Observations upon the Modes of treatment of Pleurisy, with Effusion: With special reference to the Therapeutic Value of Thoracentesis.

Joseph Carneiro
I. Preface

More than four centuries before the commencement of the Christian era, a disease, characterized by fever and severe pain in the side, had been differentiated from other morbid states, and had received the name, Pneumonia.

That Hippocrates had a good knowledge of this disease, is beyond doubt, for he has left precise directions for its proper treatment.

Yet, his clinical methods of examination were, as we know, very crude; for, we find him saying: "That none of these diseases are to be expected before puberty." He then mentions a number of diseases, and amongst others Pneumonia and Pneumonia!

But, however faulty his methods of clinical examination may have been, his extraordinary power of observation led him to follow a mode of "Of Air, Water and Situation."
of treatment, which is essentially the same as that now followed by many physicians. That he must often have missed prosperity, when it was really present; and have diagnosed it, when it did not exist, is more than probable. But yet his observation taught him to believe, as he says in his "Practicks," that a sharp's pain in the side, accompanied by long fever, would most likely end in pus; and it also taught him, that an empyema of the left side, was more likely to recover, than one on the right side.

Quite lately, Dr. Cheadle* has published the records of thirty-three cases of empyema; 16 of which were right, 17 were left. Of the former, only seven recovered, and of the latter, 15 recovered. He further stated, that it was his experience, that an empyema of the right side, was less apt to recover, than one on the left. And appeared to take some

some credit to himself, for being the first physician, who, had pointed out, this very remarkable clinical fact. Aran, made
such the same observation, however, about the year 1860, and we also have seen that the fact had been perfectly
well known to the Father of Medicine, nearly twenty-three centuries ago.

The severity of Hippocrates may have often saved him from error; but those who came after him, must
frequently have gone astray, in diagnosing the disease of pleurisy.

Galen distinguished pleurisy,
from Pneumonia and Peripneumonia. But, in
much later times, Sydenham was doubtful of
the Pathology of the disease; and our famous
Countryman, Cullen, believed it was an
inflammation of the lung. He divided
Pleurisy into Simple Pleurisy, Combined Pleurisy,
Symptomatic Pleurisy, and False Pleurisy;
thus leading one to suspect that he had
not differentiated Pleurisy, Pleurodynia.

It was a Benchman, Philippus Piel,
who, first pointed out, that Pleurisy was a serous inflammation.

But it was reserved for the genius of another Frenchman, René Laennec, to place the Pathology of Pleurisy on a satisfactory basis, and to lay down precise rules, by which, the disease might be diagnosed. However much modern science, may have modified some of Laennec's views, the broad lines of his teaching, are still adhered to.

No disease, has, perhaps, been treated in a greater variety of ways, than Pleurisy. Some have attempted, as we shall see, to remove the fluid exudation, from the Pleural cavities, by means of sudorifics. This form of treatment, was pursued, by Paracelsus; and at the present day, has found its advocates in Bartholow, Braueridge, and others, who, have exhibited laborandi, as a diaphoretic agent. Drastic purgatives, were advocated, by Sydenham, and have of late been employed. Withdrawal of the fluid by Diuretics, has always been, and is still the plan followed by.
by a large body of Physicians. The employment of that powerful diuretic, Digitalis, we owe to the earnest advocacy of Simeons Darwin.

Mercury, and Iodide of Potassium, in later times, have been largely employed; on account of their action on the absorbing action, denied by some, but believed in by many.

Counter irritants, in some form or other, have been employed, from the earliest times.

Blood-letting, sometimes to a large extent, held a dominant position, for many centuries, in the treatment of Pernicious and its memory is still fondly cherished by some Physicians, of the older school.

Paracentesis Thoracis, by the Cantury, trepan, or Knife, was advocated by Hippocrates. Of these methods the Cantury fell into disuse in the Eighteenth Century. Trepanning a rib was revived, by a French Surgeon, in our own time.

The use of the Trocar instead of the Knife
Knife, was first advocated by Drowning in the Sixteenth Century.

Thoracentesis though practiced occasionally, for many centuries, was yet looked upon as a dangerous operation; and one not to be employed, except as a dernier resort.

Trousseau in France, and Bowditch in America, have however not taken such a gloomy view of Thoracentesis: and have urged Physicians, to resort to it, much more generally, than it had formerly, been thought right to do.

Both these Physicians, base their support of a more general practice of Thoracentesis, upon the entire absence of any danger, in the operation. Bowditch goes so far as to say, that there is no more danger in Thoracentesis, than in vaccination or trephination.

It was, that, I might form for myself, some real opinion concerning the different modes of treating Pleuritis, with effusion, and also that I might see for myself
myself, the exact value, of the confidence assertions of Rousseau & Bowditch, I had been led to doubt the accuracy of their statements, by knowing that my former teacher, the lamented Professor Sanders had lost a patient, while performing the operation of thoracentesis) that the following inquiry was instituted; and if my study of the different modes of treatment of pleuritis, has led me to adopt views, about thoracentesis, which are at variance with those entertained by the severity of writers on pleurisy, I trust nevertheless, that the arguments I shall bring forward, in support of my opinions, may be deemed, not unworthy, of serious consideration.
In instituting an enquiry into the different modes of treatment, that have been, or are at present in use, for the relief of Pneumonia with effusion, the attention of the inquirer is at once arrested by one method of treatment, Paracentesis Thoracis, or the puncturing of the thorax and withdrawing the fluid from the pleural cavity. This plan was recommended, and apparently practised, by Hippocrates. It has been revived in modern times, and is, at the present day, advocated by many Physicians in the most enthusiastic, not to say dogmatic manner.

It is more particularly, to the question of the therapeutic value of the operation, that I propose to limit myself in this Thesis; and, in proceeding to discuss the subject, it will be most convenient, to do so, in reference to the advantages claimed for it by its supporters. These may be held as resolving themselves...
themselves into two main points.

1. Certain beneficial results to be derived

2. Certain dangers to be obviated.

I shall therefore have to consider whether these alleged advantages, are so great as the supporters of Thoracentesis would have us believe; or whether the supposed dangers to be obviated have sufficient clinical importance, to justify the operation; and on the other hand, whether there are not certain dangers, both immediate and remote, liable to follow the operation, which, if they are proved to exist, must always prevent Thoracentesis from becoming a routine practice, for the relief of Pleurisy with Effusion. For routine practice, for that this operation is not only justifiable, but absolutely essential, to the saving of life, in some rare instances I freely admit; what I do not aver is, that in most instances of the malady, in question, Thoracentesis is unnecessary.

Having attempted to estimate the Therapeutic Value of Thoracentesis, I shall then attempt to compare the results obtained
by other methods of treatment.

I have first to consider, the so-called, advantages of Thoracentesis. The immediate object of the operation, is to relieve the compression of the lung, by the effused fluid, and to allow it to reexpand.

Every person, who has witnessed the operation of Thoracentesis, whose successful, must be ready to admit, the immediate and distinct relief it affords to some of the symptoms of the patient. The severity of the Dyspnœa, when present, is mitigated; I say, when present, for a man may have an enormous amount of fluid, in the pleural cavity, without any particular feeling of breathlessness.*

Whether this relief experienced, in consequence of the operation is permanent or not, does not at present concern us.

But it does concern us, perhaps, in this connection, to point out, that, the general tendency of modern medicine is to attempt to treat the disease, and not the mere symptoms of the disease; and

* For an instance of this see Appendix Case 40
nobody yet, I believe, attempted to prove, that Thoracentesis has any remedial effect, upon the disease, pleuritis.

So far then it may be conceded, that the operation under discussion, to a certain extent, fulfils the expectations of its advocates. But on the other hand, it can hardly be denied, that the relief afforded by the operation is only, as a rule, temporary: I say, as a rule, for even such an ardent advocate of Thoracentesis, as Trousselot says, *"I have no objection to admit that effusion may be reproduced to such an extent as to necessitate a repetition of the tapping."

But he qualifies this concession by adding, "But what objection can there be to the repetition of an operation, which is absolutely without danger."

This question of danger attending the operation, will fall to be considered further on, for unquestionably, it is upon this, that much of the therapeutic interest and importance of the question turns. If Trousselot is right, in saying, that there is no danger in the operation; then I say, it is inconceivable, why physicians should ever

* Clinical Medicine Vol. III page 283.
pause before having recourse to Thoracentesis; it should, in fact, be the routine practice, for the relief of pleuritic effusion. If, however, it can be shown, and I think it can, that distinct dangers both immediate, and remote attend the operation of Thoracentesis, while the relief afforded by it is not permanent, then I contend, that even under my first heading, Thoracentesis does not carry out the spirit of its promise, though it appears to do so in the letter.

In his classical work, on Diseases of the Lung,* Dr. W. H. Walshe observes: "The continuance, of the secretion from the pleural surface, for a greater or less period, and hence the constant renewal of Erysipela is of very common occurrence." Walshe uses the word Erysipela as signifying a fluid collection in the pleural sac.*

In Hints Principles and Practice of Medicine* we learn that Bowditch operated.

* Page 288.
* See Note at Page 278.
* Page 146.
operated 750 times, on 154 Patients. Such statements, appear to me to warrant the observation that, the relief afforded by the operation, is as a rule only temporary; when we find that in 154 patients, the operation was performed on an average, 1.7 times, on each one of them.

Præntzel, author of the elaborate article on Pleurisy, in Siemens’s Cyclopaedia, might also be quoted in this connection; but the three authorities I have already brought forward are surely sufficient, to prove the correctness of my assertion, that the relief afforded by operative interference, is as a rule only temporary.

