SPONTANEOUS PNEUMOTHORAX IN INFANCY

BY

IAN HIGGINS, M.R.C.S., L.R.C.P.

Late House Physician, Hospital for Sick Children, Great Ormond Street, London

Spontaneous pneumothorax in infancy is a rare condition: from a survey of the literature it appears that it may be due to the following causes:—

(a) **Congenital defects**, such as broncho-pleural communication (Folke, 1935), or congenital sub-pleural vesicles (Kjaergaard, 1932). The pneumothorax may be due to associated anomalies: Miller (1937) recorded a case in which pneumothorax was due to gangrene of the lung resulting from absence of the right pulmonary artery.

(b) **Mechanical factors**:

(i) Difficult labour (Ruge, 1878), use of forceps during labour (Flipse, 1928), version or breech delivery (Donahoe, 1932). Strongin (1938) recorded an interesting case of valvular pneumothorax associated with Erb's paralysis, following difficult labour, which ultimately recovered after two paracenteses.

(ii) Respiratory obstruction, leading to acute emphysema: aspiration of mucus, vernix, meconium, with possible ball-valve obstruction has been suggested by various authors: enlarged thymus (Willi, 1934; Hotz, 1934) and glottic spasm (Ruge, 1878) have also been considered significant. That some degree of valvular obstruction is the etiological factor in certain cases was shown by Silver (1939) in serial x-rays. In his case, acute unilateral emphysema was followed by the development of a spontaneous tension pneumothorax resulting in death.

(iii) Artificial respiration: Sports and James, cited by Silver (1939), considered that mouth to mouth respiration might cause spontaneous pneumothorax if unduly vigorous.

(c) **Infective factors**. This is undoubtedly the commonest group. The spontaneous pneumothorax is due to the rupture of the sub-pleural pulmonary abscess which may follow:—

(i) Pyaemia (Ross, 1924; Bovaird, 1903; Dupin and Verger, 1937; Holz, 1936; and Foster-Carter and Leigh Collis, 1940).

(ii) Pneumonia: Johnson (1927) records ten cases complicating broncho-pneumonia, the youngest of whom was four weeks.

The following case is of interest as one of spontaneous pneumothorax occurring in an infant who made a satisfactory recovery:—

**Clinical record**

**History (case 1).** Male: birth weight 7 lb. 14 oz. Second child: full term: normal labour: breast fed. Circumcised on the eighth day, at which time the infant was doing well and had regained its birth weight. The operation wound suppurated and pus being found in the urine the infant was treated at home as a case of neonatal pyelitis with sulphathiazole and sodium citrate for three days. Progress was unsatisfactory and he was therefore admitted to hospital at the age of twenty-one days.

**State on admission.** The infant was obviously ill, weighed only 7 lb. 9 oz., and the temperature was 99°F. There was cyanosis of the lips and finger nails: the skin and conjunctivae were slightly jaundiced; the circumcision wound was suppurating and mental ulceration was present. There was moderate abdominal distention; slight enlargement of the liver, but the spleen was not felt: the tongue was furry; the throat, ears, lungs and heart were normal. The urine was acid and contained albumin —250 mgm. per cent.—and bile. Deposit showed numerous R.B.C. and W.B.C., also masses of staphylococci. On culture a fair growth of staphylococci was obtained. The post-nasal swab and the blood culture both gave a heavy growth of staphylococcus aureus: coagulase positive.

**Treatment and progress.** 1,500 units of penicillin were given four hourly by intra-muscular injection for three days, after which the dose was increased to 2,000 units for a further fourteen days. Penicillin cream was applied locally to the circumcision wound.

Five days after admission the infant became cyanosed and the respirations rose to 55 per minute. The percussion note was impaired over the left middle and lower zones; many fine rales were present. On the right side of the chest, the breath sounds were diminished but no added sounds were heard. No evidence of displacement of the mediastinum was detected clinically. A tentative diagnosis of left sided pneumonia was made. X-ray of the chest (fig. 1) however, showed a right pneumothorax with sub-apical adhesions with some consolidation at the left base.

The following day the infant was more distressed, respirations were 100 per minute, the trachea was slightly to the left and a fresh x-ray (fig. 2) showed a further displacement of the mediastinum. The case was clearly one of tension pneumothorax.

A needle was inserted into the pleural space; the intrapleural pressures were 0+5. 100 c.c.m. of air were removed, leaving the pressures —4—1.
Fig. 1.—Nov. 23, 1944. Right pneumothorax with sub-apical adhesions: patch of consolidation at left base.

