of stationary lesion, drugs are in abeyance, hygiene in force: oxygenation, unperturbed, restful sleep, bland predigested food, adapted to age and digestive ability of patient, proper emunctioning. Oxygen inhalation is indisputably and unobjectionably serviceable throughout entire stationary period. When consolidation begins, oxygen is an uniform invariable indication.

Never defer its use until crisis. Indispensable during crisis, gravity of this is allayed by free oxygen inhalation during all the stage of compressed vessels by fibrinous plugs.

RESOLUTION.

Crisis—lysis.

By Crisis.—Rapid breathing becomes still more accelerated with no respiratory pause, sometimes with a rattle or gurgle; pulse increasingly rapid, small and irregular; lips and finger ends blue, nose, ears, and extremities cold. Carbonemia causes deepening insensibility or grave restlessness. Temperature drops alarmingly. Such critical phenomena were witnessed in a mountain hotel at 1 A.M., twelve miles from a chemist's shop. Having apprehended this, it was provided for and child (eight months) recovered. In such a crisis one-half drachm whiskey in two of hot water, sweetened to make palatable and less nauseating

by mouth, digitalis, strychnine, and caffeine hypodermatically; elevate foot of crib two feet and give two drachms whiskey in one-half ounce tepid water by rectum, oxygen inhalation under strong pressure continuously. Given at right moment and in full doses these remedies prove effectual.

When resolution is by lysis, stimulating treatment is seldom needed.

TEMPERATURE IN PNEUMONIA.

This symptom is apportioned immoderate, disproportionate regard.

Temperature of 104 or 105° in pneumonia is normal to the disease. Counteraction of lesion moderates it. Eighty per cent. of heat is lost by evaporation from cutaneous surface. Dilatation of cutaneous vessels propitiates evaporation. In pneumonia dilatation of cutaneous vessels is potent, safe febrifuge.

COLD BATH AND COLD SPONGE IN PNEUMONIA.

Cold constricts cutaneous vessels. *Constriction of cutaneous vessels enhances distention of pulmonary vessels*—exudative consequents intensified.

Cold bath abstracts heat, but cutaneous vessels contract restraining evaporation, therefore effect is transient. With reaccession temperature is higher than before. Ample reason is in evidence.

Muscular action increases heat. Witness a child during a cold bath: The voluntary violent struggling, screaming, and crying, the involuntary shivering. Involuntary muscular contraction in shivering may increase combustion by 100 per cent. Liebermeister and Jürgensen found that in a cold bath heat production was three or four times greater than normal.

Abstraction of heat; increased production of heat; repression of elimination!!

After bath child is pinched, cyanosed, chattering teeth, a terrified piteous spectacle. Counteraction is

urgent. Hot applications, friction, and divers tormenting measures succeed the bath. Cycles of science make existence one continual nightmare.

Disquietude suspends heat dissipation—reflex irritation of vaso-motor nerves contracts cutaneous vessels. Management which frays, discomposes or even perplexes intensifies fever. Harassing, pestering treatment is in contravention of physiology—unscientific, harmful.

Frequent temperature taking will maintain high temperature that would not otherwise be excessive; rectal temperature should be taken during sleep and not oftener than twice in twenty-four hours. Temperature taken amidst struggling and crying deceives.

Hourly thermometric record as therapeutic guide is source of meddlesome treatment—no thermometry is saner.

INACTIVITY CAUSES TEMPERATURE TO FALL.

Repose leads to a fall of temperature, and a patient who sleeps continuously nearly always recovers.

One constantly sees a child with temperature of 105° or 106°, and after prolonged quiet sleep it has fallen to 101° F. In sleep frequency of respiration and heart is greatly diminished and rhythm more regular. Through quiet sleep excitability of nervous system is banished. A great power is thus added to those conditions which dispose to recovery. Complete exhaustion incident to bath sometimes impels sleep. Sleep and its salutary effects are ascribed to good results, whereas they should be imputed to evil consequences of treatment unwarrantably drastic and perilous.

In a self-limited disease of short duration, impetuous forcible reduction of temperature normal to the condition has no justification.

Every agent, every influence, every movement in sick-room should be tranquilizing, reassuring. Scientific therapeutics to be effective must be supplemented by soothing, composing, trust-inspiring management.

ANOMALOUS OR EXCESSIVE TEMPERATURE IN PNEUMONIA.

Despite of aconite, niter, spirits Mindererus and attention to skin, temperature may become untoward.*

SUPPLEMENTAL.

