

THE CLINICAL SIGNIFICANCE OF ABNORMAL RESPIRATION AND DEGLUTITION CLICK OR FREMITUS; THE PNEUMONIC-RESPIRATION-PAUSE-CYCLE

LAMBERT OTT, M.D.

PHILADELPHIA

As respirations normally differ at the different periods of life, so abnormal respiration has a parallel difference as a manifestation of disease in the different periods of life. I may cite, for example, the puerile lung sounds in childhood and adolescence and the diminished and distant respiratory sounds of old age; also the rapid respirations in infantile life and the slower respirations of advanced age; the brief post-expiratory pause in early life and the longer post-expiratory pause in advanced age.

The respirations of exhaustion are in a manner influenced mostly by the age of the patient and partly by the degree of exhaustion.

The breathing of the ill baby or child in exhaustion is shallow, rapid and pauseless, indicating gravity and often impending death. If they fall into slumber while in this condition the respirations lessen in frequency, lengthen in range and are still pauseless. If they awaken unimproved the breathing resumes the characteristics just described; but if, on the contrary, there is an improvement in the patient's condition, the respirations are less rapid, range lengthened, calmer, and an occasional normal post-expiratory pause is noticeable. When in the above clinical picture the disease had merely a remission and a relapse occurs, there is manifested at once a return of rapid and shallow respiration, with no inter-respiratory pause; sometimes this phenomenon precedes the increase of temperature, a natural and usual accompaniment of a recrudescence in disease. When the degree of exhaustion increases, presaging death, respiration becomes a little arrhythmical, the inspiratory range being lessened and expiration being more prolonged, this irregularity becoming more accentuated in ratio as the end approaches. The final expiration is well prolonged, with an occasional pause, while a second feeble and aborted inspiration follows, ending in more of an expiratory spasm in which the muscles other than those directly concerned in breathing become involved.

Respirations of middle life in exhaustion differ somewhat from those in earlier life. They are more rhythmical than in infantile life, shallow and rapid, and with no inter-respiratory pause. The ranges of inspiration and expiration are longer and as death approaches the occasional post-expiratory pause is noticeable. The respirations in exhaustion of

advanced age present some peculiarities. Inspiration and expiration follow each other without pause, have a longer range than in earlier life, are irregularly rhythmical, sometimes expiration being longer than inspiration, but soon again rhythm is assumed, and then a rhythm favoring longer expiration. As the exhaustion increases and the patient grows weaker, respirations grow more shallow and a post-expiratory pause is established and prolonged, which continues until death. The latter manifestation is in striking contrast to the post-expiratory pause in infantile exhaustion which is only occasionally apparent and not as continuous as in the last moments of the aged.

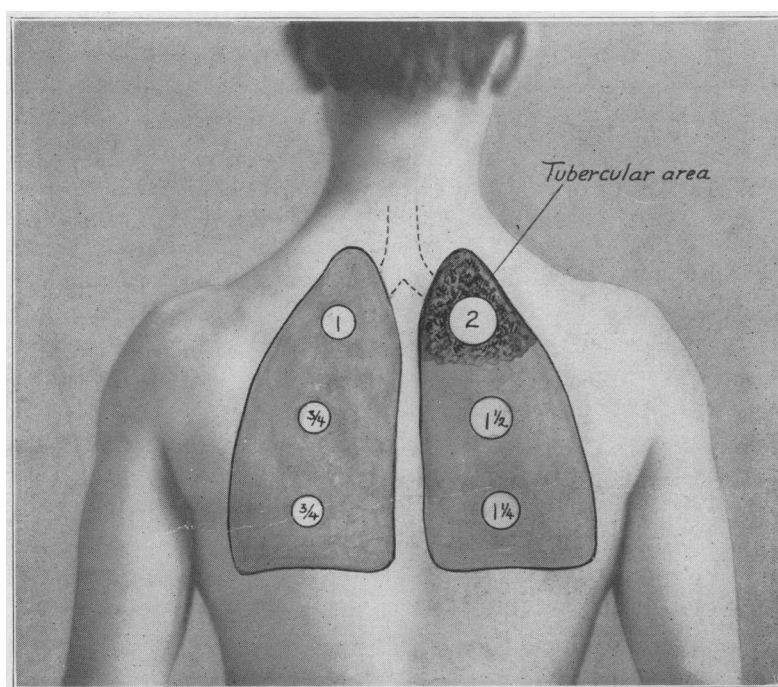


Figure showing by circles posteriorly the different degrees of deglutition fremitus or click in apical tuberculous infiltration of the right lung as compared with the healthy lung.

