

HOLT (L.E.)

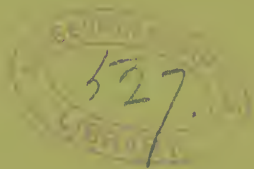
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THREE CASES OF ACUTE PYELITIS IN  
INFANCY.

BY

L. EMMETT HOLT, M.D.,

Professor of Pediatrics in the New York Polyclinic.



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## THREE CASES OF ACUTE PYELITIS IN INFANCY.\*

BY L. EMMETT HOLT, M. D.,

Professor of Pediatrics in the New York Polyclinic.

Acute pyelitis has been given but small space in pediatric literature. Cases depending upon calculi and congenital malformations are pretty well understood. It is also known that acute pyelitis occasionally occurs as a secondary affection of perinephritis. Most writers upon pediatrics and general medicine make the statement in a general way that acute pyelitis may accompany any of the infectious diseases, the eruptive fevers, diphtheria and malaria. Very few clinical observations have, however, been recorded. I have not been able to find in medical literature anything comparable to the second and third cases whose histories are given in this report. They are of such interest that I shall give them somewhat in detail, and with the histories shall present the full temperature charts.

CASE I.—A male infant fourteen months old, an inmate of the New York Infant Asylum. The child had been nursed by the mother, and with the exception of a mild attack of diarrhœa, had never been sick. On September 15, 1892, he was taken suddenly ill with a temperature of  $103.5^{\circ}$ . There were no local symptoms of disease excepting a slight stomatitis. On the second day the temperature ranged between  $101$  and  $103.5^{\circ}$ . A few rales in the chest were found, and pneumonia was suspected. On the third day the temperature was between  $100.2$  and  $101.8^{\circ}$ . Quinine was now ordered by the house physician, ten grains daily, the physical examination being practically negative, the signs in the chest not having developed further.

For the next four days a slight febrile movement continued, the temperature not rising above  $101^{\circ}$ . There

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\* Read at the Sixth Annual Meeting of the American Pediatric Society, June, 1894.



was now marked restlessness, pallor, the urine was noticed to be rather scanty and high colored. A specimen was secured for examination which after standing showed a deposit of pus nearly one inch deep, in a conical glass containing less than two ounces. There was a small amount of albumen present, and the microscope showed pus cells and epithelial cells, but no casts. The patient at this time was considerably prostrated, although he did not give the impression of being dangerously ill.

There was no subsequent rise in temperature. The pus continued to diminish gradually, although it was passed in small amount for three weeks. The examination of the urine two months later showed no trace of pus. At no time in this case were any casts found. Not enough urine could be collected to obtain the specific gravity. The child remained in the institution, and twenty months later Dr. Bremner, the resident physician, in response to an inquiry stated that the child had never had any subsequent urinary symptoms and had continued to the present time in all respects well. This case ran its course practically without treatment.

CASE II.—On December 6, 1892, I saw with Drs. Martin and Carman, of Harlem, a female infant eight months old who was reported to have been ill for nine days. The history given was as follows:

The child had been artificially fed from birth, but had never been previously ill. While apparently in perfect health, it was taken suddenly with a chill, followed by a very high temperature, which had continued up to the time of my visit. For the first three days the temperature record had not been preserved, but it had fluctuated between 103 and 106°. From the fourth to the eighth day it ranged between 102 and 105°, touching the latter point every day but one. The symptoms in other respects were almost negative. The prostration had not been great. There had been a very slight amount of indigestion as shown by an occasional green stool and a slight, inconstant cough. No evidence of local pain, no cerebral symptoms, no vomiting. Pneumonia had been sus-