A spinal ice bag wrapped in a towel fastened with pins, is placed around neck to envelope large vessels supplying brain and secured by band and safety pins. Chopped ice (ice-cream ice) is used and renewed as fast as melted (duplicate ice bags being in use.) Careful wrapping ensuring no moisture is essential precaution.

If an ice bag pinned about the throat frets and annoys, a bladder ice bag prepared in same manner may, with cautiousness and tact, be placed under nape of neck without the child knowing of its presence. Pretext of changing pillow, ice bag is renewed. †

Dry cold at vessels which discharge their contents into the brain calms and induces sleep—sedative, soporific.

Sponging extremities, never trunk, with equal parts of alcohol and water, temperature of 100° F., may have somnolent influence. If it arouses resistance and antagonism suspend it after fair trial.

When these measures lack in efficiency superadd injection into lower bowel of four ounces of water, temperature 60° F.

Nurses assure me they have given nutrient enemas with small long soft catheter during sleep without wakening child.

Repeat injections every three, four, or six hours.

* It is presupposed that there is a clean tongue and freedom from abdominal distention.

† Preparation of ice bag is never allowed in room. No "preparation"—not even pouring of medicine—is made in presence of child by a thoughtful, tactful nurse. It is as inexcusable to keep medicine as food in sick-chamber, or anything which appertains to medication, or jars the senses. A sick child should be made to feel it is being petted and soothed because of its discomfort.

Large, high irrigations are wont to cause abdominal distention adding dangerously to difficulty of respiration.

SPECIAL SYMPTOMS.

At culmination of inflammation temperature is at its climax. When inflammation ends temperature falls.

After twelve or twenty-four hours there is reaccession—absorption of toxins incident to resolution. With elimination of toxins temperature gradually subsides to normal.

At acme and during resolution, the condition, not the symptom, is treated.

Reaccession later is due to extension or pleural sequelæ. Onset, symptoms, physical signs distinguish each.

Both are minimized under that science enjoined by physiology.

With rheumatic history exudate is habitually serous; with pneumococcus and streptococcus infection purulent. Sterilized exploratory syringe supersedes ambiguous, equivocal signs in deciding nature of exudate.

RESTLESSNESS IN PNEUMONIA.

Early restlessness should be controlled by Dover's powder. Restlessness late in disease is effectually and safely allayed by chloral—entirely unobjectionable in children.

To a child of two years two grains in one drachm of water by rectum with small bulb syringe. When necessary, repeat every two hours until three doses are given.

To child of five or six years five grains in one drachm of water repeated in same manner. Experience will commend and confirm this use of chloral.

“CEREBRAL PNEUMONIA.”

Pneumonia with virulent infection, with violent onset, with severe inflammation has marked cerebral phenomena. Unfortunately this has been denominated

cerebral pneumonia. Every child with susceptible nervous system has cerebral symptoms, but the appellation cerebral pneumonia is preposterous misnomer—the term should be expunged.

OPISTHOTONOS.

Involvement of pleura at upper and posterior portion of lung in pneumonia will cause contraction of neck muscles and opisthotonos, branches of same nerve trunks supplying muscles and pleura.

Abdominal distention necessitates use of auxiliary respiratory muscles. With great distention there may be marked opisthotonos.

Involvement of pleura covering diaphragm causes pronounced opisthotonos, auxiliary respiratory muscles being called into play to prevent diaphragmatic respiration. Opisthotonos due to posterior apical pleurisy must be treated by moist heat—hot fomentations or poultices. Dry heat is powerless; moist heat specific. Hot flax-seed meal poultice, bound on with flannel and oiled silk; a fresh one gently slipped in place every half-hour proves magical.

For abdominal distention rhubarb and soda; peptonized milk or strained cereals without milk, and hot turpentine stupes every half-hour.

Diaphragmatic pleurisy is the most dangerous event in pneumonia. Pneumonia with inflammation of diaphragmatic pleura is almost invariably fatal.

OPEN-AIR TREATMENT OF PNEUMONIA.

With advent of rigorous weather pneumonia unfailingly returns.

Cold on cutaneous vessels intensifies lesion. Intensification of lesion increases cardiac embarrassment.

Every form of cardiac inability is endangered by cold. A patient with cardiac disability who suffers no embarrassment on a mild day finds life endangered when

exposed to cold. Sudden death under such conditions is common.

