## MEMBRANOUS CROUP.

[Read before the Boston Society for Medical Improvement, and communicated for the Boston Medical and Surgical Journal.]

BY GEORGE H. GAY, M.D.

CASE I.—*Membrane in the larynx, trachea and smaller bronchi. None in the back part of the mouth. Tracheotomy. Recovery.*

Charles W., æt. 7, had been troubled with a slight cold for a few days, and at 10, P.M., some difficulty of breathing was noticed for the first time. The next day he coughed but little. At 11, P.M., the difficulty of breathing came on again. On Saturday the cough was so like the barking of a puppy five months old, that was in the room, that the mother could not distinguish them by the sound. At night, the dyspnœa would return about an hour later, and continue for about two hours. Sunday night, he woke his parents up, screaming and saying he was choking. When I saw him, Monday, November 22d, he was playing about the room, without any noisy breathing, but with a hoarse voice and hoarse dry cough. His mother had already given him an emetic two or three times, in the night, with relief to the symptoms. I merely directed some syrup. scillæ and senega, a Dover's powder, and cold water to the throat. There was no inflammation, nor appearance of any membrane in the fauces. The tonsils were somewhat enlarged, but not red. The voice and cough has become less and less hoarse and dry, though the dyspnœa would come on at night. Nitrate of silver was applied to the throat and upper part of the larynx. On Thanksgiving Day, Nov. 25th, the voice was scarcely husky, though the cough was a little hoarse. He passed a pretty good night, and at 8, A.M., Friday, his mother considered him nearly well. At 9, A.M., she noticed that he was not inclined to sit up, but preferred to lie on the bed, and would not eat anything. In a few moments he had a spasmodic, strangling paroxysm of coughing, which was thus described by his mother:—with his mouth wide open and gasping for breath, he seized hold of his larynx as if to tear something away, then held his hands up high and suddenly jumped over the upper end of the lounge, turned round upon the bed, jumped again on the lounge, stood up, struggling for breath, with his face nearly black. Similar paroxysms came on every twenty or thirty minutes for about two hours. There was then an interval of relief, when they again returned. At 3, P.M., he had another attack; his lips were drawn tight across his teeth, his face was livid, his arms were tossed about, he ran across the room, and then fell, exhausted, upon the bed, with his head drawn back.

At my visit this day, about noon, the serious change in the symptoms was immediately noticed; the cough was then frequent, short, dry and almost extinct; respiration labored, noisy and hoarse, 50 per minute, inspiration and expiration being equally noisy; voice hoarse and whispering; swallowing, not difficult nor

painful, but almost constantly excited coughing; no appearance of any membrane in the posterior part of the mouth; tonsils somewhat swollen; submaxillary gland of each side enlarged and prominent since morning; no soreness nor pain about the larynx or trachea; pulse 130; tongue with white coat and red edges; no expectoration.

I proposed a consultation with reference to tracheotomy. I was sent for during the paroxysm at 3, P.M. When I arrived there, the patient had come out of it and was very much exhausted. Drs. Lewis, Ware, Sen., and Read, were present at the consultation.

*Tracheotomy* at about 4½, P.M., seven or eight hours after the strangling croupy symptoms had come on, the patient being fully etherized.

There was nothing particular about the operation, except that the thyroid isthmus was divided because it was in the way. The hæmorrhage was very slight, and stopped the moment the trachea was opened. The dilator was kept in until the usual coughing and expectoration had subsided. The tube was then inserted and fastened. After a few moments, the respiration became decidedly more quiet and easy. Pulse 120. Directions were then given for a person to be by the bedside all the time, with a sponge or cloth in the hand, to wipe away whatever came out of the tube before it was drawn back, to remove and clean the tube in hot water at least every two hours, and oftener if there was an apparent obstruction; if the obstruction still continued, to remove the other tube, and with the forceps to take away any membrane that might be seen. A further measure might be then adopted of injecting slowly through the opening of the trachea a mild solution of nit. argenti, or simply water, or of putting a large catheter bougie, with end cut off, into the trachea, and endeavor to remove the obstruction by suction. Afterward resort to pulmonary insufflation, if necessary. It was also directed to inject slowly through the tube into the trachea, every four hours, about one third of a teaspoonful of a twenty-grain solution of the nit. argent., for the double purpose of cauterization and expulsion of the membrane. Dover's powder, gr. iij., to be given p. r. n. Iodid. potass., gr. ij. every two hours. The temperature of the room to be between 70° and 75°, and the air to be moistened with steam; also, two or three layers of folded lace over the opening of the tube, like a cravat. 11, P.M.—Has been very quiet most of the time, and slept somewhat. Pulse 120. Considerable thirst—drinks easy and without producing a cough. The first introduction of nit. argent. caused a free expulsion of viscid mucus and pieces of membrane. Was relieved by it.