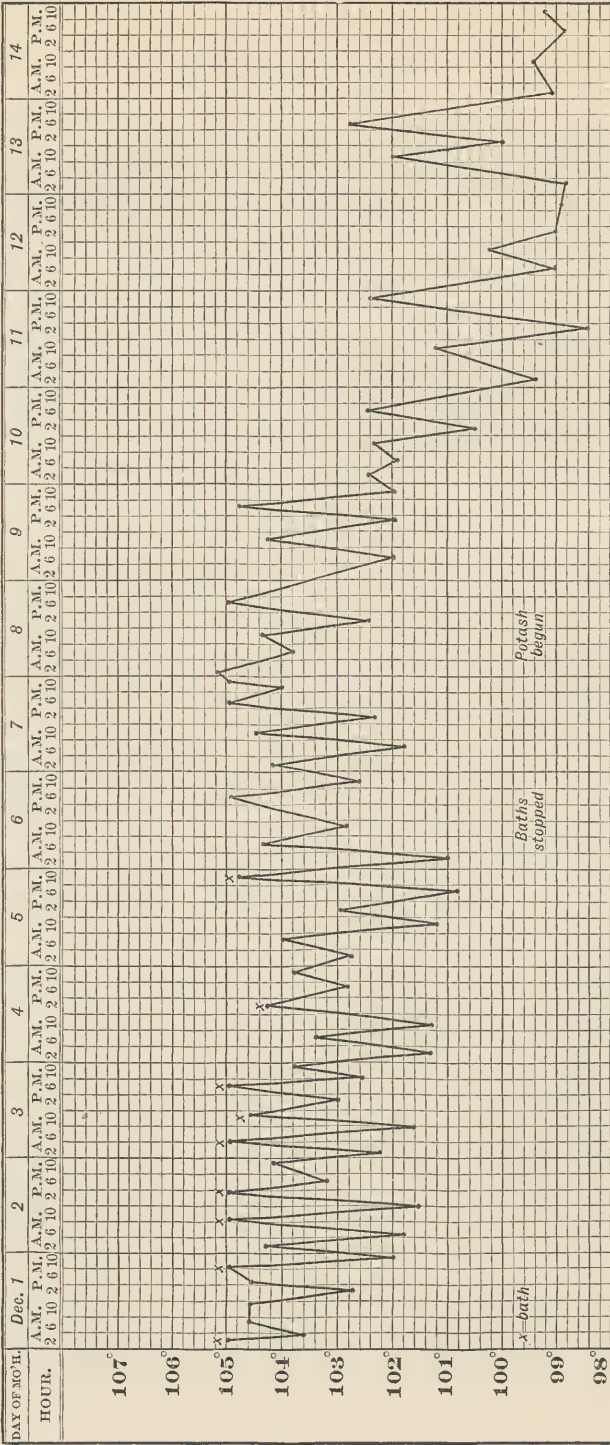
pected, but up to this time no signs had been found in the chest. The case had been closely watched from the outset, but no diagnosis made. Quinine had been given in moderately large doses, without any effect. Baths had reduced the temperature only temporarily.

On examination I found a pale but fairly nourished infant, temperature  $105^{\circ}$ , pulse about  $180^{\circ}$ , respiration  $76^{\circ}$ , the child being at this time rather excited. There were six teeth, the gums were normal. The result of the physical examination was absolutely negative, there being no evidence whatever of any disease in the ears, throat, lungs, spleen, or anywhere else in the abdomen. The child did not seem to be very ill, and excepting when the temperature was high, was usually quite bright, playful, had a fair appetite, and was taking about twenty ounces of food a day. The continued high temperature and accelerated breathing led me to suspect pneumonia, notwithstanding the absence of all physical signs.

On a second examination, on the following day, the temperature was found but a little lower, and the respiration 40. A very satisfactory examination of the lungs revealed absolutely no signs of disease, and excepting for the temperature the child did not seem seriously ill. Pneumonia was positively excluded. The diagnosis was still obscure. I directed that an effort be made to secure a specimen of the urine.

At my third visit, on December 8th, on the eleventh day of the illness, sufficient urine was collected for the first time for examination. Only three or four drachms were obtained, but this showed a very heavy deposit of pus in the test tube and a trace of albumen. The reaction of the urine was strongly acid. Under the microscope in addition to pus there was found bladder epithelium, but no casts. There had been no trace of œdema, up to this time the urine had been abundant, and there had been no deposit upon the napkins. There was no tenderness over the kidneys, no evidence of a tumor, and no signs of cystitis and vaginitis. Micturition was not abnormal either in frequency or in the amount passed.

4th day. 5th day. 6th day. 7th day. 8th day. 9th day. 10th day. 11th day. 12th day. 13th day. 14th day. 15th day. 16th day. 17th day.