I am tempted, before passing on to the second part of my subject, to compare, for a moment, the recourse to Thoracentesis, for the relief of symptoms, due to pleuritic effusion, to the use of Alcohol as a Therapeutic Agent: Here doubtless are times, in certain cases of pleuritic effusion, when life can only be saved by Thoracentesis; as there are cases, in other diseases, when Collapse sets in; for instance, (one such case is indelibly fixed in my memory) where all Therapeutic Agents failed entirely to sustain life.
life, keep alcohol in large doses. But while I
frown the value of alcohol in such extreme
cases, no physician I suppose, would dream
of ordering alcohol for the relief of mental or
bodily depression, symptoms, which it is
well known, may be relieved, not perhaps so
instantaneously, but on the other hand more
permanently, and with less danger, by other
therapeutic agents. As with Thoracentesis,
if death is imminent, it may be the only
means of saving life; but, why have recourse
to it in less urgent cases; in which, a cure
may be affected by other means, not perhaps
so rapidly, but with far less risk to the
patient?

To proceed to a consideration
of the alleged dangers to be obviated by Thora-
centesis. These bear reference to the presence,
in the thoracic cavity, of a large effusion
and are chiefly the following four:
1. Sudden Death.
2. Convulsion of Serum into Pus.
3. Collapse & Carification &
We shall look at these a little in detail viz.: (1) Sudden Death may occur in patients who are suffering from Pleuritic Effusion; as has been noted by several observers, amongst others Trouseau, who says* "It is not unusual for persons, with extensive pleuritic Effusion, to sink all at once..... death takes place from Syncope.".

The fact that sudden death, under these circumstances, does sometimes occur is incontestable; but such occurrences, are by no means universally regarded, as depending on the amount of effusion. For such a high authority as Becker*, asserts most strongly that, these sudden deaths, are not due to the large amount of fluid, in the pleural cavity, but that they are, rather, the result of the antecedent pleuritis, which, has produced fatty degeneration of the heart.

West, in his Diseases of Children says* In most of these cases (i.e. of sudden death)

* Clinical Medicine Vol III, page 221
* Walshe Diseases of the Chest, page 284
* Berliner klinische wochenschrift, Vol II 1874, page 514
* Page 372.
however, which, I have seen terminate fatally; the disease, though it began in the pleural cavity, continued limited to it, but extended, rather, to the pulmonary substance or the pericardium.

Thus, though fresh but indirectly supports Becker, he never the less appears directly to oppose Trouseau’s idea; that the sudden death is due merely to the presence of fluid in the pleural cavity.

The only case of sudden death, that is in my own knowledge, occurred in a case of erysipela. In this patient the post mortem revealed serious pericardial mischief.

2. Conversion after a lapse of time of a serous into a purulent Collection.

This has been asserted by nearly if not all, writers on pleurisy, but have not succeeded in finding any evidence, to show that it is true, and a priori, it is difficult to understand by what means, a serous effusion, in an air tight sac, could become purulent, unless its presence in the pleural sac, kindled anew the inflammation of the pleural.

* See appendix Case 41.
pleural surface, and thus caused an effusion of pus. Every pleural effusion, is composed of four constituents: namely, serous, fibrin, red blood corpuscles, and pus cells, and the effusion is called serous, haemorrhagic or purulent according to the relative proportion of each of these constituents.*

Now, the effusion having taken place into the pleural cavity, and being serous, it is difficult to understand where the pus could come from? The serum itself could not be converted into pus, the red blood cells, that are normally present in the effusion, could hardly be expected to turn into leucocytes. If however, a fresh inflammation is set up in the pleura, of course the result may be a purulent effusion.

Dr. Smith, in his work above alluded to, says* that "the change in the fluid, from a serous to a purulent one, may be observed, by the use of the Hypodermic Syringes, at different periods." I am quite ready to admit that

* C. Smith's Diseases of Infancy and Childhood page 576
* Same page 578.
That such a phenomenon might be observed, but, I am also justified, in hearing it as open to question, whether this change might not have been brought about, by the too free use of a possibly septic, hypodermic syringe?

Mr Thompson, Surgeon to the Tyrone County Hospital, in a very able article on the treatment of pleurisy, mentions a case, in his own practice, of a lad who had suffered from acute pleurisy, with effusion; who, carried this collection of fluid in his pleural sac, for three months. He was treated medicinally, and the effusion was at last absorbed; the patient, ever since, has been in excellent health.

Many similar instances could be brought forward, but this one is enough to show, that, serum, may be retained in the pleural cavity, for such a long time as 90 days or yet, not show any tendency to become purulent. It ought, perhaps, to be added, that, in the case recorded, Mr Thompson, did not add to his patient’s discomfort, by exploring his thorax with a hypodermic syringe at different times.

*British Medical Journal 12 Nov. 1881 page 773.*
time in order to see how the fluid was settling on.

Dr. West, may be counted, as against the necessity for thoracentesis, in this connection: this he is not especially referring to the subject at present treated of. In his above mentioned work he says, "I believe that so long as the child's health is improving, or at least not deteriorating, as the temperature has not begun to rise; as respiration is not growing more hurried... while measurements of chest prove the effused fluid not to be on the increase; we may pursue in the employment of the means already indicated" (these means are certain therapeutic agents he had previously named). Thus it appears that, Dr. West does not consider that there is any particular danger, if the fluid becoming florulent; or else, surely such an able and careful writer, would have insisted on the propriety of placing his patients out of the way of such a danger. This he does not do, therefore I think we have a right to suppose, that, he does not believe in the

\* Page 381.
Existence of the danger. Walsh in his above quoted Book* says "The fluid may be sero-albuminous in cases that have lasted for weeks."
See also "Case 42" in Appendix where we find a patient was tapped on 62nd day of the disease & 45 ounces of serum were drawn off — See also "Case 47" of a patient who was discharged from the Hospital, with fluid unabsorbed, in His pleura it was seen 9 months after in good health, but the fluid was unabsorbed; after this long period the fluid was yet evidently not purulent.

(3) Collapse & Carnification.

Collapse and Carnification of the lung, produced after a time, by fibrous bands of lymph, binding down the lung; followed by the falling up of the ribs, and consequent deformity of the side. This is one of the results that have to be feared. As a sequela of extensive effusion, into the pleural sac; nevertheless the fear of this result alone, ought not, I submit, to drive us to the performance.

* Page 275.
performance of Thoracentesis, an operation, which, as will hereafter appear, is attended by both immediate and remote dangers to the patient. But, I do not wish to deny that the lung may be bound down permanently by the adhesions; it the side consequently become deformed - yet, we have seen from the cases, above mentioned, that an extensive effusion may remain in the pleural sac for 90 days, and yet, the lung may entirely escape without any of the bad results, that the Advocates of Thoracentesis, insist must happen to it.

Again, let us take the opinion of Dr. Ewald, himself an ardent Advocate of Thoracentesis*. He urges the performance of Thoracentesis, in order that, the patient may avoid, amongst other dangers, the one under immediate discussion; and, yet, in the same page, he allows, that, after having been compressed, for six months, by a pleural effusion, the lung may yet re-expand perfectly.

* Medical Times Gazette Vol I 1876 page 362.
of Thoracentesis, declares* "This deformity of the ribs, which increases, and sometimes assumes formidable proportions in young subjects, produces alarm in families; dispel their fears, when once the effusion has been cured, the deformity will disappear."

Again he continues ... you can understand how the lung under the influence of this pressure (that is atmospheric pressure) disengages itself from the adhesions by which it is confined, and expands sufficiently to resume, to a certain extent, its place in the thoracic cavity."

So then it appears that even Trousseau, regards this thoracic deformity, as having very little, if any, clinical importance: and considers that the lung may be expected, as a rule, to overcome the constraining influence of those fibrous adhesions, by which it is confined.

Further, Dr. West in his above noted work, observes* "In all cases of effusion into the chest, whether it has been tapped, or not, some deformity is sure to take place ... even when the contraction, has at first been most marked."

* Clinical Medicine Vol. III page 287
* Page 388.
marked. A disposition to its spontaneous removal, almost invariably becomes apparent in a few months, and at the end of a year or two, all traces of it, have almost always disappeared.

In the Appendix will be found a few many clinical cases gathered from Medical Journals which fully bear out the dictum of this eminent Physician—Dr. Lewis Smith in his above quoted work* says: "I can recall to mind however, only one case of permanent complete collapse or carminication of lung, resulting from Pleurisy." How then it may fairly be asked, is this happy result brought about? Are we not justified in believing (in fact is there any other possible means of accounting for it) that Trousseau's suggestion is the true one, when he says, as above stated "You can understand how the lung, under the influence of this pressure, disengages itself from the adhesions by which it is confined"? After carefully studying many records of cases; their results; and being supported by the opinion of Trousseau, West, and others; I am tempted to believe, that

* Page 603.
that the danger, to be apprehended by these fibrous adhesions, is not well founded or at all events, is not of such great clinical significance as some writers suppose.

But again, is the lung itself, after all, invariably so much compressed by the fluid effusion, as many writers seem to suppose? Rokitansky estimates, that a normal lung is capable of contracting to one eighth of its usual volume. So that, an effusion cannot be said to compress the lung till it occupies at least seven eighths of the thoracic cavity. Now it is very difficult, to say exactly, what amount of fluid would represent seven eighths of the thoracic cavity. Each lung is enclosed by three walls, one muscular; one muscular and bronchial; and one serous. I do not exactly know, how the thoracic and serous walls act with regard to the lung, in presence of an effusion, in the pleural cavity. With regard however to the diaphragm Garland*

* See Dr. Garland of Harvard College pneumono dynamics page 61.
* Page 49
has shown, that, "as long as the Diaphragm is arched upwards, it can offer no point of resistance to the injection (pleural effusion), and therefore the latter will be unable to compress the lung upward, until the Diaphragm is arched downward." This statement is confirmed by Dr. Stone, in his Cremorne Lectures before the Royal College of Physicians. He relates a case in his own practice, in which the contractility of the lung had not been overcome by a very large effusion. For, he withdrew four pints of fluid, yet, the percussion after the operation seemed undoubtedly to show that still there remained a large quantity of fluid in the pleural cavity; therefore we see that such a large effusion as this, where a considerable amount was left in the pleural cavity, even after 80 ounces had been removed, had yet not been sufficient to cause collapse of the lung. Hermann in his Human Physiology gives the Vital Capacity of the lung as about 3770 Cubic Centimetres. If we take the half.

