

that have been removed must be cut away, to prevent the reformation of the bone. In doing this all the intercostal arteries of the part are necessarily divided, but often they do not bleed at all, and they seldom give any trouble to speak of. It has often struck me (and I think the suggestion was made by the late Mr. Marshall) that it would be a good plan to supplement this procedure by dividing the ribs from which portions have been removed, both near the spine and near the sternum, so as to allow of their more complete collapse; but I have never yet put this plan into practice.

PLEURISY IN CHILDHOOD.

CLINICAL LECTURE DELIVERED AT THE EVELINA HOSPITAL.

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GENTLEMEN,—Recently we have seen several cases of pleurisy among the out-patients, and to-day I shall tell you about its peculiarities, causation, diagnosis, course, and treatment. In the first place, a very free formation of fibrin is usual, and, secondly, purulent effusions are frequent. Of 190 cases there were 114 males and 76 females. The fibrinous variety totalled 85,—48 right-sided, 36 left-sided, and 1 double. There were 105 empyemas,—50 right, 53 left, and 2 double. Of the former 7 died, and of the latter 31, and one was suffering from lardaceous disease. Two or three were doubtful. Of these cases 114 were five years of age or under, 75 of them being empyemas. Many commenced with a sudden sharp febrile attack; some few gave a history of a preceding exposure to wet and cold (10 in 101). Occasionally injury in the shape of a fall or other traumatism appears in the history as the starting-point. Many were caused by pneumonia, broncho-pneumonia, bronchitis, and pertussis followed by pneumonia, etc., also scarlatina and measles, rheumatism, tuberculosis of the lungs and pleuræ, typhoid fever, diphtheria, mumps, and varicella. In many cases a rheumatic or a tubercular family history can be obtained. Children with Bright's disease are very liable to pleurisy. In acute nephritis the effusion may be double, without lymph, and therefore more of the nature of dropsy. Some cases are associated with a general tubercular implication of the serous cavities, or septicæmia with a rapidly fatal issue: in the latter colonies of micro-organisms will be found in the affected parts and organs. Pulmonary apoplexies may be complicated by pleuritis. In pyæmia the local condition may mask the general. Pleuritis may exist with or without infarcts, and infarcts without pleurisy. It may occur as an extension from pericarditis, or the converse, or it may even extend to the great vessels.

In a female of two years, with double empyema, a swollen left

hand and forearm, and œdematous chest-wall, there was a thrombus of the left innominate vein extending to the subclavian and internal jugular veins. She had general tuberculosis. As occasional causations may be enumerated mediastinal new growths in the lungs and chest-walls, extension from neighboring parts, such as axillary abscess, general peritonitis, either tubercular or due to other causes, abscesses of the liver, either between the liver and the diaphragm or between the spleen and the diaphragm, suppurating hydatids in these situations, perityphlitic and perinephritic abscess, cellulitis of the neck, for example, secondary to tracheotomy, suppurating cervical glands due to spinal disease or rib caries, and foreign bodies in the air-passages. Twice I have seen a fibrinous effusion associated with cutaneous syphilitic gummata. One boy of five with a fibrinous effusion developed a white leg. In a boy of three with empyema there was free air in the sac. The right lung was collapsed, the pleural cavity divided in two by dense adhesions with openings. A small abscess-cavity in the lower lobe, filled with caseous material, communicated with a bronchus but not with the pleura. In a boy of fourteen months with empyema the left lung was collapsed. In the lower lobe was an orifice connected with a superficial cavity and indirectly with the bronchi, also a small abscess. On the under surface were three small apertures communicating with a net-work of ragged cavities partially separated by bridges of shreddy tissue, and here and there portions of solid lung-tissue becoming gangrenous.

