THORACOSCOPY OF THE EXTRAPLEURAL PNEUMOTHORAX

BY

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However dry the walls of an extrapleural pneumothorax may be at the completion of pneumolysis a greater or lesser amount of oozing invariably occurs afterwards. Schmidt (1938) in a review of 200 cases found that a more or less large post-operative haemorrhage had occurred in 10 per cent. In none of these was the bleeding fatal, but in a large proportion the pneumothorax space showed subsequently a pronounced tendency to obliterate. All cases of oblitative peripleurisy in this series were treated by oleothorax, and the much greater frequency of obliteration after haemorrhage is evident from the fact that oleothorax was instituted in 75 per cent. of the haemorrhage cases but in only 36 per cent. of the "dry" cases.

Roberts (1938) believes that obliteration is less likely to take place if the blood clot is broken up and aspirated. This is done under thoracoscopic control. A similar procedure is mentioned by Overholt and Tubbs (1938). I treated three cases in this way at the King George V Sanatorium, Godalming, and thorascoped a fourth case two months after pneumolysis. As the endoscopic findings seem to throw some light on the mechanism of obliteration they may be worth recording.

The intervention differs from an intrapleural thoracoscopy in several respects. In the first case the thoracoscope was introduced posteriorly through the third intercostal space, but as a considerable amount of coagulum was found in this region the second interspace in the anterior axillary region was chosen for the later cases and proved more satisfactory. At the beginning of the examination vision is poor and intermittent, as the endoscope lens and lamp are constantly becoming blurred. The frequency of this accident is considerably reduced if the first step is the aspiration of the sero-sanguineous exudate. This is best performed by tilting the head end of the operating table downwards and aspirating the fluid from the upper end of the paravertebral gutter. The lung tends to expand during aspiration, an occurrence which leads to coughing and blurring of the lens and should be avoided by checking the aspiration at intervals and asking the patient to inspire deeply. The Roberts aspirator, which is used to remove the clot, is inserted through a cannula in the third or fourth space in the axilla. The clot is broken up with the blunt end of the instrument before aspiration. Thoracoscope and aspirator are interchanged as occasion arises.

Case I

A man aged 22. Cough and expectoration for eighteen months. Bilateral disease with a cavity two inches in diameter in the right upper lobe. In October, 1937, a right A.P. was induced, but proved ineffective as the collapse was contraselective, the pneumothorax being incomplete and the gas pocket situated over the non-diseased lower region of the lung. Refills were discontinued in April, 1938, but a small basal intrapleural A.P. was still present at the time of the extrapleural operation.

Saturday, May 21, 1938.—Right extrapleural pneumolysis. Through an opening in the chest wall, made by resecting several inches of the fourth rib in the paravertebral region, the fused parietal and visceral pleural sheets, together with the underlying lung, were stripped from the ribs and mediastinum. This separation extended down to the third rib anteriorly, to the eighth rib in the axilla, to the sixth rib posteriorly, and to almost the same level on the mediastinum. During the lower part of the separation a free pleural space was encountered everywhere, but as the right lower lobe appeared free from disease the basal intrapleural A.P. was not conjoined with the extrapleural A.P. by dividing the septum of parietal pleura between them.

Condition on Monday, May 30 (Nine Days after Pneumolysis).—X-ray examination showed that an ovoid opacity occupied the right mid-zone and that a small sinus effusion

FIG. 1.

FIG. 1 (Case I).—Screening diagram. Patient in the erect position. Right intrapleural and extrapleural A.P.s. Ovoid shadow in mid-zone.

FIG. 2.

FIG. 2 (Case I).—Screening diagram. Patient lying on the left side. As the mid-zone opacity is practically unchanged in size, shape, or position it is presumably due to clot.

was present in the intrapleural A.P. (Fig. 1). At aspiration performed the same afternoon only 100 c.cm. of blood was obtained from the extrapleural space. The patient was screened lying on his left side immediately afterwards (Fig. 2) and the globular shadow was found to be unchanged in size, shape, or position. This and the scanty aspiration result seemed to furnish conclusive evidence that the opacity was due to coagulated and not to fluid blood.

Wednesday, June 1 (Eleventh Day after Pneumolysis).—Thoracoscopy and aspiration of clot. Thoracoscope in third interspace posteriorly. Sucker in second space in axilla. Some sero-sanguineous fluid was aspirated. The lung and chest wall were covered with small flakes and threads of fibrin. A mass of soft clot between the lung and the axillary region of the chest wall was broken up without difficulty and aspirated. The pleural septum between the pneumothoraces was then seen as a bluish-black mobile sheet. A dark red band—presumably the pleural incision—was visible in the paravertebral region. Two dark brown cones, two and four inches long respectively, were attached by broad bases to the anterior chest wall and tapered gradually to fine loose cords which lay on the lung. The distal halves of these cones were detached, but the parietal portions were too tough to separate or break up. In all, 600 c.cm. of blood and clot was aspirated. The

patient was screened immediately afterwards. Only a small quantity of fluid remained in the extrapleural pneumothorax (Fig. 3).