ACUTE PYELITIS CASE II. INFANT 8 MONTHS.

Citrate of potash was now begun in doses of gr. ii. every two hours.

On December 10th, two days later, the first natural fall in the temperature was seen since the beginning of the illness. The child was now taking gr. xxiv. of the citrate of potash daily, which had very much increased the quantity of urine and had neutralized the acidity. It was difficult to estimate the amount passed, but in twenty-four hours twenty-eight napkins were wet. About six drachms of urine were collected for examination. This, after standing in a conical glass, showed a deposit of pus  $\frac{1}{2}$  inch deep, or about 8 per cent. of the volume of the urine.

On December 12th, the temperature touched normal for the first time, it having been below  $102.5^{\circ}$  for the last three days, falling gradually. The amount of pus discharged was still large, although diminishing. Daily microscopical examinations of the urine were made, showing pus, a few bladder epithelial cells, and a small number of renal epithelial cells, but only a few hyaline casts. The quantity still continued very abundant, the reaction very alkaline under the influence of gr. xx. of the potash daily.

From this time the child improved rapidly. Recovery was interrupted on the sixteenth day by a temporary rise of temperature, apparently from constipation. The amount of pus gradually diminished, and at the end of three weeks it had practically disappeared from the urine.

Sixteen months later, in April, 1894, Dr. Martin wrote that the child has been entirely free from urinary symptoms since the last note, and its general condition had been good.

CASE III.—A female child, nine months old, under my personal observation since birth. Until ten days before the present illness, when it had what was regarded as a mild attack of influenza, the child had never been ill. Its nutrition had been excellent, leaving, in fact, nothing to be desired.

On February 8, 1894, the child was taken suddenly, about noon, with a distinct chill. I saw the case a few moments later, before the chill was over. The lips and fingernails were blue, and there was a distinct chatter to the teeth, with shivering of the entire body. It was as typical a chill as one ever sees in an adult. There was considerable prostration, and the rectal temperature was  $103^{\circ}$ . Under the use of a hot bath and stimulants reaction was established in a few minutes, but an hour later the temperature was  $104^{\circ}$ . At 5 P. M. the same day the temperature had fallen to  $99.5^{\circ}$  (rectal), and all symptoms had disappeared. At 7 P. M. the temperature was normal, the child sleeping quietly, and was apparently well.

A little after midnight a second chill occurred, in all respects similar to the one at noon, excepting that it was not quite so severe. Temperature  $103.4^{\circ}$ . Hot baths and stimulants were repeated. At 7 A. M. on the following morning the temperature was  $99.4^{\circ}$  and the child was submitted to a second thorough examination, with absolutely negative results. Quinine was now ordered, two grains of the bi-sulphate being given every three hours per rectum. By 1 P. M. the temperature had risen to  $103.4^{\circ}$  without any chill. It fluctuated during the evening, and at 10 P. M. had again risen to  $105^{\circ}$ . Up to this time, especially when temperature was high, there had been some prostration, the child was indifferent to surroundings and rather fretful, and had but little appetite. As soon as the temperature fell the child would laugh and play as usual, took its food well and, apparently, seemed quite normal in every respect. The movements continued good, and nearly the usual amount of food was taken.

On the third day two severe chills occurred, the temperature rising immediately after, in one case to  $105^{\circ}$  and in the other to  $104.5^{\circ}$ . A fall occurred in the course of three or four hours with quite a profuse perspiration. The quinine by rectum was not retained, and during the day twelve grains were given by the mouth and retained.