* Lancet Vol II. 1879 page 418.
* Page 198.
of this amount, as giving a rough idea of the vital capacity of each lung, (of course this is not quite correct as the lungs are not the same size, but it is near enough for our purpose,) we get 1885 cubic centimetres, as the vital capacity of each lung; so that, seven eighths of the vital capacity of each lung, may be stated at about 1650 cubic centimetres; therefore if Rokitansky is correct in saying that a lung can contract to seven eighths of its size, then it follows that 1650 cubic centimetres of fluid can have no compressing influence on the lung at all; for this amount only roughly represents seven eighths of the vital capacity of a lung; whereas, seven eighths of the absolute capacity of an average lung, would be something very much larger than this.

(4). Consumption.

As regards consumption of the lung, as a remote consequence of the continued retention of an effusion in the pleural cavity.

Such a prove result is conceivable.
If the lung were collapsed, and bound down by adhesions, attended by deformity of the chest wall — but we have seen that in the experience of Fransseau, West, these conditions of the lung or chest wall are very rarely permanent; so that, by their own showing, such a grave sequela of pleuritic effusion, as consumption, must be of very rare occurrence. The rarity of its occurrence is also confirmed by the experience of Dr. Dobell, in his work on Blood-spitting and Lung Disease; in which Bock he gives a carefully prepared Table of cases of Phthisis, collected out of 800 cases under his observation. Of these, in 107 cases the history had been carefully made out; and in only one of these 107 cases, was the pulmonary consumption the result of a previous pleurisy. This Table of Dobell appears then to show one of two things: either that pleurisy is a very rare disease, which is against the experience of all Physicians; or that just any note, in the Royal Hospital for the Diseases of the Chest, Phthisis, has been found to be a
a rare, are we not justified in saying an extremely rare sequel of Pneumia? It is of course never to be lost sight of, that all authorities agree in advocating the recourse to Thoracentesis, as a means of saving life, in three cases of pleuritic effusion in which death appears imminent: and such cases are, doubtless, occasionally met with; yet it should be noted that many physicians deprecate the practice of it under other conditions.

Having now scanned, at some length, the alleged advantages of Thoracentesis in Pneumia, I shall now proceed to consider, whether on the other hand, there are not countervailing disadvantages, and dangers, which render this operation an undesirable and even a hazardous one. It will facilitate this inquiry, if in the first instance, I cite some clinical cases which plainly show that Thoracentesis is not always the innocuous method of dealing with a pleuritic effusion, which many of the advocates of the operation, would appear to regard it.

*At the Clinical Society of London 24th January 1879 Mr. Hutchinson said, "Although formerly strongly advocating thoracentesis in pleural effusions he was coming more and more to rely upon other treatment for their absorption."
At a meeting in Paris of the Société Médicale des Hospitiaux several cases of sudden death following thoracentesis were recorded, though particulars of these are not given. Dr. Besnier relates a case* of a lady, on whom he performed thoracentesis on account of empyema, dying suddenly in the middle of the operation — death being the result of nervous shock. Dr. Legros relates a case* of a patient on whom thoracentesis was performed, to his manifest relief. After the operation he spoke quietly, but suddenly said he felt faint, and died: the post-mortem showing nothing that could account for death. By exclusion therefore death was referred to syncope.

Dr. Raymond relates a case* of a patient on whom thoracentesis was performed, who died suddenly a quarter of an hour after the operation, in whom post-mortem examination revealed nothing that could

* See Appendix Case III
* See Appendix Case V
* See Appendix Case I
could account for death — Dr. Falkine, at the same meeting at which the above case was described, referred to two cases of sudden death, following on the operation of Thoracentesis, but furnished no details of the cases.

Dr. Broadhead relates a case* of a patient, on whom Thoracentesis was performed one day at 2 P.M.: with great relief of symptoms. The patient suddenly died at 5:30 the same afternoon. The Post Mortem examination revealed no cause to account for death. Many more such instances might be brought forward, but those already quoted are sufficient to establish the fact that there is actual, and direct danger in the operation of Thoracentesis.

In view of these cases, it is certainly difficult to understand, the exact meaning of the language used by such men as Dr. Hinch and Trousseau. The former of whom says* "I can testify in behalf of its innocuousness."

* See Appendix Case II

* See Hinch's Principles & Practice of Medicine Page 147.
Innocuousness," and again, "If by an operation trivial with respect to pain, and any evil effects to while Rousseau* speaks of thoracentesis "as an operation which is absolutely devoid of danger."

Is not such language, on the part of such men, likely, to engender that levity in approaching the operation which Trautzel so justly censures, and to which he attributes so many of the bad results of thoracentesis*? Other dangers, which if not directly due to the operation of thoracentesis, at least go to show the risks which attend mechanical interference with the pleural cavity, in cases of pleurisy, & empyema.

Dr. Vallin relates a case* of a patient, on whom thoracentesis had been performed, with marked benefit; and the pleural cavity was then washed out daily, with weak carbolic acid injections. After one of these injections, the patient was seized with convulsions, and died in 12 hours. At the post mortem examination nothing was found to account for death, but

* Clinical Medicine Vol III Page 283
* Ziemsen Cyclopedia of Medicine Vol IV Page 7/12
* An Appendix Case VI
but there was slight fatty degeneration of the heart.

At the same meeting, where the above case was related, Dr. Maurice Raynaud reported three similar cases, but the particulars of these cases, I have not been able to obtain.

Dr. Cayley also reports to the Clinical Society a case of a patient, whose pleural cavity had been washed out nine times, but on the tenth washing, the patient was seized with convulsions, and died in 16 hours. The Post Mortem examination revealed nothing that could account for death. At the same meeting, Dr. Cayley referred to three similar cases that had occurred in France. The first died in six hours, the second recovered. The treatment was then resumed, the convulsions returned, and the patient died. In the third case, the convulsions passed away, the treatment was resumed, and the patient, finally was cured of his stupid man.

Post mortem in the two cases that died revealed nothing that could account for death.

* See Appendix Case VIII
Dr. Williams reports a case of a child, who was under radical treatment for empyema, and was, one day, fell into convulsions and died. No Post Mortem in this case was allowed.

Do not such cases as these, justify the belief, that grave, though remote dangers may attend the practice of Thoracentesis, or other interference with the pleura? But it may be contended, that such cases as those that have been detailed, are of rare occurrence.

Let it be granted, that they are, still they exist, and therefore teach us, that Thucydides', or that of Fink's, dictum, that the operation of Thoracentesis is absolutely without danger, must be set aside, as inaccurate and very misleading. But there is another distinct danger attending the practice of Thoracentesis, which is by no means of rare occurrence, and that is; that, after a serofibrinous effusion has been drained off, by the operation of Thoracentesis; the new effusion, that collects in the pleural sac, has a great tendency to take on.

* See Appendix Case VII
on a septic purulent form, and thus a Pyo thorax results - a grave complication of the disease. Thomson, at page 284 of his before quoted work, makes light of this fear, and declares that the suggestion of such an argument is "an indication of bad faith, or of unpardonable ignorance." But, in the same page, he allows that two such men as Watson and Stokes, believe that this grave result may follow the operation - in spite of laying myself open to the charge of "unpardonable ignorance" I will bring forward records of clinical cases and the opinions of various writers, in support of the assertion, that effusions are apt to become purulent after thoracentesis. Trautzel says:

"... After a rapid evacuation, not only may the effusion very quickly increase in volume, but it may also become purulent." Again he says:

"... And two other cases in which notwithstanding the most careful disinfection of the trocar, carried out by myself, and the greatest caution in the performance of the operation, the effusion became purulent."

*Simpson's Cyclopedia of Medicine Vol IV. Page 711.

"purulent." But the evidence of Walch, is even stronger than that of Trautzel; for he says, in his above quoted work, "in rare instances the characters of the newly-secreted fluid, remain those of that originally evacuated. In the great majority, the change, the general tendency of the change, being to the purulent character. The alteration, from the almost purely serous appearance, to the purulent, is sometimes accomplished in 24 hours."

The two physicians just quoted, are not generally believed to be "unconsciously ignorant," and yet their experience leads them to differ from Trousteau. Dr. Becker in the periodical above quoted is strongly of opinion that the effusion, after the operation is very apt to become purulent, and instances in by a case which he describes in detail, in which the patient died.

I will now relate several clinical cases, collected from the literature of the subject.
Dr. Thompson, already quoted, records a case in which he performed Thoracentesis, and drew off 108 ounces of serous fluid. The fluid reaccumulated, and he again tapped the chest, and drew off 168 ounces of purulent fluid.

2nd Case recorded in the Medical Times and Gazette: A patient aged 26 years, on whom Thoracentesis was performed and serous fluid was drawn off. In a very short time it was considered necessary to tap the chest, but the fluid that was drawn off was purulent.

3rd Case: George R. was tapped and 58 ounces of clear serum were drawn off—the fluid accumulated—he was again tapped, and this time the fluid was purulent. After repeated tapings he finally died of exhaustion. The Aspiration was used in the early tapings in this case.