For some unexplained reason, after exposure to wet and cold, or often following one of the causes previously enumerated, the child is seized with the usual febrile symptoms, accompanied by a temperature of 101°, 102°, 103°, or 104° F., or more. There may be headache, vomiting, lassitude, shivering, drowsiness, or even convulsions. The high temperature is of variable duration,—a day or two, perhaps a week, or even a month. Rarely there is delirium, or rarer still a typhoid state. Pain may be absent or very slight; occasionally it is acute, and the affected side tender. Pain may be felt elsewhere, and only in one particular spot, as at the shoulder, or the sternal, epigastric, umbilical, or hypogastric regions of the opposite side,¹ and in the limbs. In one left sided pleurisy it was down the left arm. Sometimes there are profuse sweating and diarrhoea, but these symptoms belong rather to purulent pleurisy, although they are not confined to this disease. The pulse

¹ Laennec and Gerhardt agree with this. See Fagge's "Principles and Practice of Medicine," 2d ed., vol. ii. p. 171.

and respiration ratio is altered; the respirations are increased in frequency, with laryngeal grunting and sometimes dilatation of the *alæ nasi*. When effusion is abundant the pulse becomes small, frequent, and irregular. Cough is frequent, short, hacking, and dry. In young infants collapse is a noticeable feature, and wasting is rapid. There may be coldness and blueness of the extremities, as well as of the lips. Orthopnoea may occur, during coughing, and marked cyanosis. The effusion of fluid has then been very rapid and copious.

Often the child is brought to the physician on account of anorexia, wasting, and cough, and is carried into the room or drags his weakened limbs with difficulty. Physical examination alone in such a case can clear up the diagnosis. There may or may not be fever. In many pleurisy is detected only after physical examination. The pleurisy merges into the general disease. Thus, in pneumonia, broncho-pneumonia, and bronchitis a friction-sound may be heard. Disease commencing as pneumonia is rapidly merged into pleurisy with effusion, often of a purulent type. In many instances pleurisy, though present, escapes detection. A friction-sound may be heard in bronchitis revealing a concomitant unexpected pleuritis. Pyæmia may mask pleurisy. Pericarditis with pleural extension may overwhelm pleuritis, and overlying pleuritis in pulmonary apoplexy remain undetected. Attacks of dry pleurisy are occasionally submerged by the accompanying fever. Friction may be present or absent, the diagnosis depending upon the stethoscope. It may possess the usual characters, appear as a moist r le or a dry rhonchus, be heard to-day and gone to-morrow. Its dependence on the depth of respiration, the effect of the position of the child, whether it is reclining or erect, modifying or annulling the physical signs, and the importance of detecting any pericardial friction-sounds, must be remembered. Friction may be heard anywhere over the chest, but the favorite seats are the nipples, the axillary regions, and about the scapular angles. Friction fremitus may sometimes be detected.

Passing from the initial stage, we arrive at that of fluid effusion. This will be found under several types. In one, not uncommon, there are signs of consolidation of the upper or upper and middle lobes, with deficient, very rarely absent, vesicular murmur over the lower lobe. Rarely the breath-sounds may be annulled at the extreme base. Such might pass for apical consolidation, and so it is, usually fibrinous; but occasionally this compression of the lung by bands of lymph causes tuberculosis. Sometimes the breath-sounds are cavernous, but cavernous breathing is often heard over simple solid areas in children's