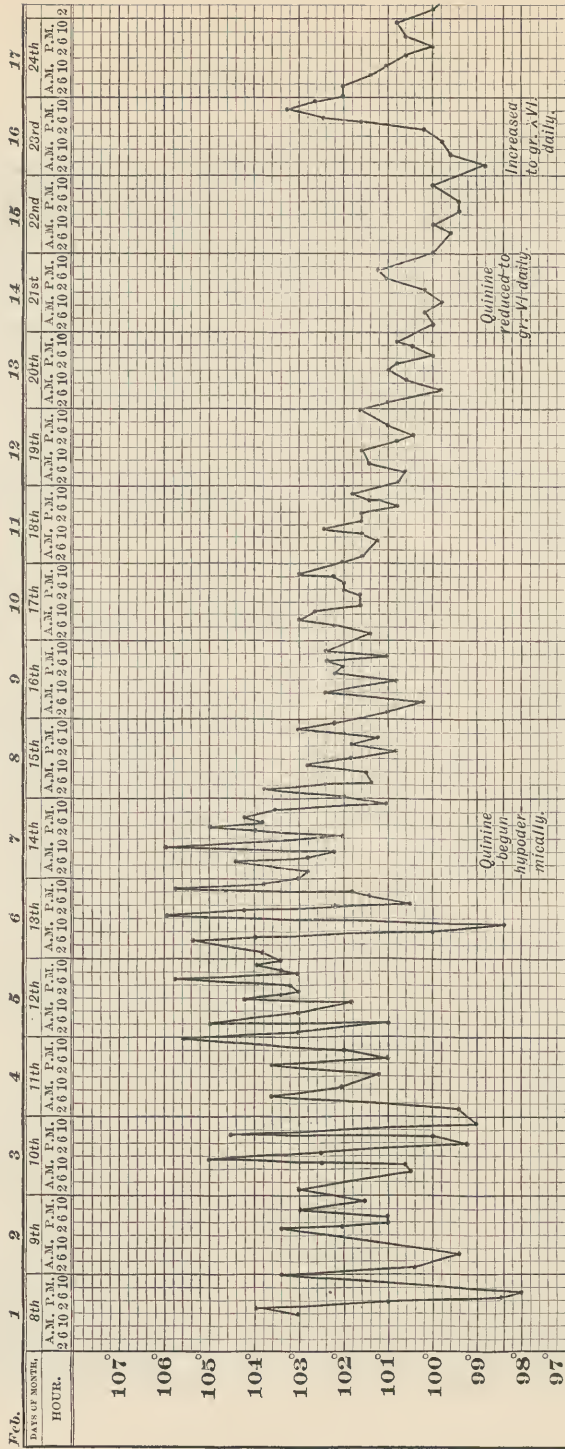
On the fourth day gr. xivss. of quinine were given by the mouth and retained; the temperature still fluctuating widely, but no distinct chill. During the day it was noticed that there was some straining and pain on micturition, and that the urine was passed only in small quantities. This evening for the first time a specimen was obtained for examination. The reaction was very strongly acid, and after standing there was a deposit of pus equal to about one-fifth of the entire volume of the urine; sp-gr. 1012, and a trace of albumen.

Quinine was now discontinued and citrate of potash gr. ii. every two hours given and hot fomentations used over the kidneys.

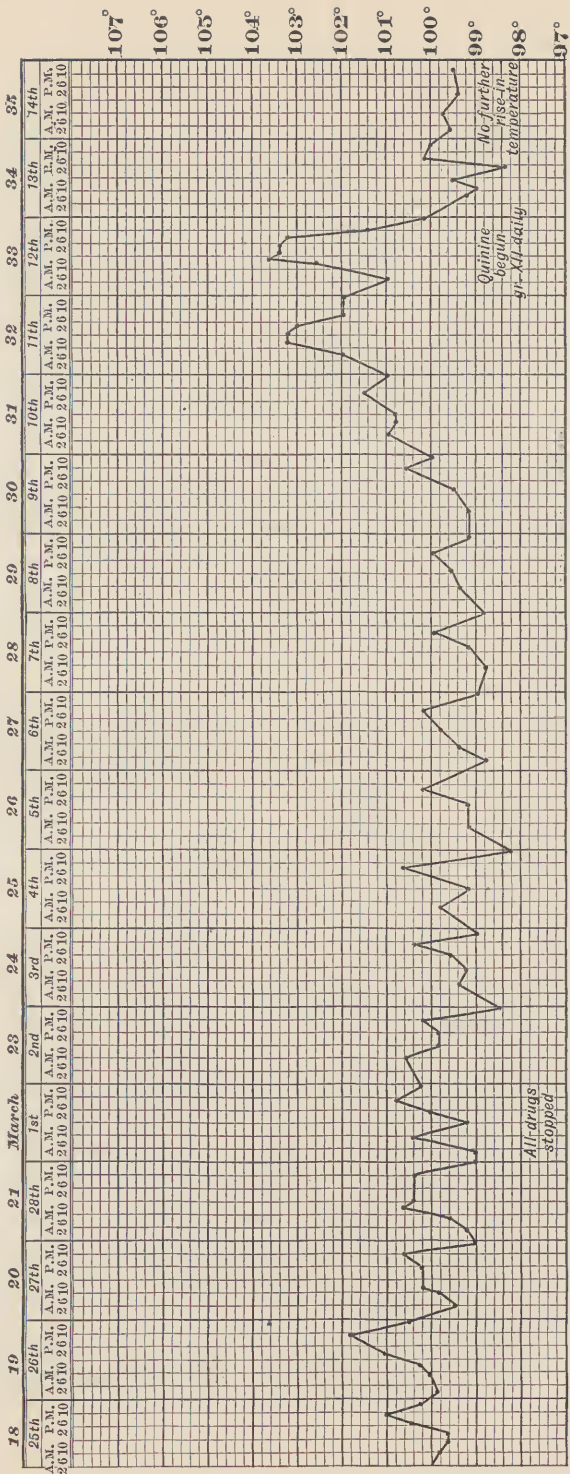
During the following day the temperature fluctuated between 101 and 105°. The urine was still very turbid from the pus and very much increased in quantity. Reaction still acid; sp. gr. 1005.