FIG. 3 (Case I).—Screening diagram in the erect position immediately after a mass of blood clot in the extrapleural pneumothorax had been broken up and aspirated.

In this case the clot stalactites would seem to have formed over bleeding-points on small tributaries of the internal mammary vessels. They had not become attached to the lung. A re-examination of the post-operative radiographs revealed faint markings, the size and shape of the stalactites, below the right clavicle.

Case II

A man aged 23. Symptoms of ten months' duration. Bilateral disease with multiple cavitation in the left upper lobe.

Wednesday, November 19, 1938.—Left extrapleural pneumolysis. The space was dry at closure.

Friday, November 28, 1938 (Ninth Post-operative Day).—Thoracoscopy and removal of clot. Thoracoscope in second space in the mammary line. Sucker in third space in mid-axilla. Some fluid blood was aspirated. Black masses of clot filled up the paravertebral gutter, particularly at the lower end. A stout chocolate-coloured pillar bridged the pneumo-

FIG. 4 (Case II).—Thoracoscopic view of a cone of blood clot arising from the chest wall in the neighbourhood of the operative incision. The attachment between the tip of this cone and the lung has been broken down.

thorax space between the lung and the scapular region about the level of the fourth rib. This was broken through near its lung end, and it was then seen to be a cone with a wide chest-wall base (Fig. 4). It was too adherent and tough to detach or break up. No other stalactites were observed, but the parietes were studded with flat adherent clots—some a bright, some a dark red colour. The incision scar could not be identified with certainty. 300 c.cm. of blood and clot was removed. A satisfactory collapse has been maintained since the intervention.

In this case the tip of the cone had become adherent to the lung nine days after the pneumolysis. The origin of the blood stalactite may have been from the pleural incision, for although this was not definitely localized

the cone arose from the fourth rib area, in which the incision had been made.

Case III

A man aged 22. The first symptom had been haemoptysis four months previously. There was bilateral disease, with multiple cavitation in the right upper lobe and scattered foci in the left apex.

Saturday, November 5, 1938.—Right extrapleural pneumolysis.

Monday, November 14, 1938 (Ninth Day after Pneumolysis).—Thoracoscopy, clot broken up and aspirated. Thoracoscope in the third intercostal space in the mammary line. Cautery in the fourth intercostal space in the axilla. Little liquid blood was visible. The parietes were covered with shaggy fibrin patterns, white and glistening against a dark red

FIG. 5 (Case III).—Thoracoscopic view of a shelf of blood clot in the paravertebral gutter.

FIG. 6 (Case III).—A close-up view of the clot stalactites found when the softer and more friable clot surrounding them and forming the shelf seen in Fig. 5 had been cleared away.

background. The clot was covered by a creamy-grey glistening layer and only appeared reddish black in colour when the surface was broken. A mass of it bridged the extrapleural space between the lung and the fourth or fifth rib in the scapular and posterior axillary zones and ran back as a fleshy shelf, widening posteriorly above and below to fill up the paravertebral gutter (Fig. 5). Some of it was soft in consistence and fell away on being touched, to reveal stouter areas of definite adhesion between lung and chest wall. These adhesions parted at the lung end on using more force. The shelf was separated backwards and clot in the paravertebral gutter broken up and removed through the sucker, 240 c.cm. of fine clot being evacuated. A considerable quantity of loose clot had to be left behind, as it was too large to come through the aspirator and too dense to break up further. At the end

of the operation three inverted sugar-loaf-shaped stalactites too firmly adherent to be detached from the parietes could be seen projecting from the chest wall in the area originally giving attachment to the shelf (Fig. 6).

In this case a shelf composed of soft friable clot, which ran forward from the paravertebral to the posterior axillary region, had formed around tougher clot adhesions between lung and chest wall. The shape of one of these which was carefully examined suggested that it had formed from a peripheral cone of blood clot similar to those hanging free in other cases. The haemorrhage may have been from the pleural incision.

Case IV

A man aged 28, with cough and expectoration since April, 1938.

