that the primary malady was tuberculation. The large amount of serosity caused death by mechanical pressure. The anasarca was mainly due to visceral displacement, and, though the heart was not of itself diseased, the pericardium being filled with fluid, great interference was necessarily given to the normal action of a vital organ. In the other fatal case, No. 7, the operation was easily performed, and the benefit was immediate and decided. As the patient lived some days, her death which resulted, in an emaciated frame, from asthenia, could hardly with good grounds be attributed to thoracentesis. In case No. 11, the fruitless efforts to draw off the liquid were doubtless from long standing and extensive adhesions. Two punctures were made, but to continue plunging in the instrument when there was no exact knowledge as to the position of the heart, or when there became a great probability of wounding the lung, would have been unwarrantable. In No. 14, I am quite of opinion that the trocar and tube would have been more effective in the withdrawal of the fluid than the aspirator. The large amount of serosity and the immediate comfort and easier breathing which followed, were most satisfactory results. The operation in this man showed most conclusively how advantageously thoracentesis may be used as a palliative in pulmonary phthisis with effusion. In such complaint, paracentesis presents itself to our notice as one of the most decisive and effectual of remedial measures. In the little boy, No. 15, the operation was expeditious and beneficial. Occurring as the effusion did, as the complication with or sequel of one of the exanthems, it was pretty evident that the fluid would be purulent. In No. 16, the good results of the operation were more speedy and decided than in any other example of my own experience. The youth was gravely ill, extremely emaciated, and unquestionably in great peril. The outcome of the fluid was at once followed by amendment, and his recovery was absolute. In the little boy, No. 17, I have already expatiated on the advantageous employment of the small silver shield-tube.

ON THE EMPLOYMENT OF THORACENTESIS IN ACUTE PLEURITIC EFFUSION.*

BY HENRY F. A. GOODRIDGE, M.D.,
Senior Physician to the Royal United Hospital, Bath.

It is proposed in the following paper, first, to relate a case of acute pleurisy with effusion, in which, ordinary treatment failing, recourse was had to thoracentesis (strictly thoracocentesis); secondly, to offer some remarks on the value of this practice in acute pleuritic effusion generally; and, thirdly, to further illustrate the subject with a case in which ordinary treatment was successful. I shall venture to give the cases a little in detail, the object in view seeming to require this; and would premise that primary, and not at all secondary, pleurisy is here under consideration.

1. A schoolgirl, aged 13, accustomed to good health, felt quite well in the forenoon of July 3rd, 1873, and walked with ease a distance of between two and three miles. About 1 P.M., she was seized with pain in the left side. This gradually became more severe, and, although it did not much disturb her at night, was attended the following morning (July 4th) with loss of appetite and general disorder, so that she was brought at once to hospital for advice. It being now observed that her temperature was 101 degs., her pulse 120, and the left side of her chest nearly motionless, she was directed to become an in-patient, and was admitted as such in the course of the day.

July 5th.—The report was, that she slept well; the pain in the left side was less. On examination, the lower half of her left chest, posteriorly, was found to be dull on percussion, and yielded little or no vocal fremitus; the breathing here was very feeble; the voice at the angle of the scapula was ægophonic; the heart's beat was to the inner side of the left nipple. Her temperature was 99.4 degs. (rising to 100.6 degs. in the evening); her pulse was 138; her respirations were 42; she had no cough; she was somewhat pale in the face; her tongue had a white coat with prominent red papillæ; her bowels were opened twice in the twenty-four hours; her urine was high coloured, acid, of specific gravity 1.030, and presented a slight cloudiness on boiling and the addition of nitric acid. She was ordered to take four grains of mercury with chalk three times a day, and one ounce of the solution of acetate of ammonia mixture every six hours; also to have a diet of milk and beef-tea.

July 7th.† She had now no pain; she seemed to be able to lie on either side. The dullness was increased over the left chest, and accompanied with bronchial breathing; only the apex-region was free; under

the clavicle, there was a distinct tubular percussion-note. Her temperature was 99.2 degs. (evening temperature 101.4 degs.); her pulse was 140, and her respirations 40; her tongue was cleaner; her bowels were inclined to be relaxed; her urine was scanty. She was ordered to omit the medicines, and to take the sixteenth of a grain of biniodide of mercury along with two grains of iodide of potassium and four minims of tincture of digitalis, in one ounce of infusion of cloves, every six hours; also to have her left back blistered with epispastic liquid and afterwards dressed with cotton-wool.