On the sixth day, February 13th, the urine was passed very freely, from sixteen to eighteen ounces in twenty-four hours; reaction still acid in spite of gr. xxiv. of the potash daily. The child's general condition was not quite so good as previously, although she showed comparatively little disturbance, considering how high the temperature had been. She was now taking about one-half the usual amount of food. The bowels moved regularly; there was no vomiting, and she slept a fair amount of time. There was no drowsiness, and the symptoms of irritation about the bladder had entirely disappeared. The temperature still fluctuated widely, rising from 98.5 to 106° in the course of two hours and falling again to 100.5° shortly afterward. The fluctuations in temperature were still irregular as to the time of their occurrence. When the rise was not preceded by a distinct chill there were nearly always cold hands and feet and pallor.

On February 14th the general condition remained about the same. The amount of potash now taken was fifty grains daily, and with this the urine was kept neutral or faintly alkaline. The amount of pus discharged was still very large, being about five per cent. of the vol-



ACUTE PYELITIS, CASE III, INFANT 9 MONTHS.



ACUTE PYELITIS. CASE III. INFANT 9 MONTHS—(Concluded).

ume of the urine. It was estimated at from two to three ounces daily. The examination of the urine showed, besides the immense numbers of pus cells, renal epithelium, a little bladder epithelium and a very few granular casts, these mostly in fragments; stained for tubercle bacilli, but none found.

The case was seen this evening by Dr. John H. Ripley, who concurred in the diagnosis of acute pyelitis, but suggested, in view of the wide fluctuations of temperature and recurring chills, that another trial be made with the quinine, with the belief that there might be a malarial element in the case, although the spleen was not now enlarged, nor had it been so at any time during the attack. It was decided to give it in large doses for twenty-four hours, and then to stop it if no benefit was seen. At Dr. Ripley's suggestion the quinine was given hypodermically.

During the next twenty-four hours thirty-six grains of bi-sulphate of quinine were injected beneath the skin, and as no untoward symptoms were seen and the child was improved, it was continued. During the succeeding twenty-four hours twenty-four grains were given in the same way, and in the third twenty-four hours twenty grains, making in all eighty grains of the bi-sulphate hypodermically in the seventy-two hours. The injections were all given deeply into the buttocks and outer aspect of the thigh. No unpleasant local or constitutional symptoms were seen as a result of these immense doses of quinine.

From the time the quinine was begun, the wide fluctuations in the temperature ceased, and it ranged from this time between 101 and 103°. There were no more chills. In other respects there was little change in the condition of the patient. The potash was continued, twenty to twenty-four grains daily, and as much lithia water given as the child would take. Hot fomentations over the kidneys were continued.

