Practical Points of Diagnosis and Treatment in Medicine.

TECHNIQUE FOR THE INDUCTION OF ARTIFICIAL PNEUMOTHORAX.

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THERE are many types of apparatus for inducing artificial pneumothorax, but the success of treatment depends on the physician and not on the apparatus, which may be as simple as possible without impairing the results of the treatment.

The choice of patient is, of course, most important and it is necessary also to study his temperament. If possible he should be got into a frame of mind so that he wants and has every confidence in the treatment. Mental attitude plays a big part in disease, and a patient who has been persuaded to have an artificial pneumothorax against his better judgment, regarding it as a last hope, is not so likely to benefit as one who has full confidence and regards it as no more than the hypodermic injection of some drug or application of a splint.

It is, of course, essential that the induction should be done with all possible cleanliness, the air from the apparatus should be filtered through sterilized wool, and all needles sterilized, kept in spirit and dried in a flame immediately before use. All preparations should, however, be made before reaching the patient, treatment should be given in his own room and not in an operating theatre, and the whole procedure should be made to appear to the patient as simple as possible. Brandy and other stimulants should be at hand in case of accidents, but the patient should not see them. It is a great mistake to give the patient the impression of an operation, and it is quite possible to be absolutely clean and avoid all chance of infection without appearing to make any more preparation than for an ordinary hypodermic injection.

The best site for the puncture is the fifth intercostal space in the mid-axillary line and unless there is any special reason this place should be tried first. If it is found that the pleura is adherent an attempt should be made to find a free space in the sixth intercostal space in the post-axillary line; failing this in the seventh space just below the angle of the scapula. If no free pleural cavity can be found in any of these sites an attempt should be made in the first intercostal space below the clavicle.

In my opinion it is not necessary to make any further attempts if no collapse can be obtained in any of these places, since with so much adherent pleura it is not possible to obtain a collapse sufficient to be of any therapeutic value even if a small pocket of free pleura is found.

The patient should lie on his healthy side and the skin over the site of the puncture painted with iodine. The skin should be anæsthetized by an intradermal injection of

a 2 per cent. solution of novocain and the procedure is absolutely painless if a small Record needle (No. 20) is used. The needle is then withdrawn and inserted through the anæsthetized skin and gently pushed down to the pleura, novocain being injected all the time, the last $\frac{1}{2}$ c.c. being injected against the pleura itself. The pneumothorax apparatus, which has previously been tested, cleaned and made ready for use, is then placed at the patient's bedside and so arranged that when the connecting tap is turned on there is no positive pressure, in other words no air can flow from the apparatus through the needle.

For the initial induction a Riviere needle is fitted to the rubber tubing of the apparatus; this needle has a blunt-ended cannula through which passes a sharp trocar. The needle is gently pushed through the anæsthetized skin between the ribs down to the pleura. The trocar is then withdrawn and the tap on the top of the needle turned off so that the cannula is connected through the rubber tubing with the manometer of the pneumothorax apparatus. The blunt end of the cannula is then gently pushed through the parietal pleura, and when it is in the pleural cavity the manometer will show a negative pressure with oscillations varying with inspiration and expiration.

The patient should be told to keep absolutely quiet and the needle held firmly as it is liable to slip out of the pleural cavity. When it is certain that the needle is really between the visceral and parietal layers of pleura, the clip connecting the needle with the air cylinder should be turned on so that the air can be sucked by negative pressure from the apparatus into the pleural cavity. Air, therefore, at the beginning is sucked by the negative pressure of the pleural cavity and not forced by a positive pressure from the apparatus; thus a chance of gas embolism should the needle be in a vein is prevented.

If 50 c.c. of air have entered the pleural cavity it is possible slightly to raise the pressure in the cylinder of air, 300-400 of which may be given at the initial induction of pneumothorax. The exact quantity of air introduced depends upon the intrapleural pressure. If this is quickly raised after a few c.c. it is probable that there are many adhesions and another site will have to be chosen. As a rule after 300 c.c. of air the pressure is raised very slightly, sometimes not even at all, and the first refill may be given the following day. After 300-400 c.c. have been introduced the needle should be withdrawn and the site of the puncture cleaned with spirit and no dressing put on. If a little gauze and collodium is put over the wound it is apt to leave a scar, whereas if the puncture is left absolutely uncovered it heals without leaving any mark at all in the majority of cases.

It sometimes happens that when the needle enters the pleural cavity a negative pressure is shown on the manometer but the oscillations soon stop. This is generally due to the visceral pleura blocking the end of the cannula and if a small quantity of air is introduced the oscillations begin again. Sometimes during inspiration the pressure becomes negative, but during expiration the visceral pleura blocks the end of the cannula so that there is a valve action which makes the manometer a minimum pressure one. If a small quantity of air has been introduced into the pleural cavity small oscillations take place.

If the needle enters a bronchus or cavity there may be small oscillations with respiration, but the pressure is not affected by the introduction of air and a steady negative pressure is not obtained.

If the needle pierces the diaphragm and gets into the abdominal cavity the

oscillations are inverse, pressure being lower with expiration than with inspiration. Cases have been described where air has been introduced below the diaphragm.

If the manometer registers a positive pressure which gradually becomes higher the needle is probably in a blood-vessel and blood will pass up the tubing. If air is forced in under these circumstances there is, of course, a danger of gas embolism.

It sometimes happens at the initial operation that the lung is punctured by the needle so that air escapes from the alveoli. These small punctures heal very quickly and as a rule do no harm, but air may escape from them for some time and this probably accounts for the occasional rise in intrapleural pressure or increase of collapse, as shown by X-ray, which is sometimes found to be the case where no refill has been given.

The two serious dangers at the induction are :—

(1) PLEURAL SHOCK.

This is extremely rare, but is a definite danger, and according to figures is as likely to happen whether or not the pleura has been anæsthetized. I always make a point of anæsthetizing the pleura at each refill as well as at the initial induction as this makes the procedure painless and gives one a feeling of security against pleural shock.

(2) GAS EMBOLISM.

This has now been described as of historical interest only and certainly it should not occur with proper technique.

The safeguards are in the first place to see that the air introduced into the pleural cavity is not under positive pressure, and secondly to avoid introducing any air even by suction until oscillations on the manometer show that the needle is really in the pleural cavity.

THE SERUM TREATMENT OF PNEUMONIA.

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As Wm. Withering pointed out some century or more ago, the appraisalment of a remedy is probably one of the greatest difficulties in medicine. More particularly is this so in pneumonia, because the mortality-rate in various epidemics differs very widely ; this variation is known not to depend upon the type of the infection. It follows that any evaluation of a serum can only be made on a rigid basis of no selection with alternate case control.

Such investigations have been made, mostly in America, and the results have been published. The first successful serum employed was effective against Type I pneumococcus only and required to be used in large volume and given intravenously at eight-hour intervals. The mass of serum so employed was mechanically difficult and inconvenient to administer and gave rise to somewhat violent and alarming reactions. For this and other reasons the method never became popular in this country, although careful American records showed very good results.