July 10th. Her urine was a little increased in quantity; her nostrils were inflated at each inspiration; the physical signs were much the same.

July 14th. She had not good sleep; she now lay continually on her left side. There was universal dullness, with absence of vocal fremitus over the left chest; a considerable amount, however, of bronchial breathing was audible; her heart was pushed over to the right side. Her temperature was 100.2 degs. (evening, 102.4 degs.); her pulse was 148, and her respirations 48.

July 15th. She had not much sleep again; her bowels were relaxed. Her left chest at the level of the nipple measured three-quarters of an inch more than her right, and was quite immobile; her heart's apex beat at the right nipple; the breathing of the right lung was much exaggerated. Her temperature was 100.2 degs.; her pulse was 144; her respirations were 48. It was now determined to resort to thoracentesis. Accordingly, at 1.30 P.M., the resident medical officer, Mr. Waller, introduced one of the fine trocars of a Dieulafoy's aspirator into the eighth intercostal space near the angle of the scapula, and, the syringe being attached, forty-five ounces of tolerably clear straw-coloured fluid were drawn off, which, in the course of half an hour, coagulated into a gelatinous mass. Resonance on percussion now reappeared at the upper part of the chest. The opening was instantly closed upon withdrawal of the cannula. The patient had a little troublesome cough during the process, but was calm and comfortable afterwards. At 9 P.M., she was lying on the right side; she had been sleeping on and off since the operation; had had more cough than before it was performed, but she did not expectorate; she was perspiring rather freely; her temperature was 103.8 degs.; her pulse 138; her respirations 54; her heart's beat was still on the right of sternum. She was ordered to continue the draught.

July 16th. She felt better; her cough was less; she had not expectorated; her temperature was 100.2 degs. (evening, 102 degs.); her pulse was 132, and her respirations were 36; her tongue was clean, and her appetite was returning. At the left apex, the stroke-sound was better, also the breath-sound; but in the infrascapular fossa, where, immediately after the tapping, fair pulmonary resonance had returned, there was more or less dullness; the heart's apex was about one inch and a half above and to the inner side of the right nipple. No friction-sound was detectable anywhere. She was ordered to continue the draught, and to take in addition, the same evening at bedtime, two grains of antimonial powder, with one and a half grains of sulphate of quinine, in the form of pill; and to have half-diet.

July 17th. She slept well, and seemed much better; she had no cough to speak of. There was tolerably good resonance over the uppermost region of the left chest, except in the axilla; the breathing was markedly bronchial about the level of the nipple, but was more open towards the apex; ægophony was present in the infrascapular fossa. Her temperature was 101.4 degs. (evening, 102.8 degs.); her pulse was 144, and her respirations 56.

July 18th. There was some amount of resonance on percussion as low as the angle of the scapula, and vocal fremitus was perceptible as far as the middle of that bone; but both were nearly absent in the axillary region. She was passing more urine, and otherwise progressing favourably.

July 20th. There was a decidedly better stroke-sound at the upper left chest, particularly behind, and the vocal fremitus extended to a lower level. Her temperature had averaged lately 100 degs. (evening, 102.2 degs.); her pulse was 140, and her respirations 48; her bowels were still disposed to be relaxed. She was ordered to continue the draught, but without the digitalis, and to take two grains of sulphate of quinine in pill night and morning, and one teaspoonful of cod-liver oil twice a day after meals.

July 22nd. Vocal fremitus was distinct now in the axilla, and generally in the upper half of the left chest; the dullness was not quite so intense at the base; the voice was ægophonic about the angle of the scapula. Her temperature had fallen to 99.8 degs. (evening, 101.2 degs.)

July 24th. There was increased area of vocal fremitus, and less extent of bronchial breathing; the heart was gradually returning to its normal situation.

* Read before the Bath and Bristol Branch.

† The writer's charge of the case commenced at this date.