Respiration of pneumonia in infancy and childhood has a positive and pathognomonic post-inspiratory pause. This pause is not continuous as many suppose. There are usually three to five post-inspiratory pauses, then follows rapid rhythmical respiration without a pause, which ends in one post-expiratory pause and then the post-inspiratory pauses begin again. There is a definite cycle in the recurring post-inspiratory pauses which vary in number from two as a minimum and six as a maximum before the period of rapid pauseless respiration sets in. But the peculiar

point observed is that just at the ending of one phenomenon and before the beginning of the recurrence of the period of the post-inspiratory pause, one prolonged expiratory pause occurs, seeming to link the two changes in some unexplainable physiologic manner. In other words, between the pauseless respirations succeeding the post-inspiratory pauses there appears one prolonged post-expiratory pause, thus leading to the beginning of the cycle. I might name this symptom the pneumonic-respiratory-pause-cycle. It must be remembered that this peculiar respiratory-pause-cycle is generally found in infantile and childhood pneumonia. Infants under 18 months or children 2 years old manifest this condition more strikingly than older children. But let this same pneumonic child fall into sound or natural sleep and all arrhythmia of respiration ceases; then you have still continuing the rapid respirations, but slower than when awake, and absolutely rhythmical and pauseless in occurrence. On reawakening the respiratory-pause-cycle is resumed. Whenever the post-inspiratory pause began to lessen and respiration grew less rapid the pause gradually became more post-expiratory and lessened post-inspiratory. In other words, a transposition of the pause from post-inspiration to post-expiration was a more favorable sign; the lessening of the respiratory pause or its absolute absence coupled with increased rapidity of respiration indicated a tendency to exhaustion and gravity.

I recall a case of bronchopneumonia in an infant 12 months of age with cyanosis, bradycardia and no cardiac murmurs, all indicating a weak heart and the overwhelming severity of the attack. The respirations differed somewhat from the regular type in that inspiration was shorter than expiration. There was the post-inspiratory pause and then a prolonged expiration, pauseless but wheezy like the expiratory wheezing of an attack of bronchial asthma in the adult. Otherwise, the pneumonic-respiratory-pause-cycle was manifested throughout the disease until some hours before death, when rapid and pauseless respiration followed and continued to the end.

Later observations convince me that the pneumonic-respiratory-pause-cycle is nearly always a manifestation of bronchopneumonia, the pneumonia of infantile life, and found in croupous pneumonia when occurring in a child 2 years of age and under. Pneumonia in older children presents less of the respiratory pause-cycle, but one finds a more continued and more pauseless respiration and the altered pulse-respiration ratio is more marked than in earlier life. I have sometimes found a pleuritic complication attended with pain in inspiration productive of irregular pauses in respiration, evidently a suspension of breathing to alleviate pain.

My experience leads me to believe that in cases of children of lowered vitality from disease other than lung troubles, manifesting cerebral symptoms, regularity of respirations negatives organic brain disease. This rule can also be applied to the pulse.

If an infant having apical pneumonia with the characteristic respirations develops cephalic symptoms, and the breathing does not change from the pneumonic-respiratory-pause-cycle, one may conclude that the brain symptoms are merely symptomatic and not organic in character. The absence of persistent vomiting is confirmatory of this conclusion.

Parenthetically, I have observed another point while closely studying the respirations of pneumonic children:

If one places the hand on the right and left flanks of the sick child one will notice a greater sinking of the side having the pneumonic lung. This observation I have frequently verified.

In the respiration of pneumonia of adults the normal respiratory pause is entirely missing, inspiration and expiration following each other in close succession. As exhaustion increases respiration grows more rapid, shallow and somewhat labored. The moment the crisis begins there is a return of an occasional post-expiratory pause and less rapid breathing.

In the early convalescence of adult pneumonia during sleep respiration becomes slower and the normal post-expiratory pause is continuous; even when during the preceding waking there is not a continuous post-expiratory pause, with some accelerated pauseless breathing.