October 19, 1938.—Right extrapleural pneumolysis. Fluid blood was aspirated on several occasions during the fortnight following the operation. After this only a trace of fluid remained, which finally disappeared within the next few weeks. An elongated vertical cone-shaped shadow bisecting the upper zone of the pneumothorax and an irregular dense area of opacity in the axillary region were noted on an x-ray film taken five days after operation; these persisted on later radiographs (Fig. 7). As the shape of the cone suggested that it was a clot stalactite it was decided to confirm this by thoracoscopy.

FIG. 7 (Case IV).—Radiograph of a right extrapleural pneumothorax. Note the vertical band of opacity behind the first interspace.

December 3, 1938 (Eight Weeks after Pneumolysis).—Thoracoscopy. No fluid was visible. The cream and red striations of the ribs and intercostal musculature were quite distinct. A whitish scar studded here and there with dark red specks was seen in the fifth rib line posteriorly. The lung was covered by a bluish-white pleura which moved hardly at all with the respiratory movements of the chest. Large liver-coloured masses of blood clot were seen on the lateral and posterior walls of the lower part of the space. The dome was a bluish-white colour; the subclavian vein was distinguishable by its pulsations, and the phrenic nerve was just visible. A sepia-coloured stalactite one and a quarter inches long sprang from the outer border of the first rib a little in front of the subclavian vein and some way behind the internal mammary vessels as they crossed the rib cartilage (Fig. 8).

Correlation of the radiographic and thoracoscopic findings in this case proved that the cone-shaped shadow was, as surmised, due to a fibrin stalactite and the axillary opacity to coagulum in this region. An interesting and unexpected finding was that two months after pneumolysis the differentiation between rib and intercostal space markings was clear and unmistakable. The immobility of the collapsed lung and the thickened pleural sheets covering it so soon after operation gave the impression that complete re-expansion of a lung after some years of treatment by extrapleural pneumothorax would be seldom, if ever, attainable.

On a film taken three months after pneumolysis had been performed the stalactite shadow was no longer visible. Whether it had disappeared by a process of autolysis or by organization and shrinkage it is of course

impossible to say. The opacity of the axillary clot was still present, but was getting gradually smaller five months afterwards, when the patient was discharged. It was

FIG. 8 (Case IV).—Endoscopic view of the extrapleural space shown in Fig. 7. A stalactite of blood clot arises from the outer border of the first rib.

closely applied to the ribs, but a considerable distance away from the lateral margin of the collapsed lung. The pneumothorax was showing no tendency to obliterate.

Discussion

In the three extrapleural pneumothoraces which were endoscoped soon after pneumolysis only in the upper region was there any suggestion of the yellow and red markings of the ribs and intercostal musculature. The pulsations of the subclavian artery in the dome were barely distinguishable. Below this were smooth glistening brownish or greyish-black walls covered here and there with fine white fibrin patterns, like lichen on a weather-beaten boulder. Long stalactites of blood clot with their apices free and pendulating, or cones already attached to lung, were seen, either at the first survey or after the softer clot that covered them had been removed.

The longer stalactites of fibrin have, as one would expect, always been found arising from the anterior chest wall. None of them was attached to the lung. The posterior projections were broader and shorter, cone- or sugar-loaf-shaped, and in both cases fixed to the posterior surface of the lung. The semi-upright position in which patients are nursed and the tendency of the collapsed lung to fall back towards the paravertebral gutter explain the greater length of the anterior stalactites and the apparent paradox that the shorter posterior cones seem more frequently to adhere to the lung. These posterior bands do not appear to cast a shadow on the postero-anterior radiograph.

Thoracoscopy has taught us that obliterative pleurisy in the intrapleural pneumothorax is often a sequel to the organization and contraction of interpleural fibrin bands which have formed in a pleural effusion. A similar mechanism is probably at work in the obliterating extrapleural pneumothorax. The fibrin bands are the cones or stalactites already described. These have been found fixed with considerable firmness to the lung as early as the ninth day after operation, when the loose surrounding clot had formed little or no attachment to the lung. It seems not unreasonable to suppose that the organization and contraction of these bands often start the obliterative process, while fibrin from the looser masses of clot acts as a cement to close the gaps between pleura and parietes, only at a later stage when the interval between them has narrowed.

Summary

The endoscopic appearance of the extrapleural pneumothorax in which post-operative haemorrhage has occurred is described.

A constant finding has been the presence of cones of blood clot arising from the chest wall.

These cones are sometimes free, sometimes fixed to the lung.

It is suggested that in some cases organization and contraction of these cones may be a factor in producing obliteration of the pneumothorax space.