July 25th. Slight friction-sound was present at the angle of the scapula, in the axilla, and just above the nipple. The left chest now measured less than the right by a quarter of an inch. Her temperature was 98.4 (evening, 100.6); her pulse was 116; her respirations 36; her appetite was good. She was ordered to continue the medicines, and to have the iodide of potassium with soap liniment rubbed into the left chest night and morning.

July 28th. There was further extension of resonance on percussion and of vocal fremitus; the bronchial type of breathing had nearly disappeared, pulmonary vesicular murmur taking its place; some grazing friction-sound was still present about the angle of the scapula; the stomach-note was high. Her temperature was almost normal. She was ordered to omit the draught and pill, and to take one ounce of the mixture of citrate of iron and quinine three times a day, continuing the cod-liver oil and the use of the liniment.

August 1st. Vocal fremitus could be felt almost to the base; there was now no friction-sound nor ægophony; the heart's apex beat at the left nipple.

August 5th. There was good percussion resonance all over the left chest, except at the base, where it was still impaired; vocal fremitus was present more or less everywhere; the inspiratory murmur was weak at the base; the left chest measured less than the right by five-eighths of an inch.

August 9th. She was gaining flesh and resuming her healthy looks.

August 22nd. She was discharged recovered. She was detained some ten days, on account of toothache with gum-boil, and also for observation.

Here, then, was a case of acute unilateral pleurisy, coming under treatment on the third day of attack, but advancing, in spite of the ordinary remedies, to very copious liquid effusion on the twelfth day, when, thoracentesis being performed, and forty-five ounces of fluid removed, absorption became active, convalescence ensued, and complete recovery* was attained by about the fortieth day.

2. The foregoing is only another to add to an already pretty numerous list of cases that have been recorded within the last few years, the manifest teaching of which is, that thoracentesis should be employed in the treatment of acute pleurisy much more frequently than heretofore. It is unnecessary to observe that, until a very recent period, this measure was universally regarded as a *dernier ressort*, appropriate only to a few exceptional conditions, as, *e.g.*, when asphyxia is impending. There seems to have been a tendency, on the one hand, to overrate the efficacy of medication, and, on the other, to view tapping the chest as a dangerous expedient to be avoided, if possible; while, not altogether unsanctioned by authority, a notion has spread abroad that acute primary pleurisy is a disease of but little gravity. It cannot be doubted by any unprejudiced person that very good results (*quoad* the effusion, that is) have frequently followed the use, internally or externally, or both, of the preparations of mercury, iodine, and other medicines, that directly or indirectly promote absorption, conjoined or not with vesication to the affected side. But it is equally true that not seldom these measures fail, the case passing on to the chronic condition, empyema, or, more correctly, pyothorax, with its attendant aggravations, where indeed, by common consent, thoracentesis is the only resource. Moreover, the operation of these medicaments is gradual and slow, and, to accomplish their purpose, considerable time is required, which in the case of large effusions is an important point; for, in respect to the gravity of the disease, it cannot be too strongly insisted on that a patient with his pleura distended with fluid, and with his lung in the same ratio compressed, and his heart dislocated, is in a state of serious jeopardy. Sudden asphyxia or fatal syncope is not at all an imaginary event under such circumstances. Thus, as an instance of the latter, which, many years ago, I witnessed, a strong healthy man, in the second week of an attack of pleurisy, with his pleura full of serous effusion (between three and four quarts, determined *post mortem*), and at the time under mercurial and other treatment, while being assisted to stool, suddenly fell back in the attendant's arms and expired. Trousseau and others have recorded similar instances. But there is another view of the case. As has been well pointed out by Dr. George Johnson (BRITISH MEDICAL JOURNAL, October 25th, 1873), pleural distension produced in this way is in itself a material impediment to absorption by the obstruction it causes to the circulation. Hence no doubt some, though obviously not all, of the failures in therapeutic treatment. And, again, where the quantity of fluid is less copious, a correct appreciation of the pathological changes that must ensue whenever a pleuritic effusion stagnates for more than a very limited period, will dispose one to concur in the remark of Niemeyer (*Text-book of Practical Medicine*, American