4th Case is reported by Troussseau. The patient was so ill that the Professor "hesitated to operate for fear of producing a more violent inflammation than that now existing," so that it appears that

* See Appendix Case XV
* See Appendix Case XIV
* See Appendix—Medical Times and Gazette Case XVI
* See Tapissiere's Clinical Medicine, vol. III page 237
that, this "operation that is absolutely without danger" has yet the power of setting up an inflammation? Which of Dr. Troussseau's opinions are we to receive? For the two are diametrically opposed, and so we cannot receive both of them. I think we are surely bound rather to follow the counsel of the wise Physician, at the head side who "hesitated to operate," rather than be led by the brilliant lecturer, who, in the heat of argument, uses words which, in calmer moments, his clinical judgment does not appear to justify. In the above case Troussseau, finally, did operate and drew off "a quantity of serosity." The patient died after six weeks, of hectic fever, and the Autopsy revealed the presence of pus in the pleural cavity. It is surely not necessary to multiply instances. No one, in spite of Troussseau, would surely deny, that the reaccumulated fluid often becomes purulent; when they find, that two such men, as Fraenkel and Walsh, declare that their experience has shown them, that such an event is more than probable—and Fraenkel
Fraenkel shews, that the purulent form of the reaccumulated fluid, in his two cases, was certainly not due to the want of antiseptic precautions. But according to Becker in his article above quoted, the purulent form, in which the fluid re-accumulates, is not due to septic influence; but he rather believes, that it results from the friction of the inflamed pleurae against each other. His argument taken generally, is as follows—We have the pleurae in a state of inflammation; but, the pleural cavity is more or less distended, by an accumulation of fluid, by which the pleurae are kept apart, and more or less in a state of rest. If we now allow things to take their course, the inflammation subsides, the lymphatics regain their tone, and absorption ensues. If on the other hand, we perform Thoracentesis, we by this means draw off the distending fluid, and thus, bring the inflamed pleurae into sudden apposition. They cease to be in a state of rest—they are rather thrown into a state of constant motion; by which means, their already inflamed state is very greatly
greatly aggravated, and a purulent exudation results with all its evil consequences. *

Frank, he does not apparently quite agree with Becker, as to the exact mechanism, by which the purulent exudation takes place, for he says it is due to certain changes "not yet fully explained in detail," certainly agrees with him in not attributing the change to septic influences. He says "the vessels in the inflamed pleura are precisely, on account of the inflammation, abnormally distended, and in consequence of certain changes in their walls, not yet fully explained in detail, are especially prone to permit the migration of lymph corpuscles."

In support of Becker's view that the purulent exudation is due to the violent inflammation set up in the pleura, may yet, perhaps, be brought forward the greater frequency with which, empyema, occurs in children than in adults. May it not be argued, that this peculiarity of children is due to the greater violence of the inflammation in their pleural membranes.

* Becker's article in the "Berliner Klinische Wochenschrift"
Membranes.

Dr. Smith, in his above-mentioned work*, records, two remarkable post-mortem examinations in infants; exemplifying the violence of this inflammation, in which "not only was pus found in the pleural cavities, but actually under the pleura, without any loss of integrity in the pleura." This state he believes was due to the violence of the inflammation.

A Physician, who not long ago, was Pathologist to the Royal Edinburgh Infirmary, tells me, that while he was Pathologist, he never saw, in the adult, any case in which such violence of inflammation appeared in the pleura, as is recorded above in Smith's cases.

A\textit{priori} have we not a right to believe that the inflammation is likely in children, in idiopathic pleurisy, to be more violent than in adults; for in adults, pleurisy occurs in robust subjects, just as frequently, as in others. Whereas in children, Smith's experience teaches him that.*

\footnote{Page 578.}
\footnote{Page 579.}
"a larger proportion of cases, occur among the children of the City Poor, than among those who are well nourished," for in the former, cachectic and anti-hygienic conditions prevail more abundantly, than among the latter.

Again, children have less inhibitory power to enable them to resist an inflammatory process than adults have. I was interested to observe that in a very able and thoughtful lecture, on "A Cord," delivered by Dr. Affleck, under the auspices of the Edinburgh Health Society, he states that adults do undoubtedly possess an inhibitory power, by which they are able to resist the evil effects of exposure, and it is a historic fact that the Covenanters boasted that not one of them had ever suffered in health from attending a hill conventicle. Thus they attributed to Divine interposition. The modern physician, however, is apt to believe, that their exemption from disease was rather due to intense mental excitement, which acted as an inhibitory power against the evil effects of hunger, cold, and wet.

I have however not been able to make out,
in support of any argument: that inflammation in the knee joint, for instance, has any greater tendency to lead to a purulent accumulation in children, than in adults. But I believe, however, (and the belief is shared by most physicians I have consulted), though I cannot discover any statistics on the subject, that inflammation of the meninges is more liable to lead to a purulent accumulation in children than it is in adults. Perhaps however, the purulent accumulation, in children and in adults, as a rule, may on the other hand, not be due actually to the inflammatory process; but may be rather due to a violently inflamed pleura, acting on the branches of the sympathetic. Fischka has shown* that, the Pulmonary Pleura, is supplied by the Vagus at the root of the lung; and that the Parietal Pleura, is supplied by the Intercostal branches of the Spinal Cord, and branches of the sympathetic. Now Claude Bernard has shown* that in an animal, the health of which has been

* Medical Times & Gazette Vol I 1860 Page 56.
been previously lowered. He conducted experiments with
purulent deposits, by the simple division of the
Great Sympathetic Nerve. In order to insure the
success of this experiment, it is absolutely
necessary, that the condition of the animal's
health, should be previously lowered.

Now have we not,
in children the very state indicated by Claude
Bernard. The children in whom injury
occurs, are badly nourished, cachectic children.
An inflammation is set up in their pleura,
causing perhaps irritation, and then paralysis
of the branches of the sympathetic, and a
purulent injection is then poured out into the
pleural cavity. Traiteaux points out*, that
in women recently delivered, "a pleurisy, which in
ordinary circumstances would have been a
simple pleurisy, becomes purulent." Hence
we see once again, the conditions demanded
by Claude Bernard's experiment: A debilitated
animal, an inflamed pleura, acting on the
branches of the sympathetic, and as a
result a purulent injection is poured into
the

* Page 230. Clinical Medicine vol. III
The pleural cavity. Dr. Ewald gives it as his opinion, that the chest should not be punctured till between the third and fourth week, after the commencement of the disease; for he believes that then, the operation will not be followed by a purulent reaccumulation. And tho' Ewald does not enter into any explanation, it is evident, that he believes that the inflammation of the pleura will have subsided by that time; and he also appears to be of opinion, that, if the inflammation is still present in the pleura, then by some means or other, which he does not explain, there is a probability of a purulent reaccumulation, following the operation of thoracentesis. It is very interesting, in this connection, to find that Hippocrates laid down, that puncture of the chest should not be had recourse to, until the fifteenth day of the disease — and how to return.

* Medical Times & Gazette Vol. I 1876 Page 362
* Dr. Beggles Address to 73. Med. Association
Return to the Adult. Thoracentesis is performed, and the patient, deprived of an enormous quantity of albumen, is necessarily greatly reduced in his general condition. Now, the inflamed pleura, rubbing against each, increases their already existing inflammatory state, and the branches of the sympathetic become irritated and then paralysed, and a purulent inflammation results. There is again another point which tells against the practice of Thoracentesis, namely, that the serous effusion in Pleurisy is very rich in albumen. Supposing Thoracentesis is performed, all this albumen is taken from the patient. In those rare cases, in which no recum- bation takes place, it may perhaps be urged, that no very great harm is done, by taking this amount of albumen away; for by nourishment &c, the system will soon recover its equilibrium; but we have seen that, in 154 cases, Bowditch operated 1.7 times, on each patient, so that we are justified in saying that most likely.
a reaccumulation will take place; granted, that this reaccumulation is serous (this we have seen, that there is a great probability of it being serous), the patient is again, in his already debilitated state, deprived of another enormous quantity of albumen. This we again draw off. Have we, by this heroic treatment, given our patient a better chance of regaining his strength than if we had treated him medicinally, and had by appropriate drugs, removed the water from him, but had left him the albumen? The advocates of Thoracentesis are so enthusiastic that, as long as they quickly get rid of the fluid in the pleura, they appear to be entirely satisfied with the result of their operation, and give us no account of the after condition of their patients. On the other hand, patients treated medicinally, tho' they may perhaps be a little longer under treatment, are discharged from hospital, not only cured of their disease, but well, fit for their work; for under medicinal treatment
treatment, I have always felt that if the fluid from the patient’s pleural cavity is not absorbed from the patient’s pleural cavity, it will cause a certain amount of albumen back into the system. I recall a case in which I performed thoracentesis on a very anemic woman. She had recently been confined, and had suffered from severe post partum haemorrhage. 80 ounces of serous fluid, were drawn off from the patient; but the fluid, at once reaccumulated. She would not allow a second operation, and left hospital in an extremely weak condition. Surely, was not this a case in which the danger of profound anemia following operative interference, was much greater than any danger to the patient from the presence of the effusion, in her pleural cavity? And now I will briefly recapitulate the points I have above discussed. We have seen that the statements of Trousseau and Flahiff, that the operation of thoracentesis is absolutely without danger, are directly disproved by the fact that many
many deaths have occurred after the operation, and as the post mortem examinations showed, that no cause existed, that could account for death, the deaths were by exclusion, referred to the effect of the operation.

The recorded cases of deaths and convulsions in those patients who were undergoing the radical treatment for empyema, are certainly mysterious; but this, they cannot be allowed to shake one's faith, in the propriety of the radical treatment in empyema; still they serve to show, that the dangers which attend interference with the pleural cavities are many and very grave. — Again in spite of the After Cathedra statement of Bouveau, I believe I have brought forward sufficient evidence to show, first, that if the effused fluid is drawn off by thoracentesis, in all probability it will again reaccumulate, for we have seen, that, on 154 patients, even Dr. Bowditch performed 250 operations. And secondly, that, there is a great tendency, in spite
of all precautions, for this reaccumulated fluid to be prevalent. And surely, the bare possibility to say nothing of the great probability, of lighting up, in a patient, such a very grave disease as Empyema, ought to make the physician frame, before having recourse to an operation, which, however brilliant its results may frequently be, has yet undoubtedly caused many deaths and much suffering.