Saturday, Nov. 27.—Was pretty comfortable through last night. Slept somewhat. Expelled many pieces of membrane through the tube. This morning the countenance is bright, and he makes a motion that there is no pain in the throat or neck. The tube was cleaned every two hours, without any disturbance to the patient.

The submaxillary swelling is about the same. Less thirst. The breathing is quiet most of the time. Has expelled more membrane, and it always comes easier after the nit. argent. One piece is thick and very firm, nearly tubular and bifurcated. At noon, some other pieces were expelled from the tube, firm and hollowed, a portion evidently from the small bronchial ramifications. The firmest membrane looks very much like some of the layers in an aneurism. Near noon, the mother thought the nostrils moved, as if air passed through. A very delicate feather placed at the nostril was not the least affected by it. Does not raise anything by the mouth. 6, P.M.—Feels comfortable, and is sitting up in bed, with his paper and pencil. Respiration free and loose in the lungs. Coughs much, and constantly raises membrane and viscid mucus. Large quantities of clear, thin mucus run from the mouth, as when salivated. Throughout the day, the respiration has been generally easy and without much noise, except just previous to a cough. 10, P.M.—Has slept quietly most of the time since the visit at 6, P.M. Has raised strips of membrane—one, one and a half and two inches long; salivation continues.

Sunday, Nov. 28th.—Had very quiet and easy naps through the night. Raised much membrane, some of the pieces nearly tubular, and of the size of the smaller bronchial ramifications; the mucus is still viscid and dark colored. To-day, is again sitting up in the bed, playing with his paper and pencil. The tongue is much cleaner. Pulse 100. From the efforts he makes to raise, and without success, and from the flapping noise, the membrane is evidently separating in the larynx. Has raised some purulent looking fluid by the mouth. Through the tube, the membrane is still expelled in long, narrow, white pieces, some very firm and thick, tubular in part, and with blood attached to them. There are some loose, flapping râles in right back. There is more discharge through the tube, of a puriform appearance. The wound of the neck has a whiter covering than yesterday. Nit. argent. was freely applied to it. Salivation nearly gone.

Monday, Nov. 29th.—Slept very quietly last night two hours at a time. Expelled membrane and muco-pus through the tube. Tube remained in *nine hours* without changing. This morning, is very comfortable. Makes occasional efforts to raise by the mouth, which produces retching. Appetite good. Pulse 100. Some healthy red granulations are appearing in the wound. Iodid. potass. is taken twice a day. The swelling of the submaxillary gland is subsiding.

Thursday, Dec. 2d.—Has been improving since last report. The tube is changed once or twice in twenty-four hours. Raises a purulent looking discharge, with some granular membrane, like boiled tapioca. Grows stronger daily. Both tubes were removed to-day, as no change was made for eighteen hours. Breathes well

through the mouth. Swallows easy. Asks for meat. Bowels regular. Tongue nearly clean. Pulse 90, stronger.

Friday, Dec. 3d.—Has breathed well since the tubes were removed. No membrane now comes away, except in granular masses and mixed with pus. After dinner, expelled some tenacious mucus by the mouth, and immediately was able to speak aloud. The voice became more and more distinct, though hoarse. This morning, he is up and dressed, playing on the lounge. The expectoration is mostly purulent, with small bits of membrane. Breathes easy and without any noise. Wound of neck healthy and contracting.