translation, vol. i, p. 273), that "every additional day during which the lung is exposed to pressure, and time is allowed for cells to multiply in the exudation, the chances of complete recovery diminish, and the danger of a fatal termination increases"; and yet, further, as no practical man can believe in the unalloyed good of a prolonged course of mercury and iodine to a patient, unless syphilitic, it may be observed that every additional day of this medication that can be dispensed with is so much gain on the side of health and vigour. Any measure, then, which will expedite the removal of the liquid effusion must have a powerful claim to adoption, unless indeed it should happen that it carries with it an objection of its own sufficient to outweigh this advantage. And just so has it been with thoracentesis. The risk of air getting into the pleural cavity, and setting up mischief there, has been a constant bugbear in the way of its employment, and, it cannot be doubted, has prevented its use in numberless cases where it would have been of the utmost value. But, with the progress of modern invention, this objection (whether in any degree fanciful or not) can no longer apply. The improved instruments, in particular the pneumatic aspirator, furnish very complete security against the entrance of air; and, in reference to this and other minor dangers that have been apprehended, it may be now fearlessly asserted, permit the operation being conducted so as to be perfectly harmless. The number of those who, their experience bearing witness to the safety of thoracentesis, have advocated it as a method of treatment in acute pleurisy, and have published cases accordingly, is considerable. Dr. Bowditch of Boston, U. S., it need not be said, is pre-eminent among them. He, it seems, has operated some two hundred and fifty times (acute and chronic cases together) without once seeing any evil, or even any very distressing symptoms result therefrom. He thinks, indeed, that we may operate in any case where the quantity of fluid is obviously so large as to seriously obstruct the greater part of a lung, as, *e.g.*, when the level of the fluid seems to rise to the middle of the back, and, in so doing, oppresses the respiratory murmur in the entire organ (*Practitioner*, No. 58). M. Paul, a disciple of Trousseau, himself the acknowledged originator of this method of treatment, insists upon the value of thoracentesis in cases both of moderate and of copious effusion (*Bulletin Général de Thérapeutique*, tome lxxxi). But I mention his name principally on account of an observation which he has made, and which he proposes to utilise as an aid to prognosis. He states that, whenever the fluid readily coagulates after its exit, the effusion will not recur, or, if it do recur, will do so in so small a quantity as to be soon reabsorbed. The case that has been narrated is in accord with this. There did appear certainly to be some renewed effusion on the day following the operation, but it clearly was soon reabsorbed. The explanation perhaps is, that, whilst the liquid effusion remains at once so rich in fibrine and so poor in pus as to coagulate thus, false membranous deposits on the pleura have not yet occurred to such an extent and thickness as to present any insuperable obstacle to absorption, on the one hand, or to expansion of the lung, on the other. Referring once again to the example given, it may be observed that, although it was found convenient to remove forty-five ounces of the effusion, it was by no means sought to extract the whole of it; the object being, as generally recognised, not so much this, which possibly might be attended with harm, as to relieve mechanical tension and remove pressure, and thereby give free scope to the absorbent processes; and, with this view, the continuance of the other remedies is not only consistent, but appropriate. To carry out the illustration of the subject, a second case may now be cited in several respects very parallel to the first, and equally successful as to the ultimate removal of the local disorder, but treated upon the ordinary and non-tapping plan. It is selected from my hospital cases, and dates, to explain an omission, from before the era of clinical thermometry.

3. A boy, aged 12 years, was admitted on September 1st with pain in his left side, dry hacking cough, loss of appetite, and weakness, all of a fortnight's standing. He was daily getting worse, and now had become thin and pale, and had much dyspnoea on exertion. His left chest was found to be motionless, and to measure at the level of the nipple more than the right; it was completely dull on percussion both behind and in front, the dullness extending here across the middle line, and it yielded no vocal fremitus. Some weak respiration was heard in most parts of it, of blowing type. His heart's apex beat half an inch below, and rather to the outside of, the right nipple, and his liver projected in the epigastrium. He lay continually on his left side. His pulse was 100, very small and weak, and his respirations 60 in the minute. His skin was hot, his tongue furred, his bowels regular, his urine scanty. He was ordered to take two grains of calomel, with the eighth of a grain of opium, in the form of a pill, every second hour, and to have a large blister applied to his left back, to be dressed with mercurial ointment; and to have milk and beef-tea for his diet.