Intake of oxygen is identical at 65° and 32° F. Oxygen percentage is same at zero and 65° F. In room of 65° with open windows a patient is assured as much oxygen as at lower temperature. Open-air treatment adds nothing of value to treatment that may not be secured without incurring its risks and discomfort.

The natural history of a disease; its course and probable termination under uncomplex physiological treatment, must be carefully weighed before having recourse to an extreme treatment.

PROGNOSIS AND MORTALITY IN PNEUMONIA.

“Primary croupous pneumonia of young children is a disease of little gravity compared with the same disease in adults.” Starr’s American Textbook, Disease of Children. Second edition page 918.

“Primary croupous pneumonia in healthy children is rarely fatal.” Keating. Cyclopedia Disease of Children. Volume 2, page 595.

“Croupous pneumonia in children is a disease in which the prognosis is exceptionally favorable.” Henoch. Volume 1, page 411.

“Primary pneumonia in infants and children almost always terminates favorably.” Eustace Smith. Clinical Studies of Disease in Children, page 58.

“The mortality of primary pneumonia in children is small.” Donkin, page 378.

“The course of true lobar pneumonia is in most cases benign.” Fruhwald and Westcott, page 364.

“The prognosis of lobar pneumonia is very favorable.” Rotch, Fourth Edition, page 685.

“I believe that the mortality of croupous pneumonia is almost nil.” Dr. Walter Lester Carr (personal communication).

Holt collected statistics from wide sources and states: “Of 1295 collected cases, chiefly from hospital practice,

there were but 39 deaths, a mortality of three per cent." Holt. Second Edition, page 573.

In contemplation of rigorous weather as an unquestionable etiological factor; in contemplation of morbid anatomy; in contemplation of physiology; in contemplation of the natural history of pneumonia, what basis is there for this harsh, unkind, cruel treatment?

FEEDING IN PNEUMONIA—IN FIRST YEAR.

At onslaught digestion is in abeyance. Thirst is extreme. To satisfy this is paramount. Water given unstintedly forestalls catastrophe of overfeeding. Unappeased thirst impels excessive ingestion of milk—fermentation, abdominal distention.

A child may for days take only cold water from its bottle, refusing milk. Unexpectedly the proffered bottle of water is rejected and milk taken eagerly. Milk mixture should be reduced in strength, diminished in quantity; formula one-fourth lime water for effect on physical behavior of proteid. An interval between water and milk is necessary, as water and food in quick succession provoke vomiting. Give milk hot or cold according to child's preference.

After first year strained cereal gruel with milk and lime water should constitute chief diet.

After modified milk period, peptonized milk should be used, peptonizing powder added just before ingestion.

In children above two years hot beef juice may be a valuable adjuvant, but must not supersede milk and gruel.

ANIMAL BROTHS.

Savory broths pervert appetite. A sick child allowed broth refuses other food. Less tasty milk and cereals are utterly disdained. Sustaining power is from these foods.

Animal broth is destitute of constructive material—a child wastes amazingly; enfeeblement is alarming.

Contained extractives in broth over-stimulate, super-

induce restlessness, aggravate temperature—every nervous phenomenon is enhanced.

EPITOME.

Recumbent position from inception to completion of convalescence.

Having made diagnosis forego further physical examination—disturbing harmful. Pulse and respiration are the important criteria for treatment.

Room 65° F., sun exposure, open fire, crib protected from air currents, open windows to assure abundant oxygen.

Ensure uniform temperature of skin—cutaneous transpiration.

Relieve tension in pulmonary vessels by aconite.

For pleuritic pain hot flaxseed poultice.

Second stage, oxygen inhalation, niter, spirits Mindererus.

Note condition of tongue and abdomen at each visit—abdominal distention endangers respiration and heart and promotes extension.

Restlessness—a danger signal—must be controlled.

Crisis: Active stimulation, heat to extremities and over heart, continuous oxygen inhalation, elevate foot of crib.

Lysis: Stimulation unnecessary.

Pathology and physiology supply a basis for scientific treatment which practically eliminates extension and exudation into pleura.

Laennec and Rokitansky found vessels bordering on hepatized lung in same state as vessels in first stage of pneumonia. Physiological treatment abates, unphysiological enhances this.

Contemplate perniciousness of cold sponging, cold pack, and zero temperature!

“Wandering pneumonia,” “Creeping pneumonia,” pleural exudates and empyema, are far commoner under treatment which is in contravention of physiology.

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