lungs. When the consolidation is that of croupous pneumonia, a trace of albumin may sometimes be detected in the early stages. The opposite side gives extra-*puerile* breath-sounds and frequently sub*tympanic* resonance. Percussion gives fluid dulness and resistance, both important; but, remember, such may be encountered over a solid lung. Because the dulness is not of fluid character, it does not follow that fluid cannot be present. The note may be merely deficient resonance, and occasionally stomach resonance is obtained as far as the angle of the left scapula. Percuss lightly, the chest-walls yielding, and it is easy to displace fluid and reach crepitant lung. In another, the chest may be dull from apex to base, with good but distant vesicular breath-sounds, or distant tubular breathing perhaps heard on a deep breath only, and then only expiratory, or distant vesicular breath-sounds with moist râles. As before, the breath-sounds on the healthy side will be extra-*puerile*, not bronchial, as sometimes called, and moist râles may be heard. With this extreme effusion there may be apical resonance or hyper-resonance, the breathing clear and distant, expiration prolonged and unduly audible compared with inspiration. Dulness then does not usually extend to the spine. A sector-shaped area of resonance may be obtained over the root of the lung and its immediate neighborhood. In another there is dulness over the lower lobe and deficient entry of air. Sometimes the breath-sounds are distantly tubular. In either case there may be loud tubular breathing at the upper limit of dulness, friction-sounds or not, sometimes friction-sounds alone, sometimes pneumonic crackles only. Skodaic resonance can not infrequently be obtained over the corresponding apex, above the clavicle, below it in both situations, and sometimes behind. Skodaic resonance is also obtained in basic consolidation, sometimes apical. Basic consolidation itself may give all the signs of fluid. Often the method of respiration deceives: now there is vesicular murmur, again with a certain laryngeal intonation the breathing is tubular, often the expiratory sound alone has this quality, and bronchophony is for the first time appreciated. Bronchophony contra-indicates fluid, but when in doubt do not hesitate to explore. Again, râles present yesterday have disappeared to-day; tubular breathing produced at a solid apex and conducted to the opposite root is present at one examination and gone at the next. Another factor in these productions is unequal action of the two sides of the chest. A case may first come under your care as an acute lobar pneumonia, but the customary crisis¹ is

¹ Sometimes extensive rises and falls occur after the crisis for a day or two or more before equilibrium is reached. Rarely the case terminates by lysis.

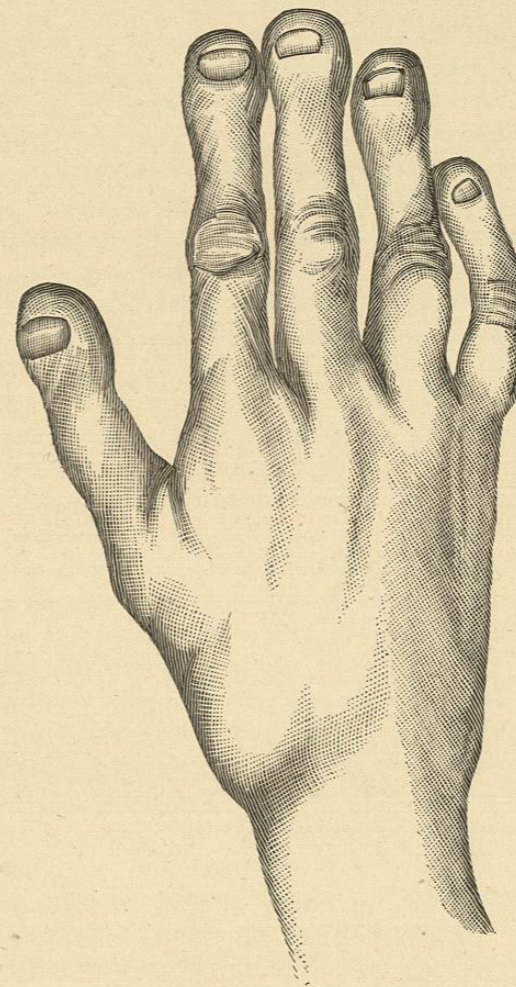
passed by, the temperature remains up, and the signs of consolidation give way—this is the important point—to those of fluid. Sometimes the temperature falls as usual and then again rises, remaining more or less elevated, but accompanied by a change in the physical signs. Broncho-pneumonia or a simple bronchitis may be responsible. With fluid effusion at one base friction may be heard over the other. Accumulations of pus may become localized and confined by adhesions, limit themselves to the apex, the base, the axillary region between adjoining lobes, the lung and the diaphragm or mediastinum or pericardium. When there are two or more cavities they often communicate by a sinus or sinuses, but they may be shut off. In a child aged ten months the space containing pus was like a honey-comb. Thus, it may be necessary to explore beneath the clavicle, or it may be quite beyond reach and the methods of physical diagnosis at our command. Fibrin alone may give the signs of fluid when no fluid is present.

