A New Method for Producing Pleural Symphysis in Spontaneous Pneumothorax

REPORT OF A CASE TREATED WITH STREPTOKINASE-STREPTODORNASE

IVAR KALLQVIST, M.L.*
Strängnäs, Sweden

The principle of preventing recurrence of spontaneous pneumothorax by means of obliterator pleuritis is not new. Many substances have been employed to bring about an inflammatory pleural reaction. They include silver nitrate and dextrose solutions, iodine, iodoform, hypertonic saline, talcum powder and the patient's own blood. Beardsley et al., in their comprehensive paper on spontaneous pneumothorax, recommended scrubbing of the visceral and parietal pleurae with gauze in order to produce adhesion between these surfaces. Other surgical procedures advocated in the literature for treatment of spontaneous pneumothorax range from excision of a solitary cyst or bleb to complete removal of the affected lung. Water-sealed drainage is also widely used.

In searching for an alternative method of promoting pleural adhesion in recurrent, non-hemorrhagic spontaneous pneumothorax, the writer considered the irritative properties of streptokinase-streptodornase. It was thought that the irritation of the pleurae and outpouring of fluid which follows the instillation of these enzymes into the pleural cavity could be utilized to obtain secure attachment of the lung to the chest wall.

Case Report

F. W., a 36-year-old male, was admitted to Lötz Sanatorium on October 1, 1953. Seven weeks previously he had complained of sharp pain in the right side of the chest and spontaneous pneumothorax was roentgenographically diagnosed. On admission the roentgenogram showed the base of the right lung to be so concentrically collapsed that it was drawn up clear of the diaphragm. The right upper lobe was prevented from total collapse by an apical adhesion. Six similar episodes of right spontaneous pneumothorax had been confirmed over the last 20 years. Spontaneous collapse of both lungs had occurred in 1952. In all of these episodes the treatment had consisted of bed rest with or without aspiration of the pleural air.

Thoracoscopy was performed on October 7, 1953 and the surface of the right lung inspected. The upper lobe was attached to the parietal pleura by a sail-shaped adhesion. This lobe was normal in color and on its surface were many small blebs. The parietal pleural surface was painted with a 2 per cent solution of silver nitrate after local painting with xylocain. The patient experienced no discomfort during or after this procedure, apart from a rise in temperature to 38.3° C. A small pleural effusion formed, but despite this and intermittent aspiration of air the middle and lower lobes remained totally atelectatic for several weeks.

On November 18, 1953, when the atelectasis had begun to show signs of clearing, 20,000 units of varidase** were instilled into the right pleural cavity. After about 16 hours the patient's temperature rose to 39° C. Fluoroscopy then showed a small pleural effusion and the pleural cavity was washed out with normal saline solution. Continuous suction drainage with negative pressure of 6 to 8 cm. of water was instituted and maintained for one week. At the end of this period the lung had re-expanded and adhesions had formed which divided up the lower pleural space. For this reason evacuation of pleural fluid necessitated intermittent needling at different sites.

**Streptokinase-Streptodornase Lederle.
Following removal of the varidase by pleural irrigation his temperature fell to 37.5° C. As the fluid re-formed and increased, however, the temperature gradually rose again until on November 4 it reached 39.2° C. It then fell slowly and by the end of December he was afebrile. When he was discharged home on January 30, 1954 the right lung was almost completely adherent to the parietal pleura. The basal parts of the lung, however, showed comparatively poor re-expansion (Figure 2), possibly due to the long periods of atelectasis and to the obliteration of the costophrenic sulcus which had commenced before varidase treatment was instituted (Figure 1). During the entire period of treatment he was encouraged to perform deep abdominal breathing and to lie as much as possible on the healthy side so as to keep open the costophrenic sulcus of the treated side. Figures 2 and 3 show the pulmonary condition 7 months after treatment. The diaphragmatic mobility is surprisingly good.

Discussion

In this case of recurrent spontaneous pneumothorax with extensive formation of emphysematous blebs on the surface of the lung, varidase was tested as a means of producing obliterator pleuritis. Instillation of 20,000 units brought about a general pleural irritation, which on the first day was accompanied by a rise in temperature but little fluid formation. The subsequent pleural effusion reached its maximum after about 6 days. That the parietal pleura in its entirety was involved in this reaction was shown by the appearance on the roentgenograms of an inflammatory swelling 3 mm. in depth. The lung was gradually re-expanded by continuous suction drainage of the pleural contents. As the adhesions formed the fluid became loculated, which made aspiration somewhat difficult.

It is not suggested that the dosage of varidase employed in this case was optimal. Since varidase appears to effect a generalized irritation of the pleural surfaces lower dosage may suffice. This extensive reaction is, in the writer's experience, in contrast to that of silver nitrate solution, which often produces adhesion only over the areas painted.

If it is desired to bring about adhesion of the basal parts of the lung before e. g. extrapleural pneumothorax, it should be kept in mind that a partial inhibition to varidase develops with repeated use. This is par-

**FIGURE 1**

*Figure 1:* Right spontaneous pneumothorax occurring for the 7th time in a 36-year-old man. Obliteration of the right costophrenic sinus has commenced. The arrows indicate the boundary of the lung at the site of an emphysematous portion.—**Figure 2:** The same patient 7 months after intrapleural instillation of varidase and suction drainage.
particularly important in cases in which varidase may be required to facilitate postoperative removal of clots. In sensitive patients the possibility of an anaphylactoid reaction secondary to the use of streptokinase-streptodornase, such as described by Orr Goehring and Grant, must be kept in mind.

Intrapleural instillation of varidase is not recommended for simple cases of non-hemorrhagic spontaneous pneumothorax, which do well with such methods as suction drainage. But in patients with a history of repeated pulmonary collapse, particularly when the surface of the lung shows extensive emphysematous blebs, the method merits consideration.

Warning must be given, however, against injudicious dosage of varidase which, by causing an excessive pleural reaction, may ultimately lead to a condition requiring pulmonary decortication.

SUMMARY

Past and current methods of treating spontaneous pneumothorax are briefly reviewed, and a case is presented in which pleural obliteration was achieved by intrapleural instillation of varidase (streptokinase-streptodornase). The patient was a 36-year-old man with a 20-year history of recurrent episodes of non-hemorrhagic spontaneous pneumothorax.

Varidase appears to evoke generalized pleural irritation. With judicious dosage and continuous suction drainage and breathing exercises, the

FIGURE 3: Double-exposure roentgenogram taken with the writer's mobile grid and showing the maximum inspiratory and expiratory movements of the diaphragm.
method would appear to merit trial in relapsing spontaneous pneumothorax.

RESUMEN

Brevemente se revisan los métodos del pasado y del presente para el tratamiento del neumotórax espontáneo y se presenta un caso en el que la obliteración se logró por la instilación intrapleural de varidasa (estreptokinasa-estreptodornasa). El enfermo era un hombre de 36 años con episodios recurrentes de neumotórax espontáneo recurrente no hemorrágico. La varidasa parece provocar una irritación pleural generalizada.

Con una dosificación juiciosa drenaje con aspiración y ejercicios respiratorios, el método parece merecer el ensayo en el neumotórax espontáneo recurrente.

REFERENCE


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