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ASTHMA IN CHILDHOOD**A DISCUSSION OF THE PSYCHOLOGICAL ASPECT**

BY

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Although an association between nervous factors and bronchial asthma has been commented upon from time to time for more than a century, it is only within recent years that any serious attention has been paid to this aspect of the latter disorder. Dejerine and Gauckler (1915), writing of the effect of emotion upon the respirations, described cases of what they termed "nervous pseudo-asthma" which responded to treatment by reassurance. Ziegler and Elliott (1926) considered that the relation between the emotions and asthmatic attacks warranted careful study in that psychic stimuli seemed capable of inducing bronchial asthma in certain people with no history of protein sensitivity. Hurst (1929) thought that the most common psychological factor in asthma was expectation of an attack in certain places and under certain conditions, and attributed the fact that some 75 per cent. of patients are relieved directly they enter a hospital to the expectation of benefit from the treatment they are about to receive. In relation to this he stresses the importance of instilling into asthmatics a spirit of optimism as regards the ultimate outcome of their case. Rogerson, Hardcastle, and Duguid (1935) remarked upon the occurrence of asthma in over-protected children, and regarded the benefit derived from convalescent treatment as being attributable to the removal of the child from the difficult home environment. Gillespie (1936) considered asthma as being a mode of reaction of certain individuals to a variety of stimuli which might be of either a physical or a psychological order, and concluded that psychological factors might be equipotent with, replace, or be additional to physical factors in producing both asthma and asthmatic attacks. Bray (1937) regarded the psychic trauma as the trigger that fired the already loaded allergic gun, and considered that psychological treatment might help the patient suffering from allergic disorders by attending to his personal difficulties or his environmental stresses.

Strauss (1937), as a result of a detailed investigation of thirty unselected cases of asthma in adults, concluded that, even in the presence of the allergic diathesis, psychic factors contribute to the asthma syndrome in greater measure than had previously been thought likely, and held that psychotherapy, in the widest sense of the term, should reinforce physical methods of treatment. A

similar view was expressed in the Asthma Research Council's Report for 1938. McGregor (1938) considered that there is probably no such thing as a pure type of asthma, but that allergic, toxic, and psychogenic factors, among others, all play a part. He believed, however, that emotion occupied a prominent position in the structure of asthma and urged the introduction of these views into the approach to treatment. Pearson (1938) stressed the frequency with which over-anxiety, timidity, and lack of self-confidence are encountered as character traits of asthmatic children and the necessity for treating these and the environmental circumstances contributing to them. He also stressed the importance of preventing the patient from becoming a slave to his asthma. Boland (1938) issued a timely warning against attributing improvement to some special form of treatment when it might just as readily be due to chance, change of season, or mere passage of time. There are, however, recognized authorities who pay but scant attention to psychogenic factors in discussing the aetiology of asthma, as, for example, Coke (1939), who prefers "materialistic explanations to psychological theorems." It is also of interest that in a recent publication covering the ground of child psychiatry (Gordon, 1939) no reference is made to asthmatic states in childhood.

Study of a Series of Cases

During the past two years detailed study has been made of a series of cases of asthma in childhood with a view to determining the significance of psychological factors in the aetiology of this disorder and the contribution that psychological methods of treatment might have to offer. In that they were referred by medical practitioners for psychological investigation they were selected cases. In some of them physical factors were felt to be mainly responsible for the state of ill-health, and psychological treatment was not therefore recommended. In others, although the patients were subject to asthmatic attacks, advice was being sought primarily on account of other symptoms, such as those of a conduct disorder. In a third group psychological factors were considered to be contributing to the patients' condition, but full co-operation of the parents in carrying out the recommended plan of treatment was not obtainable. In a definite proportion of the cases, however, asthma was the primary symptom for which advice was sought, psychological factors were considered to be of significance, and the full co-operation of the parents, or in the case of adolescents of the patients themselves, was obtained. Five cases representative of this group have been chosen for detailed description, and have the following characteristics in common: (1) Asthma was the principal symptom for which advice was sought. (2) The symptom had been present for at least three years. (3) The patient was incapacitated by the attacks—in one case with respect to ability to follow an occupation, in four cases concerning ability to attend school with any degree of regularity, and, in all, as regards ability to enjoy the normal physical and pleasurable activities of childhood.

Case I

A girl aged 11½; an only child. Her maternal grandmother was subject to eczema: no other relevant family history was obtained. The father was of a worrying disposition and had not attempted to conceal his anxiety from the child, whom he coddled. "Have you coughed to-day?" was his usual greeting when he returned from his place of business. The mother stated that she had been very unhappy during the patient's early childhood owing to the attitude of her husband's people, who lived near by. The maternal grandmother resided in the home. The child had been healthy at birth but liable to eczema from infancy. At 3 years of age she suffered an