The position of the cardiac impulse is a most important factor in forming a diagnosis. In right effusions the impulse may be in the nipple-line or an inch or more outside this. In left effusions cardiac impulse may be epigastric or in the fourth and fifth or the third and fourth right interspaces. A triangular area of dulness can be mapped out. This impulse is occasioned by the impact of the right ventricle in the interspaces, and of the right and left ventricles in the epigastric region. The heart by some is thought to rotate on its axis, by others to be pushed bodily over to the right. In one autopsy on a child of six the heart was placed vertically in the middle line of the body and the pericardium partially adherent to it. In another, a child of four, more of it lay to the left of the sternum, but chiefly behind it; in another, aged three, the mediastinal contents were shifted to the right without cardiac rotation; in another, right-sided, aged ten months, the heart was a little displaced to the left.

Cardiac bruits are sometimes caused by the kinking of vessels. The liver and spleen also share in the dulness; thus the spleen may be displaced and enlarged or not, the lower edge of the liver reach to the umbilicus with nutmeg alterations, or not, according to the chronicity of the case. The affected side does not usually show much alteration, but it may be more rounded, or even bulging; sometimes it is smaller. Obliteration or even bulging of the interspaces happens occasionally, best seen by looking from above downward. Rarely there is fluctuation. Sometimes there is œdema. Increase of cutaneous thickness may be determined by pinching the skin and comparing it with that of the opposite side.

In a female of four with purulent pleuritis in the upper part of the chest, this was uniformly bulged forward from the clavicle to just below the nipple, and the sterno-clavicular joint was loosened. The overlying skin was œdematous. In another purulent pleuritis in a male of three there was marked localized bulging of the lower ribs of the right side. Bulging of the chest-wall and cutaneous œdema signify purulent collections. Empyemas sometimes point, usually in one place, rarely in more, and mostly to the front of the chest, passing through an interspace with denuding of the periosteum. Abscesses may be pale, or inflamed and painful. In a boy of seven there was a fluctuating swelling over the front of the left fifth, sixth, and seventh ribs. In a girl of six, it formed over the left fourth, fifth, and sixth ribs. In a boy of three, perforation was at the seventh left interspace in the nipple-line, with commencing subcutaneous abscess; and a boy of nine had an elastic fluctuating prominence over the right hypochondriac region. Pus may also find its way into a bronchus, the abdominal cavity or some of its organs, the loins, or the lower extremities. Sometimes these chest tumors have a transmitted cardiac impulse and the heart sounds are plainly audible over them. Such are called pulsating empyemas. Pulsation may be detected in the interspaces near and above the nipple without an external tumor. Puffiness of the face and eyelids, like that of renal disease and pertussis, is seen in some cases. The affected side will be found more or less immobile. Sucking in of the lower interspaces is noticed in some. The quantity of fluid is variable. The most I have seen is forty-six ounces of clear fluid in a child of six, but Heyfelder aspirated six pints from a boy of the same age. The smallest quantity I have diagnosed and evacuated is one-half ounce of pus from each pleura in a child of five, with immediate disappearance of physical signs. The average, perhaps, is eight to ten ounces, caught at the time of operation, but matter will drain away for some hours afterwards, to the extent of many ounces. Vocal resonance and vocal fremitus are of very little service. Cry resonance and cry fremitus are useful. Egophony is of little value. In the early stages the child usually lies on the healthy side, but with effusion in quantity he lies on his back or on the affected side, but there are frequent exceptions. In chronic cases the fingers and toes become clubbed, the chest falls in, the ribs crowd together, and the spine is curved laterally, the concavity pointing to the affected side. The child wastes. The right heart hypertrophies and dilates, and the various alterations in the organs accompanying this condition make their appearance. Owing to this wasting, dropsy is rarely observed. A female aged six had been ill two years;

the diagnosis was phthisis. She had signs of consolidation in the upper half of the left chest. Above the breath-sounds were cavernous, below they were distant vesicular or tubular. The dulness was absolute. Once or twice the other root appeared consolidated, but the



Clubbing of fingers in chronic empyema.

sounds were conducted, otherwise they were extra-puerile and the resonance was subtympanic. Expectoration was muco-purulent, sometimes little, at other times profuse. She had a contracted chest with lateral curvature. The cardiac impulse was in the fifth and sixth