Saturday, Dec. 11th.—Voice has become stronger. Coughs somewhat, and the expectoration is purulent. The edges of the wound are brought together by plaster, and scarcely any air escapes except during a long cough. Appetite sufficient. Pulse 80 to 90. The hoarseness is not gone yet.

Monday, Dec. 13th.—Is improving in every particular. The cough is less and the voice is not so husky. He suffers a little from two boils at the upper part of the right chest, near the clavicle. Has lost a great deal of flesh since the sickness appeared.

The directions in reference to the patient were at all times faithfully attended to. The tube was frequently cleaned and replaced, without the slightest difficulty or disturbance to the patient.

After the operation there are certainly greater facilities for acting through the opening of the trachea directly upon the disease, even when in the bronchi.

The injection of a solution of nit. argent. (gr. xx. to ʒ i. water), through the tube into the trachea, formed the principal treatment after the operation. In two cases it has had an evident beneficial effect. Up to this time, it will be probably allowed that no internal medicine is known that will stop the *secretion* of the membrane. The local application of the nit. argent. has certainly appeared to come the nearest in producing this effect, particularly after tracheotomy. Its influence, graduated in strength according to circumstances, in other cases, will show its value.

In this patient there seemed to be three different forms of the membrane: the tough, firm pieces looking like some of the layers of an aneurism, or like the calcareous concretions of an artery; the tape-like strips, and the granular or tapioca form.

There were several reddish strips, looking as if organized, not unlike the coat of a vein.

The small hollowed casts of membrane could have come only from a *small bronchus*.

The small bifurcated piece was too small for the tracheal bifurcation, in a child (a boy) æt. 7.

A point of noticeable interest is the fact that at no time was

there any sign of membrane in the back part of the mouth. The sudden swelling of both submaxillary glands was certainly not encouraging.

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CASE II.—*Membrane in the nose, back part of the mouth, larynx, trachea and bronchi. Tracheotomy. Recovery.*

Martha L., æt. 11, Roxbury, had had more or less of a cold, with some hoarseness, for two weeks. It was nearly well, when on the 19th of November, she was suddenly taken with inflammation of the tonsils, after coming home from play. The next day there was so much swelling that the tonsils nearly met on the median line. The voice was thick and nasal. There was no particular difficulty in the breathing, nor cough. At night she snored loudly, and kept her mouth wide open. In a day or two, by report of the mother, the whole of the back part of the mouth was covered with a "*white canker.*" This gradually came away in pieces, and the tonsils and velum palati were nearly free from it, when, on the 24th, in the night, she had a croupy hoarseness. Up to this time there had been no cough. She is naturally of a feeble, scrofulous constitution, and had been much enfeebled by this sickness.

Thanksgiving noon (Nov. 25th), there was decided croupy cough, voice and breathing. She could not speak loud, and the voice afterward was a mere whisper. At night the cough was almost incessant, the respiration labored and noisy. The next day, Friday, the symptoms were generally worse, and at night she raised a small piece of membrane. Saturday morning she raised another piece of membrane, and at 5, P.M., another piece. The tonsils and fauces generally were again covered with a white membrane. She was comparatively quiet an hour and a half after raising the membrane in the afternoon. The symptoms then returned with increased severity, the breathing was very tight and the voice nearly gone. She passed a very bad night, and on Sunday morning, Nov. 28th, some strangling paroxysms of coughing came on, which nearly exhausted her. The cough was dry. These strangling paroxysms increased in frequency and severity, and at 4, P.M., I saw her, at the request of her family physician, Dr. Jackson, of Roxbury. At that time her countenance looked very distressed and exhausted, her eyes were staring, her nostrils wide open, and the lips and cheeks were purplish. The cough was frequent, dry, hoarse and very nearly extinct; the voice was a faint, hoarse whisper; the respiration was very labored, but not very hurried, noisy and hoarse, inspiration and expiration being equally noisy. From auscultation nothing could be pronounced upon with confidence. By percussion the resonance was not very marked.