The urine ranged from sixteen to twenty-two ounces daily, the amount of pus being about four per cent. by

volume of the urine passed. Microscopical examinations were made daily. The report of the examination of February 17th, by Dr. Walter Mendelson, is a good average of the urine at this time: Spec. grav. 1007; faintly alkaline; a small amount of albumen; urea 3.6 grams in twenty-four hours; urates, phosphates and chlorides diminished; a trace of blood pigment; no indican. Microscopical examination: immense numbers of pus cells, a few red blood cells, a few blood and epithelial casts, bladder cells and many bacteria.

From February 17th to February 22d there was a steady improvement in the general condition and in all the symptoms, the temperature gradually declining until on the 22d, for the first time, it did not rise above 100°. Hot applications over the kidneys and potash in sufficient quantity to keep the urine neutral or slightly alkaline were continued. The quantity of pus slowly diminished. There was still a trace of albumen, and now and then an epithelial or granular cast would be found upon microscopical examination. Frequent examinations of the abdomen were made, but at no time was there tenderness or tumor in the region of the kidneys. The quinine had been gradually reduced now to six grains daily, a part of which was still given hypodermically. During the two weeks' illness the child lost 1½ pounds in weight and cut three molar teeth.

On February 23d the temperature took a sudden jump to 103.5°; this was not preceded by a chill nor accompanied by any other general symptoms, and a careful examination revealed no explanation of this increased fever. The quinine was now increased to sixteen grains daily, all given hypodermatically for twenty-four hours, and the temperature was immediately controlled. The quinine was then reduced to eight grains daily for three or four days, and then finally to three or four grains.

On March 1st both the quinine and the potash were stopped, as the child seemed in all respects convalescent. She was now taking thirty-five ounces of food a day, had gained five ounces in weight and had a good appetite.

There was only a very faint deposit of pus seen by the naked eye, but under the microscope the pus cells were still abundant.

For the next ten days the general improvement continued, the temperature ranging between 99 and 100.5°.

On March 10th a temperature of 101.5° was again reached, but was attributed to a slight sore throat. On the following day the temperature continued to rise; and a careful examination was made, but did not reveal any sufficient cause for the increased fever. The urinary conditions remained unchanged or slightly improved.

On March 12th the throat symptoms had diminished, but the temperature had risen to 103.5°, and quinine was therefore again begun, this time by the mouth and rectum. During the succeeding twenty-four hours twelve grains were retained, with the effect of controlling the temperature. It fell at once to 100°, and thereafter remained below that point.

On March 14th the child was taken to Lakewood, the urine still containing a trace of albumen, many pus cells, but no casts; reaction acid; spec. grav. 1010. Eight grains of quinine were given daily for four or five days, and six grains daily were kept up for two weeks, after which it was stopped altogether. No further rise in temperature occurred, and the child improved rapidly in every respect, gaining in two weeks one and a half pounds in weight.

At the site of the hypodermic injections of quinine there are now over the buttocks and thighs twenty or thirty irregular lumps, of a slightly brownish color about as large as an almond. These are not tender or painful, and show no disposition to suppurate. They have only recently come to the surface.

May 15th: it is now over three months since the beginning of the attack. The child is in splendid condition, one year old, weighing 22<sup>3</sup>/<sub>4</sub> lbs. The urine has been examined at intervals of a few weeks since the last note, and has always shown a good many pus cells under the microscope, although in other respects it is normal. The

nodules upon the thigh still remain, but are slowly diminishing in size. The child is now taken to Europe for the summer.

September 1st: Reported as having been free from urinary symptoms since last note.\*

*Remarks.*—Case I. was a simple one, of moderate severity, in which the diagnosis seems quite clear, and in which there is no reason to suspect any complication. There was a sudden onset, with a temperature of  $103.5^{\circ}$ , and an unexplained fever for a week, ranging most of the time between  $100$  and  $102^{\circ}$ . The urine was at first noticed to be scanty and high-colored, but no examination was made until the end of a week, when pus was found in large amount. The constitutional symptoms were only moderately severe. There was no evidence of any implication of the kidney, and the case made a prompt and complete recovery. There was nothing in this case to suggest a local cause, such as traumatism or calculus, balanitis or urethritis.

