THE ASSOCIATION OF PNEUMONIA AND ACUTE BRIGHT'S DISEASE.

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It is a curious fact that although acute nephritis and lobar pneumonia are two of the common diseases which we believe are frequently caused, or at least predisposed to, by chill, they should so seldom occur together. This at all events would seem to be the experience of the majority of authors, if one may judge from the evidence of the literature. Many text-books omit any mention of the possible relationship of the two maladies, and do not discuss the influence on prognosis of the one as a complication during the course of the other.

It has, of course, always been recognized that pneumonia developing during the course of chronic nephritis is exceedingly grave, Pye-Smith¹ stating that as a prognostic factor chronic Bright's disease is scarcely less serious than alcoholism. That it is not always fatal under these conditions is admitted and I personally remember one adult with chronic nephritis, who developed the disease as a sequel to lead poisoning, passing successfully not only through one, but several, attacks of lobar pneumonia. The seriousness of this combination is animadverted upon by Rosenstein² who states that under such conditions the pneumonia tends to be purulent, and also by McDowell³ who remarks that it usually becomes gangrenous.

The association of acute nephritis and lobar pneumonia is less frequently remarked upon; in fact, it is with difficulty that one can find any expression of opinion at all either in text-books or journals.

There are several aspects to the question: the nephritis apparently may be the primary disease and the pneumonia secondary, or vice versa, or the two diseases may be coincident in their onset.

So far as I have been able to discover those authors who have discussed this question have been interested in the presence of nephritis as a complication of pneumonia. They have looked upon pneumonia as one cause of nephritis, and, from its apparent curability, have considered such a nephritis as probably due to the pneumococcus, and as a special and benign type of the disease. In this connection it must be clearly understood what really constitutes nephritis. The mere presence of albuminuria is insufficient, as this is not infrequent from the fever alone, and for the diagnosis of nephritis the presence of albumin in the urine in considerable amount with blood and casts and possibly also œdema is essential. Still⁴ records two examples of lobar pneumonia during childhood in which there developed in the course of the disease acute nephritis. Rosenstein⁵ also reports two cases of lobar pneumonia, aged 20 and 40 respectively, in which nephritis, as evidenced by abundant albumin, blood and casts, appeared about the 4th day of illness. In all these examples the course of the

pneumonia seemed unaffected and all the patients made complete and speedy recoveries, blood and albumin having completely disappeared from the urine within 6 to 8 weeks. Pye-Smith and Beddard⁶ on the other hand say that in pneumonia septicæmic nephritis, which is commoner in children than in adults, is grave and that the mortality is high, though if the case is not fatal the nephritis generally disappears.

It is interesting to note that in none of these cases was there any œdema. This, however, is fairly characteristic of secondary nephritis, at least so far as the diphtheritic and scarlatinal types are concerned.

Apparently no bacteriological examination of the urine was made in any of these cases, at least such is not recorded, and one might raise the possibility of 'pyelitis' or suppurative nephritis being the nature of the complication, and without doubt pyelonephritis and broncho-pneumonia are not infrequently associated, the one or other being the complicating mischief. At one time I considered the presence of casts of great importance in the differential diagnosis between Bright's disease and pyogenic infection of the urinary tract, as in the latter disease casts are seldom met with, and more seldom described. More extended experience, however, has taught me that not only much blood but also numerous renal casts may in the early days of 'pyelitis' be the dominant feature of the urinary picture. There would seem therefore little doubt that pyuria in infancy and early childhood is often of the nature of a nephritis, and a nephritis which is suppurative in character which is the view so ably defended by Chown⁷ in a previous number of this journal. (Edema, too, though seldom developing in 'pyelitis,' does so on occasion and hence the differential diagnosis of these two diseases (Bright's disease and 'pyelitis') is at times not a little difficult. In my opinion the urine in Bright's disease is almost invariably sterile so that the recovery of an organism, and especially the *B. coli communis*, from the urine would be of material help in coming to the correct diagnosis.

I think all will agree that as a cause of nephritis pneumonia is rare: most authors, in fact, do remark on the rarity of the association. I personally never remember seeing a case or meeting with an example of chronic nephritis, or at least persistent albuminuria, in which I could trace the origin to pneumonia. This apparent extreme rarity may, of course, be accounted for by the fact, previously remarked upon, that the nephritis under such conditions as a rule rapidly recovers.