There was, and had been, considerable pain in swallowing of liquids even, and at times an entire inability. Any attempt would excite a choking paroxysm of coughing, which made her face almost black.

The tonsils were swollen, and, with the *uvula, velum palati* and *upper part* of the *pharynx*, were covered with *white membrane.* The *nostrils* (mucous membrane) were inflamed, and had *patches of membrane.* The tongue had a thick white coat and red edges. The pulse was 130, and feeble. The larynx was painful to the touch, as was also the upper part of the trachea. There was no glandular swelling of the neck.

It by no means could be considered a favorable case for an operation. The naturally feeble restorative powers of the system, the great constitutional depression attendant on the *re-deposit* of the membrane throughout the fauces and in the nose, the extension of the membrane into the larynx, trachea, and probably the lungs, held out nothing but an unfavorable result if the disease was left any longer to itself. A very prominent indication seemed to be to see if a large opening in the trachea would not allow a more free and permanent passage of air into the lungs than that then existing, and thus relieve a strong asphyxiating cause; then to resort to stimulants, tonics and such other remedial measures as the circumstances of the case might suggest. This would give rest to the larynx, where there was so much danger, and time for the disease, wherever it was, to go through its course to the separation and expulsion of the membrane through the opening in the trachea. With all these complications, it was decided to perform tracheotomy, even though the relief was only temporary.

*Operation* at 4½, P.M., with the assistance of Drs. Lewis, Windship and Jackson, the patient being under the influence of ether.

The irregular distribution and the very large quantity of veins, and the swelling of the thyroid gland, rendered it necessary to proceed with great caution. The veins were carefully dissected away and held aside by blunt hooks; a tenaculum was then inserted into the trachea to steady it, and four or five rings were divided, with the loss of but very little blood. The dilator was then introduced, and the slit of the trachea was kept wide open until the usual bloody liquid was expelled. The breathing soon became easier, though considerably obstructed. The pulse was very feeble, though less frequent than before the operation. After the administration of stimulants, she gradually revived, and was able to expel many pieces of membrane from the opening still kept free by the dilator. After a few moments' rest, the tube was inserted and fastened. The breathing was much relieved. Instructions were then given respecting stimulants, and the watching and cleaning of the tubes, and the dropping into the trachea, through the tube, every three or four hours, of a small quantity of a twenty-grain solution of nit. argent. A small Dover's powder was to be given according to circumstances, and iodid. potass., gr. ij., every two hours. A gauze cravat and steam were directed, as in the case of the boy.

Monday, Nov. 29th.—Had a more quiet night than was expected. She raised through the tube many pieces of thick membrane, and viscid, glue-like mucus. The first introduction of the nit. argent. caused much coughing, which expelled from the tube, in every direction on the bed, many pieces of membrane. She had some sleep, with but little labored breathing. To-day, she is very nervous and fretful. Pulse 110, feeble. Complains of great soreness over the whole chest, probably owing to the hard breathing and coughing. There is some vesicular respiration in the left lung. The right lung does not sound so well. The respiration is much less hurried than yesterday. The tongue has a thick white coat. There is no further extension of the membrane in the fauces. The nit. argent. was very thoroughly applied to the throat and trachea through the tube. Iodid. potass., gr. ij., was given every two hours; Dover's powder, gr. iij., p. r. n.; wine and water and milk porridge at regular intervals, and cold water if much thirsty. Patient swallows without any difficulty.

Tuesday, Nov. 30th.—Was much more comfortable in the latter part of yesterday and night. Expelled large quantities of thick membrane and viscid mucus. The tube was removed and cleaned every hour, without any disturbance to the patient. Had a nap of one hour at a time. While the nurse was cleaning the inner tube in the night, the patient out of curiosity removed the other. The father immediately replaced it. The breathing was not very labored during the time that both tubes were out. To-day, appears and looks stronger. Pulse better, 100 to 110. The respiration is much more quiet. Some moist rattles in trachea and lungs. Raises some very thick, hard, firm pieces of membrane through the tube. One of the surfaces in most of the pieces is more or less bloody. The viscid secretion is tinged with yellow. Both tubes were removed, and kept out fifteen minutes. Wound of neck had a whitish membranous deposit upon it. Nit. argent. was freely applied to it. There is but little swelling. The throat looks better. Membrane still on uvula and tonsils. The nose is about the same. Some appetite. Tongue cleaner. While the tubes were out, a piece of membrane was seen hanging from the larynx; could not seize it. Every injection of nit. argent. through the tube expels pieces of membrane.