I have attempted to show, that the purulent nature of the reaccumulated fluid, may not perhaps be due to external influences, but rather to forces, acting internally, upsetting the equilibrium of the patient's nervous mechanism. I have also pointed out, that in those cases in which the effuseous humor pervades throughout, how very injurious the repeated abstraction of such large quantities of albumen, as are contained in the pleural fluid, must be to the general health of the patient. But the great and insuperable objection to the operation is, that, while it brings with
with its great, and varied dangers, to the patient: it has no remedial effect upon the disease; the pleuritic membrane unaltered, the operation merely aiming at the relief of some of its symptoms: if those symptoms are urgent, that death appears imminent, no doubt the operation of tapping is justifiable may necessary; but, if the effusion is not so excessive as to cause those urgent symptoms, what good, it may be fairly asked, have we done our patient, by practising thoracentesis? We have removed a large quantity of albumen from him, we have made him run the risk of death from shock, the probability of empyema, but we have done nothing to cure him of pleuritis—

I feel greatly supported, in the opinions I have ventured to express, with regard to the propriety of performing thoracentesis, by finding Becker and Thompson, each of whom have, in years past, been ardent advocates of the practice of thoracentesis, subsequently recanting, and each of them declaring that in
their opinion, Thoracentesis ought never to be practised, on account of the great dangers attending it, except in those urgent cases, where death is imminent.

Before concluding my remarks on the subject of Thoracentesis, I would refer to some interesting facts which appear to be clear directly on the view I have taken on this subject in this treatise:

At a meeting of the Lyons Medical Society, M. Desnier stated, that the mortality from pleurisy, in Paris, had doubled within the last six years, and he enquired how far this increased mortality was due to the practice of Thoracentesis, which had been largely resorted to in Paris during the period stated. While on the other hand, Clement, at the same meeting, shewed, that the mortality in the Military Hospitals in Paris, where the treatment was exclusively medicinal, had, during the same period, remained at its usual.

usual low level.

These facts speak so eloquently against the practice of Thoracentesis, that no comment on them appears necessary.

**Part II.**

In discussing, as the main topic of this Thesis, the subject of Thoracentesis for the relief of Pleurisy with Effusion, I have been led to compare its therapeutic value with other methods of treatment. I have hitherto, purposely, avoided complicating the discussion, by alluding to these other methods of treatment in detail; but, it will now be proper, at this place to specify, and briefly consider some of the more important of them. They may all be comprehended under the following:

1. Antiphlogistic Treatment
2. Treatment by Deobstructants, Diuretics, Counter Irritants
3. Diaphoretic Treatment
4. Schroth's Method of Treatment
5. And lastly, a plan of Treatment, I venture to suggest namely the Employment of the Interrupted Current.
1. Antisyphilitic Treatment.

The old routine practice, in Pleurisy, was by means of severe blood letting, followed up by Diuretics and Mercury. And undoubtedly, the results were often extremely good and the recoveries extremely rapid. Take for instance "case 19" in the appendix. Could any modern treatment show a better, or more rapid cure? In this case, we found a man, with his left side full of fluid, and the intercostal spaces bulged. He was freely bleed blistered, given Mercury and diuretics. He was discharged from Hospital in 21 days; & the note adds - "percussion note, resonant; a free respiration was heard over the whole chest." It is important to note, that the patient had been ill a whole month before he went to Hospital; for this is just one of those cases, in which its Advocates would have pressed for Thoracentesis. But I doubt, even, if the operation had been successful, whether the patient could possibly have left Hospital sooner than he did; so that in
In this case at any rate Thoracentesis could have conferred no benefit on the patient which he did not derive. Equally from other treatments, yet, while the employed treatment exposed the patient to no latent dangers, the surgical treatment might have lighted up in him an empty furrow.

In the appendix will be seen several cases which were treated with good results by blood letting. In spite of frequent good results, the practice of general blood letting in the treatment of Pleuritis has in the present day fallen into general disrepute; and discrediting may be taken as expressing a generally received opinion when he says * "I am convinced it neither cuts short the malady nor prevents the effusion."

* Practice of Medicine Vol I. p. 282.
Walshe, however, rather advocates resection in healthy adults and so to a certain extent does Trautzel. But Bartholow condemns the practice.

2. Treatment by Deobstruents or Counter Irritants.

Most writers appear to agree that blistering is followed by good results. Some apply a large blister, but there is a certain amount of danger in this. A large blister is very apt to give rise to severe struma, which is sometimes more painful than the struma itself, and at all events greatly adds to the patient's distress. This undesirable occurrence does not appear, so far as I can discover, so likely to follow the application of small blisters which have the additional advantage of causing less annoyance.

* Diseases of Chest Page 276.
* Siemens Cyclopaedia Vol IV. Page 685.
an annoyance to the patient. The internal administration of mercury, & diuretics and purgatives is strongly supported by many writers, and as strongly repudiated by others. Bristow, *pues so far as to say, that all these drugs are practically useless, and recommends the exhibition of tonics.

Dr. Clifford Allbutt * appears to be much of the same opinion. Bartholomew in his above quoted work also repudiates the use of mercury. But surely mercury has some action, besides the poisonous one, with which alone some writers appear inclined to credit it? In syphilitic iritis, for instance, does not the therapeutic action of mercury undoubtedly make itself apparent? And if we believe that in some way, aids in setting rid of the products of inflammation in this disease, may we not also believe, that it aids in setting rid of the products of inflammation in the pleural cavity?

* Practice of Medicine Page 395.
* Medical Times & Gazette Vol I 1874 Page 497.
I give in the appendix several cases recorded by various writers of Pleuritis with effusion, treated with Mercury, Auriculéria et Blister, and I think the results will compare most favourably with those following Thoracentesis. Take for instance "case 28" in appendix, in which, on the 19th Dec., the effusion reached to the 7th rib, and we find that the patient left the hospital restored to health, on the 17th of the next month—that is, in 29 days after the commencement of treatment. Do not such cases justify the boast of the late Dr. Gardiner that "nothing could have been done, by Thoracentesis, in these cases, which was not done by remedies with more than equal safety, and nearly equal rapidity?"

Amongst Auriculéria, Digitalis has long held, and deservedly, a high place. On the 16th March 1785, Dr. Graham's paper read at a meeting of the Royal College of Physicians of London in which he advocated the

* Fauces Vol II Page 453.
* Medical Transactions Vol III Page 255.
the use of this drug, for the purpose of getting rid of fluids, in any of the body cavities; and it has been used, as a diuretic ever since.

3. Diaphoretic Treatment.

In this mode of treatment, one of the most potent drugs is the recently introduced Laborandi, which is not only a diaphoretic but likewise a diaphagoge. Dr. Braemidge relates a case, which he treated successfully, by the exhibition of Laborandi, and in the same journal, Dr. Saphe of Montpelier, says, that his experience of the value of Laborandi after using it in five cases is that (1) Laborandi is very useful in treatment of pleuritic effusions whatever may be their date or amount. (2) It usually causes the rapid disappearance of the liquid and the production of pleural friction sounds. (3) The effects of Laborandi are of short duration, so that the liquid is often reappeared with great rapidity, but usually the definite disappearance.


disappearance of the fluid will be obtained.

But while the disappearance has been obtained, and the pleural friction sound appears
then Jaborandi becomes inefficacious and
must be discontinued.

Bartholin also recommends the
Exhibition of Jaborandi.

An effect, similar to that
of diaphoretics, has been sought to be obtained
by the action of drastic purgatives. This
plan was employed by Sydenham for the
Treatment of pleuritic effusions. But as
Nemeyer very properly points out*, "the
pernicious effect of drastic, upon the
digestion and assimilation, forms a serious
objection to their employment". It is very
interesting to note, in this connection, that
as related by Faenius, Paracelsus treated
this stage of pleurisy by sudorifics, and
application of cow dung. This latter agent
appears to be employed by the Brahmins
in all cases of difficulty*.

* Practice of Medicine Page 517.
* Practice of Medicine Page 283.
* See MacDonald's History of Medicine Page 64.

In his method of treatment, Schroth conceived the idea of producing inspissation of the blood, by diminishing the supply of water coming to it. Henneberg relates one case which he saw treated successfully by this method.

Dr. Morgan of Guy's Hospital relates a remarkable case of a patient with an enormous collection of fluid in the pleural cavity, who had been ill three months, and in whose pleural cavity all signs of fluid had disappeared by the middle of the third week of treatment. Bantzel also says that he has known very good results follow this mode of treatment.

Numerous other methods of treating pleurisy with effusion have been suggested. I shall only refer to:

* Practice of Medicine, Page 284.
for the sake of illustration refer to two.

(1) Isonic acid has been advocated by Dr Debouit. He declares that in the cases treated by means of this therapeutic agent, case resulted in a space of time varying from 12 days to 5 weeks. But apparently only 4 cases were thus treated. The dose he used varied from 10 to 25 grams per day.

(2) The other method is that now very commonly resorted to in certain stages of the disease named - Strapping the chest by means of adhesive plasters so as to secure as far as possible complete physiological rest to the one side of the thorax.

This plan was first proposed by Mr J. Hilton* and has since been carried out by Dr. J. T. Roberts.*

* Lectures on Rest and Pain.
* Hand book of Medicine.
5. Treatment by Electricity

There appear to be strong reasons for believing*, that the Pleuritic fluid should rather be called a Collection, than an Effusion, for the normal pleurae are constantly pouring forth minute quantities of fluid which are as constantly absorbed. Lehmann having collected, from the pericardium of a man, in three and a half minutes, 9 or 10 drachms of fluid; equal to one or a half gallons in 24 hours. And I believe there is no reason for supposing, that the pericardium secretes its fluid more rapidly than the pleurae. Therefore it would seem, as if the power of absorbing the effused fluid, which collects after pleuritis, had been by some means interfered with.

Some Writers* appear to believe, that the large quantity of the pleural effusion, by its pressure causes a paralysis of the absorbents. This theory is surely contradicted by the fact, that very enormous effusions are often quickly absorbed, and also that we find

* See Frantjebo's Article on Pleurisy, hometown Cyclopaedia Vol IV Page 696.
fluid, the want of absorbing power shown in cases of effusion, which are not large; not higher for instance, than the angle of the scapula; and such effusions, tho severe, cannot be called very ominous.

But an experiment, by Richardson*, in which he injected a very large quantity of fluid, into the peritoneal cavity of an animal, and which was immediately absorbed, tends to support my belief, that the continuance of an effusion in the pleural cavity is the result of some alteration in the function of the absorbent, and is not due to the pressure of the fluid, in the pleural cavity, upon the absorbent.