The association I specially wish to discuss in this communication is that of pneumonia and acute nephritis in childhood. I will consider it under two headings: (a) pneumonia as a complication of acute Bright's disease; and (b) coincident pneumonia and acute Bright's disease. Personally, (with the possible exception of Case No. 14), I have had no experience of acute Bright's disease as a complication of pneumonia, the nephritic malady which I have observed complicating pneumonia having been always a suppurative nephritis or pyogenic infection of the urinary tract.

It must be admitted that the association which I am describing would seem to be of a less direct nature and more accidental, but nevertheless it is of considerable interest and importance, standing as it does in marked contrast

to the other both in frequency and in its danger to life. In the case where pneumonia is primary there is possibly a septicæmia, and hence metastatic infection is not surprising and the marvel is, if in pneumonia there is really a septicæmia at any stage, that it should so seldom occur. It may, of course, be another example of the selective action of the organism for one particular organ. Whatever may be the portal of entry in pyogenic infection of the urinary tract, and into this question I do not at present wish to enter, the notable fact remains that the pneumococcus is rarely the ætiological organism.

A.—PNEUMONIA COMPLICATING ACUTE BRIGHT'S DISEASE.

The only reference I can find to this association is in Allbutt's System of Medicine (Vol. V, p. 108), where Pye-Smith says that lobar pneumonia occurs both in the acute and chronic forms of Bright's disease. This writer remarks on the more serious prognosis in consequence of their association, but mentions that it is rare in childhood.

During the last 9 years (1919 to 1927 inclusive) there have been observed in the Royal Hospital for Sick Children, Glasgow, at least 11 cases in which pneumonia developed during the course of acute Bright's disease (Nos. 1 to 11 in appendix). When one recollects that there were admitted to the medical wards during the same period in all 219 cases of acute nephritis this incidence (5%) of secondary pneumonia is not inconsiderable.

That the acute nephritis was in existence before the onset of pneumonia is quite apparent from the case histories as summarised in the appendix of this article. In two of the cases the onset of pneumonia occurred after the child's admission to hospital, as can be seen in the accompanying temperature charts.

The interval between the onset of the nephritis and the inception of pneumonia varied between 3 and 14 days, the average period being 6 days.

The type of pneumonia was lobar in 8 cases and broncho-pneumonic in 3.

The outlook so far as life is concerned is apparently much more serious than in either uncomplicated pneumonia or nephritis. Of the 219 cases of acute Bright's disease admitted during the 9 years 1919 to 1927 inclusive, 34 ended fatally during the acute phase of the disease, giving a mortality rate of 15.52 per cent., whereas of the 11 cases complicated by pneumonia 3 died which represents a mortality rate of 27 per cent.

Of the three cases that died the pneumonia was of the lobar type in two and of the broncho-pneumonic in one. It is thus evident that the presence of acute Bright's disease increases considerably the gravity of lobar pneumonia in childhood, which at this period of life is eminently a benign malady. The death-rate of 416 cases of lobar pneumonia during the 9 years under review was 4 per cent., whereas the death rate among the cases complicating acute Bright's disease was 25 per cent. Broncho-pneumonia is always a serious disease, especially when complicated, so that the death rate of 33 per cent., represented by one death in three is not unduly high. One does not, of course, wish to lay too much stress on the above figures as the numbers of cases considered are small.

One of the most striking features of the non-fatal cases was the rapidity with which the nephritis cleared up. In these cases the time which elapsed before all blood and albumin had disappeared from the urine varied between 2 and 8 weeks, with an average duration of 4·7 weeks. This contrasts markedly with the duration of the illness in the average case of uncomplicated acute Bright's disease. During 1927 there were admitted to the wards in the Royal Hospital for Sick Children, Glasgow, 22 examples of this disease. In 10 the condition had quite recovered before dismissal and had lasted for a period varying between 3 and 15 weeks, the average duration being 6·75 weeks. In 12 cases with a residence in hospital varying between 2 and 12 weeks (average 4·5 weeks) the condition had not cleared up.

In the three fatal cases the average duration of the illness was 14 days.

So far as the seat of the pneumonic lesion was concerned there seemed to be no predilection for either lung. In six cases the left lung was involved; the lower lobe was affected five times, and the upper lobe once. In five cases the right lung was the seat of the disease; once the upper lobe, twice the middle lobe and three times the lower lobe.