In a case of adult pneumonia from which the above observations were made I noticed the following: One-half to one minute before awaking respirations became pauseless and rapid and remained so until semi-consciousness merged into full consciousness when approximately normal breathing followed. This manifestation is probably more physiologic than pathologic.

In the extremely aged there is a form of respiration accompanying bronchial catarrh in which there is shallow and accelerated breathing, with only an intermitting post-expiratory pause, with moist and dry râles, indicating presumably a pulmonary edema, the other symptoms not being in accord. I ascribed this condition to an associated nervous element and it is seemingly more dangerous than real. The same clinical picture in a young adult would portend greater evil.

By the term deglutition fremitus I mean the sounds occasioned by the act of swallowing which are more readily conveyed to the ear through the area of a pneumonic induration. In the adult it does not seem as valuable as the transmitted voice, but in infantile pneumonia, where the act of crying is the sole manner of expression, this diffuses itself throughout the lungs in such a way as to confuse. Let the suckling infant nurse and while the ear is auscultating the lungs posteriorly note the area conveying the noise of the act of swallowing. A gurgling or clicking sound heard more distinctly at any point will indicate a pneumonic spot. Repeatedly I have verified this observation but it requires tact, time and patience to derive the benefit from this aid to the diagnosis of pneumonia.

While other well-known symptoms are more positive diagnostically, a decided aid in localizing indurated areas may be obtained by deglutition fremitus. Could we but request the infant to modulate the sound of crying or soften the voice we would have an equally valuable aid in the diagnosis of lung consolidation as in adult vocal fremitus, but this is impossible.

The examination should be made after the infant has fasted for a long time and then when put to the breast it nurses with a feverish thirst and hunger and consequently swallows oftener and greater quantities, which aids in accentuating the deglutition fremitus through indurated area.

I am justified in calling deglutition fremitus, deglutition click, the pronunciation of the latter word "click" corresponding to the fremescent sound heard when auscultating the chest during the act of swallowing. The following peculiarity developed in the course of my examination: Over a left apical tuberculous indurated area posteriorly the deglutition click or fremitus was decidedly distinct, and as I passed down to the middle of the lung over a non-indurated area the fremitus was slightly lessened. Over the base of the apically indurated lung, or over the normal lung tissue, the fremitus was still accentuated but less distinct than that of the middle area and the latter fremitus was less distinct than that of the apical area.

Examining the healthy lung of the same individual, deglutition fremitus was alike in pitch and tone over the entire lung, possibly a little more accentuated at the apex. But the three distinct degrees of deglutition fremitus of the healthy lung were measurably less than over any area of the apically diseased lung.

In the accompanying illustration I can better explain the difference in intensity of sounds as evidenced over the lung area of one lung partly diseased and the lessened deglutition fremitus of its non-diseased fellow.

Let an imaginary circle 2 inches in diameter be drawn over the indurated lung area posteriorly and one circle $1\frac{1}{2}$ inches in diameter over the middle non-indurated lung area of the same lung, and a third circle $1\frac{1}{4}$ inches in diameter over the base of the same lung. Then draw a circle of 1 inch over the apex posteriorly to the opposite healthy lung, and two circles of three-fourths inch in diameter over the middle and basilar area of the same lung. You will now have a guide as to the variety of fremitus produced by the act of deglutition. The 2-inch circle represents the maximum of intensity over the tuberculous, infiltrated apex and the three-fourths-inch circle represents the base of the opposite healthy lung — the most remote area from the diseased tissue — giving the less distinct deglutition click or fremitus; the three-fourths-inch circle

representing a minimum as compared with the 2-inch circle over the tuberculous area as a maximum of fremitus.

My studies and observations in deglutition fremitus or deglutition click are yet embryonic and this paper merely embodies a preliminary report. I do not believe the developments thus far contribute much in the way of a decided and valuable aid to diagnosis, but my purpose is to call the attention of the profession to a hitherto neglected element in physical diagnosis which can be further evolved on a practical basis by the great body of medical practitioners, who are the final arbiters of all the novelties in medicine and diagnosis. They must affirm or reject a proposition on its merits. The child cannot be asked to say one, two and three, or be requested to alter its respiration like an adult, but the act of swallowing is instinctive and automatic and can be readily produced even in a new-born infant.

831 North Broad Street.