September 2nd. He had a very restless night, with delirium; but, at

* This expression is used, of course, within the limits imposed by pathology; the permanent adhesion in these cases affords proof that anatomically the *status quo ante* is never regained.

the visit, said he had less pain and felt better. The blister had risen well. His pulse was 108, and his respirations 36.

September 3rd. He had a better night; the mercury was beginning to affect his gums. He was ordered to take the pill every fourth hour only, and the opium in it to be increased to a quarter of a grain.

September 5th. He was feeling better; his mouth was distinctly, but not unduly, under the influence of the mercury; as yet, however, there was no manifest reduction of the effusion. He was ordered to take the pill twice a day only.

September 6th. He could now lie on his right side. There was a decided return of resonance on percussion over the left chest behind, with increased amount of respiration audible. He was ordered to omit the calomel and opium, and to take three grains of blue pill, with one grain of powder of squill and half a grain of powder of digitalis, in the form of pill, twice a day.

September 8th. Resonance on percussion was returning beneath the left clavicle and downwards in front; the heart was beginning to recede; the epigastrium was flaccid. He was ordered to omit the pill, and to take fifteen minims of the compound tincture of iodine in one ounce of water three times a day. The following day, he was put upon half-diet.

September 13th. He was progressing very favourably. Resonance on percussion was returning generally over the left chest, with vocal fremitus in the upper portion; a grazing friction-sound was observed in the infra-axillary region when the patient lay upon his right side; the voice was egophonic about the angle of the scapula; the heart's apex was under the sternum. His pulse was 88; his respirations 28; he had no pain nor cough; his gums had recovered from the effects of the mercury; his tongue was clean and moist; his appetite was good. He was ordered to omit the draught, and to take five grains of iodide of potassium in one ounce of decoction of bark three times a day.

September 17th. He was still making good progress, and was now to have meat every day.

September 21st. The iodide of potassium draught was exchanged for the syrup of the iodide of iron, one teaspoonful three times a day; he was also ordered to have another blister, to be applied to the left base.

October 5th. His convalescence had continued uninterrupted. The upper left chest had regained pretty completely its normal stroke-sound, and there was only a trifling deficiency of same inferiorly; the vocal fremitus was more or less everywhere present; a little weakness of respiration remained towards the base, but distinct vesicular murmur was audible above; the heart's apex was felt as near as possible to the left nipple; his left chest at this level now measured one inch less than his right. The following day (October 6th), the patient was discharged recovered, being the thirty-sixth of his stay in hospital and the fiftieth of his attack.

Satisfactory as was the issue of this case, in presence of the considerations before adduced, the comparative disadvantages of its treatment can hardly be overlooked. I will just mention them in conclusion.

1. The uncertainty of success, which uncertainty, it is maintained, cannot, in anything like equal degree, if at all, be predicated of thoracentesis practised with due precautions, and with the improved instruments; practised, in short, as it now is.

2. The prolongation of the period of danger here represented by the four or five days following the admission of the patient. Sudden death was then a liability, and the youth of the subject would afford no adequate protection against it.

3. The length of time under treatment, and the comparative slowness of convalescence.

CASE OF EMPYEMA TREATED BY THORACENTESIS.

By WILLIAM DATE, M.R.C.S.Eng., Crewkerne.

J. C., aged 29, a strong healthy-looking agricultural labourer, had never had a day's serious illness in his life. On May 25th, while at work, he was seized with shivering, faintness, etc., which proved to be the commencement of an attack of acute right pneumonia. This followed the typical course, with much pyrexia, rusty sputa, etc. About the eighth day, the fever abated, and he appeared about to recover; but the improvement did not go on; the rate of respiration continued above 36, and the pulse about 100. On examining the chest to discover the cause of this check, I found that the right pleura was about half full of fluid. (It is unnecessary to give detailed notes of this part of the case. Suffice it to say that he was treated with blisters, diuretics, and iron; and that the effusion gradually increased.)