In Case II. the condition is a much more complicated one. The striking features of this case were a sudden onset with a chill, in a child who had been previously in perfect health and from birth under the close observation of one of the physicians, in fact living in the same house with him. For twelve days the temperature was steadily high, touching  $105^{\circ}$  almost every day, and on several occasions above this point, only temporary reduction being effected by baths. The early administration of quinine in doses of eight to ten grains daily had no effect whatever upon the symptoms. There was no evidence of local disease until the urine was examined on the eleventh day and found to contain a large amount of pus. With the administration of alkaline diuretics, and a great increase in the quantity of urine and the discharge of pus the temperature gradually fell, and after four days remained at the normal point. There seems to be no suspicion of malaria. The early administration of quinine had no ef-

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\* NOTE.—Specimen of urine Sept. 15th showed a considerable number of pus cells, but was otherwise normal.

fect whatever on the symptoms, and the temperature remained throughout steadily high, and not of remittent type. There were no evidences of vaginitis or cystitis. It is of interest to note that this case occurred at a time when grippe was prevalent in New York City, and it seemed not improbable that this may have been the etiological factor in the case. The occasional casts which were found, and renal epithelium, indicated that the kidney participated in the inflammatory process, but only to a very slight degree, as the rapid and permanent recovery of the case showed better than anything else. A surprising thing in this child was the absence of very marked prostration in spite of the prolonged high temperature. In fact, without the thermometer one would hardly have deemed the child seriously ill.

Case III. is in all respects a remarkable one. It resembles Case II. very closely in many particulars, in the age of the patient, the previous good health, the sudden onset with a chill, and in the excessively high temperature. What the exact etiology of this case was I am unable to say. The family history was a gouty one, and a grandmother of the patient has diabetes. An older child has been repeatedly under observation, with attacks of genital irritation accompanied by an excessively acid urine and the discharge of crystalline uric acid.

Were the recurring chills due to malarial poisoning, or were they septic? It should be remembered that this child had what would be considered very large doses of quinine during the first three days of the illness, but without any effect whatever upon the symptoms, and also that there was no enlargement of the spleen at any time during the attack. Furthermore that the child had never been exposed to any malarial poisoning, excepting such as may exist in the best residential portion of New York City. I regret that the blood was not examined. When the quinine was given hypodermically in the immense doses mentioned, viz. eighty grains of the bi-sulphate within three days, although the chills ceased, and the wide fluctuations in temperature were at once checked,



still a very decided fever continued and the disease itself did not seem to be affected. The effect of the quinine, it seems to me, admits of two explanations, the first that there was a malarial element in the case, and the second that the drug eliminated in such a large amount by the kidney had a marked antiseptic effect in the urinary tract. In view of all the facts I regard this explanation as more probable than the malarial theory.

In this case there was more evidence of implication of the kidney than in either of the foregoing, but even here the renal disease was evidently of very secondary importance. The amount of albumen was not more than would be expected from the quantity of pus present. The casts were few; and at many examinations none whatever could be found. A number of epithelial cells present was very much more distinctly of the bladder type, and others distinctly renal, with many intermediate forms between. It is now pretty well agreed that there is no peculiar epithelium in the pelvis, the form present being generally of the transitional variety.

In none of the cases reported was there any evidence of a local cause of the disease, either of traumatism or of calculus. In no one were there any previous or subsequent symptoms pointing to disease of the kidney, and in no one were there any minute calculi discovered at any of the examinations, although they were carefully looked for. In no case was there evidence of disease of the lower part of the urinary tract.

It seems difficult in view of the histories given to make any other diagnosis than that of acute pyelitis, arising probably from some infection carried to the kidney through the blood vessels. What the primary source of infection was it is impossible to say. That the pelvis of the kidney rather than the kidney itself should be affected also seems surprising, although the clinical course leaves no doubt in my mind that such was the case.

In conclusion I should like to call attention to the necessity of the examination of the urine in infancy in all acute diseases with doubtful symptoms. In a previous

communication to this Society I have reported a series of cases in which prolonged high temperature in infants depended upon an acute nephritis, apparently of primary origin. We must now add acute pyelitis to the causes which may give a very high temperature of a prolonged character.



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**DILLON BROWN, M. D.,**

Adjunct Professor of Pediatrics in the New York Polyclinic, etc.

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