Dylekowsky's, researches into the anatomy of the pleural membranes, have shown, that, the portions of the pleura which cover the diaphragm, mediastinum, and lung, are relatively poor in lymph vessels; on the other hand, the Costal pleura is particularly rich in these vessels.*

* Pneumonia Dynamics by Professor Farland Page 174.
Dyle Rowsey further points out, that the Pleural Membrane consists chiefly of a single layer of epithelial cells, in immediate juxtaposition to each other, and of a sub-epithelial layer, called the basement membrane. This basement membrane, is a delicate network of connective tissue, and its interstices are occupied by capillary blood vessels, and by the ultimate ramifications of the lymphatics. The open work among the meshes of this basement membrane, therefore, is called the lymph spaces. The lymph vessels do not open directly into these spaces, but form a closed tubular system like the haematic capillaries. The epithelial cells, however, which form the walls of these minute vessels, are more or less spherical, and consequently, as they lie in contact with each other, they leave little cellular spaces, called stomatae, which afford communication between the lymph spaces without, and the interior of the lymph canals. He also shows that the lymph spaces communicate...
communicate with the pleural cavity, by means of the inter-cellular openings in the pleural epithelium.

He injected a coloured solution into the pleural cavity of a dog, and after two or three hours, he found the lymph vessels full of the injection. The absorbing force was sufficient, not only to draw fluid into the vessels, but also to take in solid particles of colouring matter. No absorption took place, however, if the animal was killed immediately after the injection. He inferred from these results, that the muscular acts of respiration, must have some influence upon absorption; and he explains his theory as follows:

"The lymphatics in the pleural membrane, are situated between two forces, acting in opposite directions: namely, the elastic lung on one side, and the intercostal muscles on the other. During inspiration, the intercostals bulge into the chest. During inspiration, however, these muscles contract and straighten..."
straighten, and thus create a traction from within outwards, upon the pleural membrane and its contained vessels. At the same time, the elasticity of the lung, acts a traction in the opposite direction. This antagonism of these two forces, tends to pull the different layers of the pleura apart, and as the walls of the lymph vessels, are in close connection with the framework of the basement membrane, it also tends to separate these walls, and to form a vacuum within the same. The moment this condition of affairs is established, the fluid within the pleural cavity, whether it be the result of a natural secretion of that cavity, or of a pathological exudation, moves through the stomata, above described, and occupies the space formed. When expiration occurs again, the parts return to their former position, and the fluid absorbed, is crowded along the lymph vessels to remote parts, whence it is prevented from returning, by the abundant valvular armament of the vessels.!!

As indirect evidence of the correctness of his theory, Dubrowsky points out that those
those parts of the Costal Pleurae, which cover the intercostal muscles, are very rich in lymph vessels: whereas other parts of the Pleura are almost destitute of them. Dr. Kowaszy also found that very little, fluid and no solid particles, were absorbed during quiet inspiration; on the other hand, if means were taken to produce an abrupt jarring inspiration, the absorption was proportionately great.

Dr. Kowaszy also enclosed a dog's head in an air chamber, and rarified the air. The intercostal spaces were exceedingly depressed, and each act of inspiration was accomplished only by a powerful ventralatory jerk. The absorption was excessive. When he reversed the operation, and allowed the animal to breathe in a chamber of compressed air; the intercostals bulged during expiration and retracted during inspiration. The conditions here were such, that no antagonism between the intercostals, and the lung was possible, and no absorption took place.
Now, it seems highly probable that in all pleural effusions, the intercostal muscles in the region of the effusion lose, somewhat, of their tonic action; in large effusions we know they do, and that this loss of tone is carried a step further, so that the intercostal grooves become obliterated, by the muscles not only losing their tone, but becoming more or less paralysed; in some cases, they even become bulged outward. Do not by Kowský's experiments and anatomical researches, appear to teach us, that the non-absorption of a pleuritic effusion, is due to this loss of tone, in the intercostal muscles. This want of power in the muscles, prevents the normal action of the stomata, in the lymph vessels, from coming into play. A state of things which has been wrongly spoken of as paralysis of the absorbers; but we have seen, that the normal action of the stomata, is, in all probability, only a passive action, and that it is really the intercostals that do the work, by pumping the fluid into the former.
The advocates of Thoracontesia, at present, particularly insist that only a portion of the fluid in the pleural cavity should be drawn off by the operator; and that then the remaining fluid is quickly absorbed. They say the results of this mode of practice are very good. They explain this by saying, that the absorbents, paralysed by the pressure of the fluid, again resume their function, when some of the fluid is drawn off; and can then do their work in absorbing the remainder of the fluid.

We have seen, that most likely, the absorbents are really not at fault at all, and that the vice most likely lies in loss of tone of the intercostal muscles.

I venture to suggest, therefore, that when the inflammation of the pleuritic has passed away, an interrupted current should be applied to the intercostal muscles, in the region of the effusion, in order to cause them to contract powerfully, and thus bring their normal pumping action on the stomata into

* * *

Freudsee Page 696 of Siemens Cyclopaedia Vol. IV.
into play.

The results obtained by the operation of thoracentesis in large effusions, where a small portion of fluid only is removed, seem to justify the mode of treatment I have just recommended: because, I believe, that by the removal of a portion of the fluid, the intercostals probably regain somewhat of their normal contractility, and at once resume their pumping action on the stomata.

And as I believe these results of thoracentesis add weight to my arguments in favour of electricity in the treatment of pleuritic effusion, I therefore claim them as arguments against the general practice of thoracentesis: a practice, which I saw, formerly known, to be attended by grave dangers, and which I have now attempted to show is (if the researches of Dyckowsky are correct) advocated from an imperfect knowledge of the mode in which the absorbent of the pleura, perform their normal functions.

Having
Having completed my review of the different modes of treating Pleurisy with effusion. It only remains for me, after a careful study of the records of a great many clinical cases, some of which are brought together in the Appendix, to say that I believe

I. No particular form of treatment is so invariably, and so pre-eminenty, successful, as to deserve to be considered the best treatment of Pleurisy.

II. The proper treatment of this, as of every disease, is that, which is dictated by a careful consideration of all the phenomena presented by each particular case; and the constitutional conditions of each particular patient.
Death following Thoracentesis

(1) Medical Times and Gazette Vol. II. 1875 page 664.

Raynald related, a case before a French Society of a Rheumatic Patient on whom Thoracentesis was performed, and who died a quarter of an hour after the operation. The post mortem examination revealed no cause of death which was therefore attributed to reflex nervous action.

At the same meeting

Dempire mentioned two deaths which occurred after Thoracentesis, but no particulars were given in the English Journal.

Lancet Vol. II. 1876.

Dr. Broadheath related to the Clinical Society of London, the case of a patient 67 years of age on whom Thoracentesis was performed (by aspiration) at two P.M. 80 ounces of serum drawn off to treat relief of patient.

Patient was well at 5 P.M. had his tea. At 5.45 p.m. was observed that he was lying very still. It was found that he was dead.

Post mortem examination showed nothing whatever to account for death.
Death following Thoracentesis

Medical Times and Gazette Vol I. 1864 page 429.
At a meeting of the Société Médicale des Hôpitaux several deaths were from Thoracentesis were recorded but no particulars are related in the English Journal.

Medical Times & Gazette Vol. II. 1875 page 169.
Dr. Besnier related following to the Société Médicale des Hôpitaux.

Case of a lady 43 years of age: on 19th June she was found to be suffering from a very large pleuritic effusion on right side.
There was no cardiac lesion.

On 21st June dyspnoea had increased and thoracentesis was performed. She did not complain of pain during the puncture. Between 300 and 400 grammes of horribly fetid pus had been discharged, when it was suddenly noticed that respiration had ceased.

The Patient was Dead.

Besnier believed that death was due to nervous shock.

In same Journal is the last case at page 382. Legron reported to same Society the case of a
Death following Thoracentesis

A patient 52 years of age, who had suffered from an immense effusion into pleura, had been ill one month.

Thoracentesis was performed & 7 litres had been discharged to patients great relief - after coughing and speaking quietly for a while, he complained of faintness and suddenly died.

The autopsy furnished no explanation of why death had occurred - Leroux therefore concluded that death was due to syncope.

Convulsions following Thoracentesis

(6) Medical Times & Gazette Vol II. 1875 page 664.

Vallin reported in the "Gazette des Hopitaux" case of a man 23 years of age, who had been ill with Pleurisy for a month - symptoms appeared to demand Thoracentesis. - Operation gave great relief - but effusion recurring a drainage tube was inserted - and the pleural cavity was washed out daily, with weak carbolic acid solutions. During one of these washing out the patient complained.
Convulsions following Thoracentesis.

complained of slight pain, and at the end of the washing out he painted, the limbs became stiff, the extremities cold, face cyanosed, pulse small. After three quarters of an hour Opisthotonus came on, and 12 hours after the onset of the attack, the man died without any return to consciousness. At the autopsy nothing was found to account for death—there was however fatty degeneration of the heart.

Medical Times & Gazette. Vol. II. 1876 page 557.

Dr. Williams related to the Clinical Society of London, the case of a child on whom Thoracentesis had been performed & pus evacuated. The cavity was washed out daily and a drainage tube was worn “for months” – the lung expanded—on one day the child was seized with insensibility, one sided convulsions and finally died comatose.

No Post Mortem Examination was allowed in this case.
Convulsions following Thoracentesis
and also
Conversion of Serum into Rus.

Medical Times and Gazette Vol. II 1876 page 557.