Wednesday, Dec. 1st.—Was not so well yesterday P.M. Dr. Ware, Sen., went to see her with me, and we found her with more fever than at any time since the operation. The cheeks were flushed, the skin hot and dry, some thirst, and the pulse 130. The respiration was hurried, the cough dry, and the lungs seemed much oppressed. This condition continued till about midnight, when, after an injection of nit. argent., the cough became much looser, and some large, tough lumps of membrane were expelled. She then became easier, and slept more quietly. This morning, she is decidedly more comfortable. Feels hungry. Pulse 120. Has

expelled some thick pieces of membrane, some were reddish on one side, looking almost as if organized. One piece had a smooth concave surface, as if a part of a tube; the other surface seemed to be made up of different layers of membrane. There is not much yellow color as yet to anything that is expelled. Tongue moist and cleaning. By the mother's report, at 5, P.M., she had had the most quiet day since the operation. Is still nervous. Throat and nose better.

Thursday, Dec. 2d.—Passed a very good and quiet night. Slept easy for an hour at a time; would wake to expel membrane and mucus through the tube. At the visit this morning, she is sitting up in the rocking chair, breathing quietly and without effort, and is not so nervous. The wound of the throat is improving in appearance. The tongue is much cleaner. There is some membrane on the end of the uvula; the rest of the back part of the mouth is clean. The pulse 100, much stronger. Complains of pain in her ears. The soreness of the chest is much less. The membrane expelled since yesterday is still in lumps, and stained with blood, but much softer, as if it were decomposing. Some air comes through the mouth, without much effort. The appetite is good, and she asks for beef-steak. She swallows without pain or difficulty, and without exciting any coughing. Has not had any trouble in swallowing since the operation. The countenance and general appearance are good. The treatment has been continued.

Friday, Dec. 3d.—Patient was allowed to sit up again by the attendants in the afternoon, and on account of it was much fatigued at night. She passed the first half of the night less quietly, and the cough was more dry. After midnight the cough was looser, and she expelled a large quantity of lumpy membrane, with some purulent fluid. This morning, she is not so comfortable as she was yesterday morning, though better than she was last evening. Wine-whey or jelly, beef-tea or milk-porridge were given oftener. Pulse 100, rather weak. The breathing is easy, not noisy nor quick, and there are many loose râles throughout the chest. The tongue looks well. No membrane in fauces. Appetite not so good as yesterday. Seems to want strength more than anything else. Has expelled more membrane in the last twenty-four hours than in the twenty-four preceding. It is softer and less firm. There is some that is granular, or looking like boiled tapioca. In the P.M., she was quiet most of the time. Did not sleep any during the day. Some bloody expectoration, as if from the separation of membrane.

Saturday, Dec. 4th.—Had a very comfortable night. Slept more than an hour at a time. This morning, feels better and stronger. Appetite improving. Pulse 100. Breathing easy, slow and very quiet. The cough is very loose. She raises the membrane easily, which is softer, though lumpy, and more yellowish. There is much mucus and pus expelled through the tube.

Sunday, Dec. 5th.—Was easy yesterday and night, sleeping two hours at a time. Cough was frequent and very loose, expelling pieces of membrane, reddish as if organized. This morning, patient is better. The tongue looks nearly well. Appetite good. Expectoration from the tube and mouth is more purulent. One piece of the membrane probably came from above the tube, as it produced a longer, harder coughing and some gagging.