B.—NEPHRITIS AND PNEUMONIA COINCIDENT.

During the same period, namely 1919 to 1927 inclusive, there were admitted to hospital 5 children (Nos. 12 to 16 in the appendix) in whom nephritis and pneumonia seemed to be coincident in their development: at least from the histories it was impossible to say whether the renal or the pulmonary mischief were primary. These children ranged in age between 3 and 7 years. Three of the patients made a complete recovery and, just as was the case when pneumonia was secondary to the nephritis, the renal mischief was of relatively short duration, all blood and albumin having disappeared from the urine between three and four weeks after its onset.

In two cases the illness terminated fatally. These children were aged 3 and 3½ years respectively. In the elder child empyema and pericarditis were present in addition to the pneumonia. This represents a death rate of 40 per cent, which is excessively high, not only for nephritis, but also for pneumonia, especially at that period of life.

Both lungs and each lobe of either lung were equally frequently the seat of the pneumonic consolidation.

CONCLUSIONS.

1. Pneumonia not infrequently develops as a complication of acute Bright's disease.
2. This occurred in 11 (5%) of the cases of nephritis admitted to the Royal Hospital for Sick Children, Glasgow, during the years 1919 to 1927 inclusive.
3. The association of acute Bright's disease and pneumonia increases the death rate of either disease considerably.
4. When the condition does not end fatally the nephritis is unduly short-lived, and clears up rapidly and completely.

5. Pneumonia may also develop coincidently with acute Bright's disease but less frequently than as a secondary complication. This occurred on 5 occasions during 9 years.

6. This association also increases the gravity of either disease.

7. Though nephritis may also arise as a complication of lobar pneumonia, it does so much more seldom than either of the above sequence of events, as it has not been observed once during 13 years at the Royal Hospital for Sick Children, Glasgow. But according to the literature when it does occur complete and rapid recovery is the rule.

SUMMARIES OF CASES OF NEPHRITIS FOLLOWED BY PNEUMONIA.

Case No. 1. (Chart I.) S. McC., f., *æt.* 5 years, 10 months. Admitted 7.8.23. Took ill day before admission with swelling of face, feet and legs. Nothing abnormal detected about urine. Admitted with normal temperature; œdema of feet and legs and ascites, breathing easy, and chest normal. Urine: albumin and blood present.

CHART I. (CASE I.) NEPHRITIS FOLLOWED BY PNEUMONIA.

On morning of 4th day of residence, temperature rose to 104° F., respirations to 60 per minute and dullness at left base with tubular R.M. appeared. X-ray examination demonstrated consolidation at left base. Leucocytes 15,400. Fever continued; child got much worse, œdema increased, fluid appeared at left base and child died after 7 days. Blood culture: staphylococci and strepto-diplococci. Fluid from chest: streptococci and pneumococci. No P.M. examination permitted.

Case No. 2. J. G., m., *æt.* 5 years. Admitted 27.5.25. For 3 weeks had not looked well, "yellowish look"; continued at school. Returned from school 6 days ago with headache, vomiting, and face noticed to be swollen; swelling later in evening affected whole body. Vomiting has persisted since 6 days ago. Cough for 4 days.

Admitted with temperature 103.4° F., œdema of face, arms, trunk and legs and generalized cyanosis, cough, respirations 48 per minute, inspiratory dilatation of nostrils; dull left apex, back and front, with moist râles. Urine: albumin and blood present. Fever and rapid respirations continued, also œdema, cyanosis, and consolidation of left apex. Died 3 days after admission. No P.M. examination permitted.

Case No. 3. M. R., f., *æt.* 3 years, 8 months. Admitted 2.2.26. Took ill 2 weeks previously with headache, vomiting and next day œdema of face, with urine scanty, muddy and of reddish colour. Swelling rapidly spread to legs, feet and abdomen. One week later developed cough with dyspnœa. These, as œdema, continued till admission.

On admission temperature 101° F., œdema of feet, ankles and lumbar region, cough, rapid breathing (50), inspiratory dilatation of nostrils, dullness at both bases, generalized wheezing, tubular R.M. and crepitant râles at right base. Urine: albumin, blood and epithelial casts present. Died 2 days after admission.

P.M. Examination: Small amount of fluid both pleural sacs. Broncho-pneumonia both lungs, general. Kidneys swollen, cortex enlarged, mottled due to fatty change, markings irregular. Histologically: glomerular nephritis.