On Caley, related to the Clinical Society of
London, case of a Patient 36 years of age—on
whom Thoracentesis was performed in the
Middlesex Hospital, on account of an effusion
in Right pleural cavity—23 ounces of serum
were drawn off by the Aspirator—six days
later patient again tapped in two places—
six ounces of bloody serum drawn off from
each spot—8 days later tapped again and 12
ounces of fetid pus withdrawn—The pleural
cavity was now washed out daily with a
weak solution of Jodine—great improvement
took place in patient's condition—he began
to put on flesh—The tenth time that the pleural
cavity was washed out, while the solution was
being injected—Patient suddenly became pale,
pulse slow, breathing gasping—pupils dilated—
followed first by rigidity then by several
Convulsions, temperature ran up to 107° & he
remained Comatose till death, which occurred
in 16 hours—At the Post Mortem Examination
nothing whatever was found to account for
death.
Convulsions following Thoracentesis and also

Convulsion of serum into Pus.

Dr. Cayley then referred to three similar cases which occurred in France. In the first death supervened in 6 hours. In the 2nd case the convulsions passed off but on the washing out of the pleura being resumed, they returned and death ensued. In the 3rd case the convulsions passed off. Treatment was resumed and the patient finally recovered. In the two cases that ended fatally the autopsy revealed no cause to account for death. The nature of the fluid injected did not appear to matter. For in the different cases water, iodine solution, Carbolic acid or alcohol had each been employed. In all the cases the pleural cavities many times been washed out with impunity. In one case daily for three months.

Death by Bronchitis following Thoracentesis.


Dr. Chas Williams mentioned in the course of
Death by Bronchitis following Thoracentesis

A lecture before the Royal College of Physicians.

A case of severe Bronchitis, causing Death, which came on in a Patient two days after Thoracentesis had been performed. Dr. Williams stated that he believed the Bronchitis was produced by the sudden access of air into a previously collapsed lung.

A Cure of a Deformity of Side.

Medical Times & Gazette Vol. 1854 page 13.

Case of J. J. age 12. Admitted into Hospital 27th February 1852.

Examination. On percussion dullness was found all over the left side except for 1½ inches below the clavicle. At this spot harsh breathing was heard - no respiratory sound could be heard over the remainder of the left side.

No cough - Pulse 144.

The lower portion of the sternum was prominent - the left shoulder dropped - the left chest was contracted and there was a slight lateral curvature of the spine.
Aure of a Deformity of Side.

Right side 1/4 inches greater in measurement than the left side.

History. Had suffered from dyspnoea and pain in side for six months with occasional exacerbation of symptoms.

Treatment. Principally Cod oil, and Country air. The boy was again examined after two years - he was in perfect health - Respiratory murmur normal all over, the left side - and both sides acted equally in respiration - the right side of the chest was however an inch larger than the left.

Deformity of Chest cured in 5 Months.

Lancer Vol I. 1868 page 338.
Dr. Buchanan in his Lettsomian Lectures relates.

Case of Boy 7 years of age subject of a right pleuritic effusion - Thoracentesis was performed and he did well - But the side "greatly Contracted" the right side measured 10 3/4 inches and the left side 12 3/8 inches.
Deformity of Chest cured in 5 Months.

He was sent to the Country and he was seen five months after and was quite well and there was a great reduction in the deformity of the chest.

Disappearance of Chest Deformity

Dr. Charles Williams mentions a Case of a young lady 14 years of age suffering from right pleurisy with effusion. Thoracentesis was performed - Cure resulted leaving contraction of the side.

This Deformity entirely disappeared within a space of two years.

Again he relates case of a boy ten years old through whose side an Empyema burst. Cure finally resulted - but side contracted causing deformity.

In two years however the side had almost entirely regained its normal dimensions; and the lungs were pervious throughout.
Case of W.S., age 26. The patient was the subject of Pulmonary Phthisis - on the 22\textsuperscript{nd} January, pleurisy supervened, by 12\textsuperscript{th} of February, all acute symptoms had passed off - the general health improved but resolution of the fluid was but slight; therefore on 26\textsuperscript{th} February Thoracentesis was performed and serum was withdrawn. By some day (not mentioned) in March Thoracentesis had again to be performed and a quantity of pus was withdrawn, the effusion contained purulent for two months. The side contracted - when the patient left Hospital in August the percussion note was still dull.

Case showing that a patient may have an effusion in pleural cavity for six months yet the lung was not bound down.

Converting serous effusion into an Empyema by Thoracentesis.
Conversion of Serous Effusion into an Empyema by Thoracentesis.

Mr Edward Thompson relates the Case of J. D., of the Irish Constabulary, admitted into Hospital 8th December 1874.

In previous June had been suddenly seized with severe pain in the side; was supposed to be suffering from an aneurism.

Examination revealed the existence of a very large effusion in the left pleural cavity. A soft beat of the heart was felt an inch to the right of the left nipple.

Thoracentesis was performed and 108 ounces of Serous Fluid were drawn off. Rapid improvement followed. But fluid reaccumulated and on 5th January Thoracentesis was again performed and 168 ounces of Pus-laden Fluid were drawn off. The patient recovered after this; there was some retraction of the side.

J. D. was seen by Mr Thompson two years after this; he was in good health and again doing duty as a Constabulary Officer.
Conversion of Serum into Pus.

Medical Times & Gazette Vol II. 1875 page 680
Case of George P. aged 12 years - Suffered from Pleurisy, with effusion of right side.
Thoracentesis performed at end of June and 50 ounces of clear serum drawn off with the aspirator.
On 8th August chest was again tapped and 51 ounces of purulent fluid drawn off. On 11th September was again tapped and 50 ounces of pus drawn off - after repeated tapping the patient finally died of exhaustion on 11th November.

Non absorbed effusion - but health of patient good after nine months.

Medical Times & Gazette Vol. 1854 page 10.
Thomas March age 15, admitted into St. Bartholomew's Hospital 23 April 1853.
Examination showed that right pleural cavity was full of fluid - there was no fever or dyspnoea, there was slight dryness of completion.
Pain referred to a spot remote from seat of disease
with severe pain along the margins of the cartilages of the lower ribs on the right side
spreading from edge of liver downwards through the abdominal wall and penetrating inwards.
He could not stand upright or walk.

Examination revealed an effusion in the left pleural cavity—intercostal muscles bulged outward.

Treatment: Blisters Jodide Pot. & Diuretics. The effusion disappeared under this treatment.

In same paper the same Physician relates case of a blacksmith who complained of severe pain in Right Hypochondrium—spreading over the abdomen.

Examination revealed an effusion in the left pleural cavity. This state was relieved by appropriate treatment.

Both of these cases had been treated for disease of the liver before Dr. Jones had seen them.
Medical Times Gazette Vol. 1854 page 11.

Case of W. P. age 23 admitted into Hospital on 5th July.

Examination showed that the left side was full of fluid and was bulged outwardly; the patient suffered from Orthopnoea.

History. A month previous to admission into Hospital he had been seared with severe stitch in the side.

Treatment. Cupping to 8 ounces, grey powder every six hours and a blister to side.

on 3rd day another blister - and on 5th day another blister. Diuretics now were commenced and exhibition of Mercury was stopped.

Patient was discharged from Hospital on 25th July perfectly well - the note adds percussion resonant and free inspiration heard over the whole chest, but vocal pneumonia was not quite so distinct as on the right side.
Medical Times & Gazette Vol 1854 page 12

Case of R. S. age 30. Admitted into Hospital the 11th October.

Examination showed presence of a pleuritic effusion on the left side. Dullness extended over the whole side & respiratory murmur absent except at apex. Left chest was bulged out - Pulse was 104.

History. Patient had been ill for five weeks and acutely ill for three days.

Treatment. Cupping to ten ounces - Repeated blisters - Calomel and Opium thrice daily.

After treatment for a month Patient had a slight relapse - but after two months residence in Hospital the Patient was discharged - When discharged there was no fluid in the pleural cavity and there was no contraction of the side.
Medical Times & Gazette Vol. 1854 page 13.

Case of E. S. Admitted into Hospital 21st July 1853, aged 7 years.

Examination revealed pleurisy of right side with effusion as high as the right nipple.

History: Attack had been sudden and attended by fever.

Treatment: Six leeches were applied to the side and internally mercurials and salines were given.

Absorption was complete on August 1st.

Cure in 11 Days.

From Medical Times & Gazette Vol. 1854 page 14.

Case of Harrieh S. age 28, Admitted into Hospital 2nd December 1851.

Examination showed that the left pleura was full of fluid up to the lower border of the 7th rib. The heart was pushed to the right side. Right lung was healthy. Left side measured an inch more than the right. Pulse was 108.

Treatment: Cupping to eight ounces — Antimony — Calomel & Opium — repeated blisters.
Treatment Leeches Mercurials Salines

Blisters - Iodide of Potassium & Diuretics.

History of Case. Patient had been ill for 3 weeks before admission with pain in the side and shiverings.

After three months patient was discharged with a clear percussion note as low as the nipple. The patient was seen two years after leaving Hospital - she was in perfect health. At no time had the side contracted at all.

Treatment Blood Letting Mercurials

From Medical Times Gazette Vol XVI 1858 page 477
Reported by Dr. Hamilton Roe.

Case of Mr. E. L. age 28. A strong healthy woman Nurse to Westminster Hospital.

Examination - Sharp pain on left side which was increased on inspiration. Lower part of left side dull on percussion. Respiratory thumper indistinctly heard.

History. Attack had been sharp & sudden.

Treatment. XX ounces of blood taken from the arm. Calomel 3 gr. Opium 5 gr. Every four hours.
Treatment Blood Letting & Mercurials.

Next day breathing was more difficult - she could not lie down - dullness extended up to the clavicle.

Bled to 16 ounces - 1 grn. digitalis + 1/4 grn. tart. antimonius - added to former mixture of calomel and opium. Next day she was salivated - Improvement now rapidly set in - and in less than 14 days from her admission all signs of fluid had disappeared from the pleura. Patient was now convalescent & very soon resumed her duties in the Hospital.