Monday, Dec. 6th.—Slept very quietly last night; at one time, three hours. To-day, general appearance very much better. Grows stronger daily. Raises less membrane by the tube and mouth. Membrane is softer, yellowish and easily broken down. Purulent secretion free. Breathes very quietly, and without effort. Wound of neck looks very healthy. Interior of mouth and nose without any membrane. *Both tubes removed.*

Tuesday, Dec. 7th.—Was better and easier without the tubes during yesterday. Slept most of the night. To-day, feels generally stronger. Breathes easily, and without noise. Cannot speak aloud as yet. The membrane is softer and softer; some of it looks granular, or like boiled tapioca. Most of the expectoration is purulent.

Thursday, Dec. 9th.—Doing very well. Coughs but seldom. Sleeps nearly all night. Wound of neck contracting; edges brought together by adhesive plaster.

Monday, Dec. 13th.—Sits up during most of the day. Grows stronger. There is still some loose cough. The voice is yet a loud whisper.

The great comparative ease and quiet in this patient and in the boy a short time after the operation, of themselves alone are points of great practical interest as bearing upon the propriety of the operation of tracheotomy. Without the operation, the result, in a few hours, would undoubtedly have been fatal to both.

The marked peculiarity in this patient was a condition of the system favorable to the re-formation of membrane, and its appearance in the nose, throat, larynx, trachea, bronchi, and wound of the neck. Another peculiarity was the expulsion of the membrane in large *lumps* and in very great quantities. Some of the lumps were very firm, and looked as if there were successive layers; others looked as if they were rolled up previous to the expulsion. There was the same reddish look as if organized, as in pieces raised from the boy. It was not merely blood upon the surface which could be wiped away, but the red portion had some thickness, and looked like the coat of a vein.

At no time has there been a symptom of pneumonia in either case.

In *six* cases operated upon by myself within about twelve months, *four* have recovered: in one, there was pleurisy, pneumonia and erysipelas *after* the operation; in another, the croup came on after an attack of mumps, and membrane was deposited on a

blistered surface; in another, there was no membrane in the throat, but in the larynx, trachea and bronchi; in another, there was a general constitutional infection, with membrane in the nose, throat, larynx, trachea and bronchi.

There are recorded cases of recovery after tracheotomy for membranous croup, where scarlet fever, measles, whooping cough and erysipelas have complicated the trouble, either before or after the operation; also after a general diphtheritic infection, with this membrane extending into the bronchi, and also after pneumonia. These of themselves add more danger to a case, but are not necessarily fatal complications. The strongest contra-indication to an operation seems to be the presence of double pneumonia.

An allusion was made, in the report of the two cases last winter before the Society, to the difference in the successful result of early over late operations for strangulated hernia. It was also remarked that time would show whether an earlier period of performing the operation of tracheotomy for membranous croup than has been customary, may not be followed by as successful results.

It is an important and very significant fact, that until within about a year there has been no recorded case, in any part of this locality, of recovery after tracheotomy for genuine membranous croup. The difference certainly cannot be attributed to the operation, for that was hitherto performed as at present. It must be now allowed, we think, that the constant fatality was mainly attributable to the late period of the operation, resorting to it merely as a *dernier ressort*, and not as one of the means of treatment. It is true that a tubular membrane has been raised in some desperate cases, and recovery has followed without an operation. But the number of such successful issues is so vastly disproportionate to the deaths, that it is altogether too desperate a risk for a patient to incur.

The proper time for an operation seems to be, not when the patient is pretty well, nor when nearly dead, but an intermediate or medium time, when the evident croupy symptoms are increasing in severity, unrelieved, and when there is a decided presence of membrane in the larynx.

Still, operate even when the patient seems moribund, although the chance of success will not be great.

## Reports of Medical Societies.

EXTRACTS FROM THE RECORDS OF THE BOSTON SOCIETY FOR MEDICAL IMPROVEMENT. BY F. E. OLIVER, M.D., SECRETARY.

DEC. 7th.—*Congenital Fissure of the Sternum.*—A special meeting of the Society was called for this evening, to see and examine a remarkable case of fissure of the sternum. The subject of this rare