Case No. 4. J. N., m., *æt.* 6 years. Admitted 30.10.19. With exception of measles always well. Took ill 2 weeks previously with vomiting, followed by œdema of face; doctor diagnosed nephritis. Four days before admission cough and dyspnœa.

On admission temperature 103° F., respirations 56 per minute, œdema of scrotum, dullness and tubular R.M. over right lower lobe, and blood, albumin and casts in urine (Esbach .25 per cent.). Pseudocrisis 3.11.19. Chest explored: mucopus with pneumococci. Temperature normal 6.11.19. Urine clear 19.11.19. Child dismissed well 6.12.19.

Case No. 5. W. K., m., *æt.* 5½ years. Admitted 6.11.19. Took ill 14 days previously, tired and sleepy and shivered, put to bed. Ten days previously swelling of back, and next day swelling of face, and day later swelling of feet and legs, also frequency of micturition. Sick and vomited day previous to admission.

On admission temperature 103.6° F., respirations 40, pulse 116 per minute, slight œdema, dullness over right middle lobe with tubular R.M. Urine: blood and albumin (Esbach U+) and blood casts present. Markedly remittent fever till 10.11.19 when fell by crisis. Albumin persisted till 10.11.19, and blood microscopically till 6.1.20. Child seen 16.11.25 well.

Case No. 6. (Chart 2.) R. E., m., *æt.* 4 years. Admitted 26.6.26. Pneumonia 4 times during first year of life, treated in R.H.S.C., Glasgow. Pneumonia again at 1½ years when resident in Shieldhall Hospital, Govan. Always "chesty," cough and shortness of breath off and on. Last night œdema of legs and face puffy.

On admission œdema of face, legs and lumbar region. Fever with rapid pulse and respiration from 28.6.26 till 6.7.26, consolidation left lower lobe. Urine: blood and albumin, epithelial and granular casts (Esbach 5.5). Blood disappeared 7.7.26. Albumin a haze 9.7.26. Irregular dismissal.

Case No. 7. R. M., m., *æt.* 3 years. Admitted 16.2.25. Fourteen days ago "out of sorts," œdema of face 10 days ago, and urine dark in colour. For 4 days œdema worse and urine very scanty.

CHART 2. (CASE 6.) NEPHRITIS FOLLOWED BY PNEUMONIA.

Admitted with temperature 104.2° F., œdema, cough, respirations 50 per minute, dull over middle lobe with tubular R.M. and moist clicking râles, urine contained much blood, albumin and casts. Temperature fell by crisis day after admission. Two days after admission no œdema. Albumin and blood rapidly disappeared from urine, clear by 6.3.28.

Case No. 8. A. McK., f., *æt.* 9 years. Admitted 16.12.22. Twelve days previously complained of pain in stomach, continued at school, few days later again complained of stomach-ache. Eight days ago frequency of micturition and passing of dark coloured urine; severe and persistent vomiting for 5 days; fever and cough for 1 week and dyspnoea for 4 days.

Admitted with temperature 104.6° F., respirations 30 per minute, dull left base with R.M. tubular, and clicking râles. Urine: blood, albumin and casts present. No œdema. Blood urea 30.8 mgrm. per cent. Temperature subsided by lysis and was normal in 4 days. Blood and albumin rapidly diminished, and urine had quite cleared in 2 months.

Case No. 9. M. A., f., *æt.* 4 years, 10 months. Admitted 31.10.23. Swelling of feet 4 days ago; next day child heavy and swelling more marked. One day ago child much worse and at night breathing rapid and laboured with cough.

Admitted with normal temperature, pulse 140, respirations 80, puffiness of face and marked œdema of feet, legs and lumbar region; dullness, tubular R.M. and moist râles at left base. Urine: albumin, blood, epithelial and blood casts present. Slight irregular fever continued for 1 week when respirations became normal in rate. Oedema disappeared in 10 days, blood and albumin rapidly diminished, no blood after 1 week, albumin a mere haze after 10 days; urine sterile.

Case No. 10. C. L., f., *æt.* 2 years. Admitted 18.1.26. Eight months ago swelling of face, hands and feet and scanty dark-coloured urine, treated at out-patient department for 10 weeks. Since then 4 similar attacks each lasting 1 week. Present illness commenced 6 days ago with fever, swelling of face, arms, legs and abdomen, and dark scanty urine; headache for 4 days.