June 26th. He had lost flesh since the commencement of his illness,

and felt weak. Pulse 110; respirations 45; temperature 102 deg. The cough was at times troublesome; he expectorated a whitish frothy mucus. There was no acute pain. There was complete dullness on percussion all over the right half of the chest, except just below the clavicle in front and between the spine and the scapula behind. Over this area of dullness, the breath and voice sounds were extinguished, and there was no vocal fremitus. Liver-dullness extended nearly as low as the umbilicus. The heart's impulse could be felt half an inch to the left of a line dropped perpendicularly from the nipple. Measurement an inch below the nipples gave: right side, 18¼ inches; left side, 17½ inches. There was not much bulging of the intercostal spaces. As the man was becoming worse in spite of treatment, I tapped his chest to-day with the aspirator (Weiss'), and drew off about ten ounces of greenish pus. I used the small needle first; but it became obstructed, and the pus would not flow. I then substituted the large needle (No. 4), but even this became blocked by flakes of lymph. He complained very much of the pain caused by withdrawing and reinserting the needle, and I desisted. Even with this small quantity withdrawn, he expressed himself as being more comfortable.

July 2nd. Since the operation, he had been worse. The breathing had gradually become more hurried, with frequent attacks of dyspnoea. He had lost flesh and strength rapidly. The dullness over the right chest was now complete; breathing was only heard faintly close to the spine (transmitted through the spine from the left lung?). Breathing over the left lung was puerile, with slight mucous râles. The right side now measured 19¼ inches, and the intercostal spaces bulged considerably; the left side, 17½ inches. The liver was as low as the umbilicus. The heart's impulse was two inches to the left of the nipple-line. Pulse 131; respirations 46; temperature 101.8 deg. I tapped again with the large needle, and drew off six pints of pus free from fœtor. The same difficulty as before was experienced from the needle becoming obstructed; but this time I adopted a plan to avoid the necessity of withdrawing the needle. I removed the tube from the exhausted bottle, and plunged the end into a basin of warm water, keeping the sides of the India-rubber tube squeezed tightly together, to prevent the entrance of air. Under water, this end was connected with a Higginson's syringe, from which all air had been previously pumped. Two or three syringefuls of water thrown into the chest sufficed to clear the needle, which was again attached to the aspirator with the same precautions against the admission of air. This proceeding was required three times during the operation.

July 4th. He seemed better since the tapping, said he felt "slacker", and had been able to take more food. Pulse 120; respirations 38; temperature 99.7 deg. Dullness behind now extended up to the angle of the scapula; in front, up to the right nipple. The lower edge of the liver was three inches higher. The heart's impulse was immediately below the left nipple. The breath and voice sounds could be heard above the dull area in a muffled manner, with mucous râles. The measurement of the right chest was 18 inches; of the left chest, 17½ inches.

July 9th. He was worse since last report, and lost flesh and strength. Fluid had accumulated again, although not quite to the previous extent. The dull area, with absence of breath and voice sounds and vocal fremitus, extended now up to the spine of the scapula. The heart's impulse was half an inch to the left of the nipple-line. Pulse 143; respirations 47; temperature 100.4 deg. Measurement gave: right chest 18½ inches; left chest, 17¼ inches. At his own urgent request, he was again tapped to-day, and about five pints of foetid pus were drawn off by the aspirator. Three pints of solution of carbolic acid in water (1 in 100) were injected through the needle, and withdrawn, all but half a pint, by the aspirator.

July 16th. The subjective symptoms had been much relieved by the tapping, and there was great improvement in the physical signs. He slept well and felt comfortable. The cough, previously troublesome, was relieved. The right chest now was resonant everywhere except about the lower fourth, although the percussion-note was not so clear as on the left side. The breath and voice sounds corresponded to the area of dullness; that is to say, they could be heard over the upper part of the chest, gradually becoming fainter towards the lower fourth of the chest, and there inaudible. They were nowhere so clear as over the left side. The heart beat an inch to the right of the nipple-line. The breathing over the left lung was puerile, with rhonchus under the clavicle. Pulse 140; respirations 37; temperature 101 deg. Measurement gave: right chest, 17½ inches; left chest, 17½ inches.

July 18th. Notwithstanding the improvement in some of the symptoms, he continued to grow weaker and weaker, and during the last twenty-four hours had been evidently sinking from exhaustion. Just after midnight, while he was vomiting, he suddenly fell back in bed, and died in a few minutes.

REMARKS.—Cases of empyema are among the most difficult and un-