Treatment by Blisters & Diuretics

Medical Times & Gazette Vol. 1854 page 10.
Case of Sarah Riley, a pale delicate woman aged 18, was admitted into St. Bartholomew's Hospital under the care of Dr. Burrows on 20th September 1852. On examination fluid was found in the right pleura as high as the 3rd rib. Below the 3rd rib percussion was quite dull. Above the 3rd rib percussion was

Note
Treatment by Blisters and Diuretics

Note was clean, and respiratory sounds were distinct but harsh. Below the level of the 3rd rib no respiratory sounds could be heard. Vocal fremitus was abolished. The right side of diaphragm was depressed. Evidence of this shown by a bulging in the right hypochondrium below, over site of this bulging percussion note was dull. There was a sense of fluctuation at this point. The left side of the chest appeared to be quite healthy.

Dyspnoea not very urgent. But the face was congested and dusty.

Pulse 100 — Respirations 24.

Measurement showed right side was 1½ inches wider than left below the nipples. There was a history of an old pleurisy of same side. And pricking pains had been repeatedly experienced since. When admitted into Hospital the patient had been ill a month.

Treatment — Nitrate of Potash, Nitric Ether — Infusion of Digitalis and repeated blisters. Patient returned to her work 23'2 October.
Treatment by Blisters and Diuretics

There was still fluid at base of lung and side was 1 1/8 inches greater than the left side by Christmas four months after the commencement of the illness absorption was complete and the lung had quite recovered itself.

Treatment by Mercuvalds & Blisters

Medical Times & Gazette Vol 1854 continued from page 10.
Ada M. Admitted into Hospital 9th October

History of Case. Three weeks after her confinement she had had a rigor. As she felt very unwell she came to Hospital for advice, and was admitted on the 10th day of her illness (i.e. 10th day after the rigor). Examination showed Patient was suffering from Pleuro-Pneumonia of the left side—the fluid in the pleural cavity reached to the level of the fourth rib.

Treatment Sul. Hydros. & Greta Sin. 4 times daily
and repeated blisters

Patient was discharged from Hospital on 25 Oct. that is 16 days after admission perfectly well.
Treatment by Mercurials & Blisters

From Medical Times & Gazette Vol 1854 page 31 May.

S. L., age 34. Admitted into Hospital 31 May.

Examination. Pulse 120. Whole of left side was dull on percussion and was found to be full of fluid—heart was pushed one inch to right of sternum. The left side measured 1/4 inches more than the right side.

History. For two weeks previous to her admission she had suffered from stitch in the left side and chills.

Treatment. Cupping, Calomel & opium and antimony. On 4th June left side had diminished 1/4 inch from its previous measurement. Blisters were now ordered and pitch and iodide of Potassium given on Cod oil and chest was strapped.

Patient was discharged from Hospital on 19th July perfectly well and fluid entirely absorbed—(Absorption was complete 49 days after admission into Hospital).
Case of G. H. Admitted into Hospital on 14th September.

Examination showed that patient was suffering from pleuro-pneumonia of the left side and there was complete dullness over the lower two thirds of the left side.

History. Patient had been seized with a rigor, followed with pain in the chest and dyspnoea on 11th September.

Treatment. Blistered; grey powder thrice daily with antimony.

Patient was dismissed from Hospital on the 22nd September perfectly well.

Case of J. B. aged 33 Admitted into Hospital 19th December 1857.

Examination showed that pleuritic effusion was present that it reached to the level of 2nd rib (record omits to say on which side the effusion existed).

History. Patient had been ill for three weeks before admission into Hospital.

Treatment. Mercury, opium to physic, saline diuretics and counter irritation externally. Patient was dismissed from Hospital quite convalescent on 17th January 1858.
Treatmen by Mercurials & Diuretics

Medical Times & Gazette Vol 1854 page 10.

Cornelici C. aged 20. Had been attended for two weeks previous to her admission into Hospital on account of Peri Carditis and Pleurisy. She was admitted into Hospital on the 3rd September.

Examination showed that the left pleura was full of fluid up to the margin of the 2nd rib. The area of precordial dullness was also much extended.

Treatment. Calomel and Opium pill three daily and Nitrate of Potash drunk.

On 8th September the fluid had entirely disappeared from the pleural cavity. Patient was discharged from Hospital on 20th September quite well.

Cure in 5 Days.

Treatmen by Blisters & Mercurials

From Medical Times & Gazette Vol 1854 page 16.

Case of John G. 12 years of age admitted into Hospital 15th November 1853.

Examination
Treatment by Blisters + Mercurials

Examination revealed effusion into the right pleural cavity reaching as high as the nipple line.

History. Patient had been ill for six days. Treatment: Mercurials and Salines and some of soda painted repeatedly over the side. Discharged quite well November 28th.

From Same Paper

Case of John B. aged 28, admitted into Hospital 21 November 1853.
Examination revealed effusion in the right pleura up to the level of the nipple and loud friction above the nipple line. There was great general prostration.

Treatment: Mercury + Opium - Quinine - Blisters - 14 Days
Fluid was entirely absorbed in two weeks.

From Same Paper.

Case of J. P. age 32. Admitted into Hospital 9th May 1853.
Examination left pleural cavity was almost full.
Treatment by Blisters & Mercurials

full of fluid - the side was bulged outwards.

History. Patient had been ill for three weeks.
Inflammatory symptoms had been slight.

Treatment. Mercury, Jodide of Potassium.
Blisters & painting side with rich Jodide.

Patient was discharged from Hospital in seven weeks - absorption was complete.
and air entered all parts of the lung.

Treatment by Blisters Mercurials Diuretics

From Medical Times & Gazette Vol 1854 page 33. Case of B. B. age 18 years - admitted into Hospital 21 June 1853.
Examination showed that the left pleura was full of fluid - left side distended - heart beat was felt beneath the right nipple.
There was no dyspnoea except on exertion.
History. For three weeks patient had felt rather languid and short of breath but had continued at his work (deblacksmith) till
Treatment by Blisters, Mercurials, Diuretics.

The day of admission into Hospital.


At the end of 4 months, patient insisted on leaving Hospital as he felt quite well. Absorption was nearly complete—there was no retraction of the side.

From same Journal & Same page.

Case of G. P. Admitted into Hospital 18 May 1853—aged 8 years.

Examination. Left Pleura was full of fluid. Measurements of both sides the same. Heart's beat felt beneath the right nipple.

History. Patient had been ill for a month with pain in side and shortness of breath—bend he had continued at school till time of admission.

Treatment. Counter-irritation—Diuretics and Jodide of Potassium.

Resolution Complete on 6th July—lung had completely recovered—there was no deformity of the Chest.
Treatment Blister.

Medical Times & Gazette Vol 1854 page 10.

William J., aged 24, was admitted into St. Bartholomew's Hospital.

Examination showed that the left pleura was full of fluid, and the heart was pushed over to the right of the sternum.

History. Patient's previous health had been robust. He had caught cold from sitting in an open railway carriage when in a state of profuse perspiration. Before the end of his railway journey he had a rigor, and felt a slight prickling in the chest. After this he had felt short of breath, but had kept on at his work till his admission into Hospital.


Cure in 60 Days.

Patient was discharged from Hospital 60 days after his admission in perfect health; fluid entirely absorbed and limbs perfectly healthy.
Case of Charles H., aged 8 years. Admitted to Hospital with an immense effusion of right side. Had been ill 14 days. Admitted to Hospital 5th June + temperature was 103.5 pulse 156.

On 9th June temperature 102.6
On 10th 99.8 - Thoracentesis performed. Clear Serum drawn off. Evening after operation temperature 102.8
On 11th June temperature 101.8

Thoracentesis performed and clear Serum drawn off.

Case of Henry M. Admitted to Hospital 30th June. Was suffering from effusion on right side had been ill 4 days.

Temperature on admission 104.2 pulse 120. Sweated profusely at night.
6th July Morning temperature 100.2
Evening 102.2
10th July Morning 99.4
Thoracentesis performed + clear Serum drawn off.
Temperature no guide.

Case of A. B. in 4th week of Pleurisy.
Evening temperature 103 Morning temperature 99-101 for several days.
Thoracentesis performed but only serum drawn off.

Empty and with normal temperature.
Case of child suffering from pleural effusion.
Evening temperature 98°.5
Thoracentesis performed hence morning 10 ounces of pus drawn off.

Schroth's Method.

Reported by Dr. Morton.
Examination Revealed a very large effusion
in the right pleural cavity. Dullness was found on right side up to about that clavicle.
Schroth's Method.

Clavicle where the note was hollow. Dullness passed some distance to left of the median line above beat of heart felt half an inch outside the left nipple. Some difficulty in breathing.

History. Had caught cold three months previously, and had since had pain in the chest and some difficulty of breathing.

Treatment. Pot. Jodid
Pot. Chlorat a gr v or in die and bitartrate of Potash eleborary.
Restricted to 10 ounces of fluid in 24 hours.

By the middle of third week all signs of fluid had disappeared from the pleural cavity.

Sepsis was cured by a single tapping.

Medical Times & Gazette Vol II 1879 page 144.
Case of George N. aged 7 years.
Paracentesis performed by Dr. Cundle at North Eastern Hospital.
Two ounces of pus were drawn off.
Child made a good recovery.
These cases following were observed in Ward 23 this Winter:

(40) Case of John M. Had been ill since April, and was a good deal off work—Came to Edinburgh in October, 1881, and got work—Kept at work, though it was difficult to work, till his entrance into the Infirmary on 4th December 1881.

Examination showed that the right limit of the heart's dulness was in the right mid axillary line.

There was no breathlessness when this patient was at rest and could not have been much when he worked himself as he kept at work till admission into Hospital.

(41) Henry P. age 18. Empyema—Thoracentesis performed on 12th February and 50 ounces of pus drawn off. He died suddenly on 13th February.

Post Mortem Examination

Righe
Right pleural cavity contained 170 ounces of thick pus—right lung collapsed but was not bound down by adhesions to any extent.

Heart: Pericardial sac continuous with fibrous adhesions.

Medical Times Gazette Vol II 1876 Page 258.

Case of a Labourer aged 38.

Thoracentesis was performed on 41st day of his stay in Hospital and 62nd day of the disease—45 ounces of serum were drawn off twice. Patient subsequently died of Thrombosis.
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