Admitted with temperature 103° F., pulse 140, respirations 48 per minute, œdema of feet and face and consolidation of right upper lobe. Urine contains blood, albumin and casts. Temperature fell by crisis 24th Jan., *i.e.*, 12th day of illness; œdema had disappeared by 28th, and urine was practically clear by 5th Feb. Little blood and albumin after 22nd Jan. Child developed measles Feb. 7th.

Case No. 11. M. McC., f., *æt.* 2 years, 10 months. Admitted 18.11.24. Awoke in morning 2 weeks ago with face swollen; œdema of face diminished but abdomen and feet then became swollen; urinary output scanty; cough for 1 week, dyspnœa and cyanosis for 1 day.

Admitted with temperature 101° F., œdema of feet, legs, back and face, respirations rapid (80), dull left base with intense tubular R.M. Urine: blood, albumin, and epithelial and blood casts present. Fever gradually subsided and was normal by 7th day of residence—œdema all gone by 14th day; urine rapidly cleared, mere trace of albumin and blood after 2 weeks, none on dismissal 6 weeks after admission.

SUMMARIES OF CASES OF COINCIDENT NEPHRITIS AND PNEUMONIA.

Case No. 12. J. S., f., *æt.* 3 years. Admitted 10.5.16. Took ill 4 days previously with swelling of face and later œdema of hands, feet and abdomen appeared with oliguria.

On admission temperature 104° F., respirations 50 and pulse 140 per minute; generalised œdema; inspiratory dilatation of nostrils; dullness at left base with tubular R.M. Temperature gradually declined as also respiration rate but not pulse rate. Temperature normal 4th day but child died suddenly. No P.M. examination permitted.

Case No. 13. I. McT., f., *æt.* 3½ years. Admitted 9.4.26. Pneumonia twice previously last occasion 7 weeks ago in Isolation Hospital, discharged 5 days ago. Four days ago urine red in colour and scanty with return of cough.

Admitted with fever, 101° F., respirations 44, pulse 140; consolidation left lung; albumin, blood and casts in the urine (Esbach 7). Blood and albumin rapidly diminished and had disappeared by 17.4.26, but fever continued. Empyema and pericarditis (pneumococcal) developed and child died 23.4.26. No P.M. examination permitted.

Case No. 14. J. E., m., *æt.* 7 years. Admitted 5.3.23. Fourteen days previously out of sorts and pains all over body, with cough, put to bed. Three days later face swollen and urine contained albumin and blood. Vomiting for 5 days.

Admitted with subnormal temperature, normal respiration and pulse rates; face puffy but otherwise no œdema; dull left apex with tubular R.M., and urine containing blood, albumin and casts, blood scanty. Blood and albumin rapidly disappeared, no blood after 1 week, mere haze of albumin after 10 days. Never any fever. Dismissed home after 6 weeks well.

Case No. 15. J. L., m., *æt.* 3 years, 10 months. Admitted 9.10.24. Took ill 5 days previously with complaint of abdominal pain, vomited, and urine was noted to be dark in colour. Did not seem fevered. Next day hands and face swollen, seemed to be fevered for 2 or 3 days and was advised by family doctor who had examined the urine to take child to hospital.

On admission normal temperature, pulse 130, respirations 56, œdema of face and shins, dullness right middle and lower lobes with tubular R.M. and râles. Urine: blood, albumin and epithelial casts present. Respirations normal after 5 days, no fever during entire illness. Never much blood or albumin, no blood after 2 weeks and a mere haze of albumin after 2 weeks.

Case No. 16. E. B., f., *æt.* 5 years, 4 months. Admitted 28.8.26. Influenza and pneumonia at 2 years, 4 months. Five days ago listless, 4 days ago vomited, and 3 days ago pain in abdomen. Yesterday face swollen, with scanty urine and heavy rapid breathing.

On admission face puffy, otherwise no œdema, herpes upper lip, impetigo on arms; temperature 103° F., pulse 156, respirations 60; dullness right apex with tubular R.M., abundant albumin (Esbach U+) and blood with blood casts in urine. Temperature fell by lysis and reached normal 1.9.26. Urine cleared quickly; mere haze of albumin and blood by 16.9.26; clear by 23.9.26. Dismissed well 1.10.26.

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