Fig. 2.—Nov. 24, 1944. Pneumothorax shifted further to the left.
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Fig. 3. Nov. 28, 1944. After two thoracenteses. Right lung re-expanding.

Fig. 4. Dec. 5, 1944. Area of consolidation right lower lobe.

One further thoracentesis, with aspiration of 200 c.cm. of air was required the following day, after which the clinical condition gradually improved. X-ray of the chest now showed the right lung re-expanding with consolidation in the middle lobe of the right lung and a small area of consolidation still present at the left base (fig. 3).

In view of persistent pyuria the infant was examined under anaesthesia by Mr. T. Twistington Higgins. A mass was detected in the region of the right kidney. The right loin was therefore explored through a retro-peritoneal approach and a perinephric abscess drained. The pus on culture grew staphylococcus aureus; coagulase positive. The pyuria rapidly cleared and the infant was discharged home, gaining weight and aged eight weeks. The final x-ray (fig. 4) of the chest showed the lung fields to be quite normal.
Two other cases of spontaneous pneumothorax in infants have also recently been treated at the Hospital for Sick Children, Great Ormond Street, the case notes of which are of interest:

**Case 2.** Male: aged nine weeks: first child: full term: normal delivery: birth weight 8½ lb, breast fed for one month. Attended hospital on account of respiratory difficulty dating from birth, associated with generalized convulsions lasting one to two minutes.

Examination of the chest showed diminished breath sounds on the right: no added sounds. Auscultation of the heart revealed an apical systolic murmur. X-ray of the chest showed cardiac enlargement and a right pneumothorax. X-ray at the end of a week showed absorption of air from the pleural space and re-expansion of the lung which appeared quite normal.

Examination at six years of age showed no evidence of cardiac lesion (intelligence appeared normal).

**Case 3.** Male: aged four weeks: second child: full term: normal labour: birth weight 6 lb 10 oz. Twenty-four hours after birth the infant became cyanosed: the respirations were rapid and the infant collapsed. He was treated with artificial respiration, stimulants and aspiration of mucus with improvement in the condition. Subsequently the infant had several recurrent attacks of rapid respirations, accompanied by blueness. Two days before admission to hospital there was bloody discharge from the nose.

On examination: weight 6 lb 9 oz. The child did not look ill, was slightly cyanosed and the respirations were rapid, 80 to 90 per minute. There was no apparent respiratory obstruction, but the breath sounds were diminished on the right side. Petechial haemorrhages were found on the soft palate; there was some abdominal distension; the liver and spleen were not felt. An x-ray of the chest showed a collapsed right lung with pneumothorax.

Three days later a further x-ray showed no pneumothorax.

**Discussion**

In case 1 the spontaneous pneumothorax was almost certainly due to rupture of an abscess into the pleural cavity. In view of the strongly positive blood culture and the development of a metastatic perinephric abscess, it seems likely that the areas of consolidation seen in the x-rays of the chest were due to metastatic pulmonary abscesses. It is surprising, as in the case recorded by Foster-Carter and Leigh Collins (1940), that a pyopneumothorax did not follow rupture of the infected lung. This is probably partly attributable to the fact that the infant was receiving penicillin and also possibly (as they suggest) to the fact that the pleural reaction was plastic rather than exudative.

Cases 2 and 3 illustrate the more benign form of spontaneous pneumothorax attributable to early respiratory efforts (the second possibly partly due to the convulsions). It is possible as Bertin (1936) claimed, that many examples in this latter group are overlooked, since rapid re-expansion of the lung occurs in the absence of a persistent bronchopleural communication.

The diagnosis of spontaneous pneumothorax should be considered in cases of respiratory difficulty associated with cyanosis. The signs are hyperresonance and absent breath sounds associated with mediastinal shift to the opposite side. The affected side may appear unduly prominent. A differential diagnosis must be made from congenital balloon cyst and diaphragmatic hernia; help in the latter condition may be afforded by opake swallow. Since the signs of mediastinal shift in infancy are by no means easy to demonstrate clinically, pneumonia, atelectasis and hypoplasia of the lung must also be considered, although in such conditions the deviation is towards the affected side, and the diagnosis is readily made by simple radiography.

The prognosis depends upon the presence or absence of infection of the pleural cavity and upon the type of pneumothorax: 30 per cent. in Glaser's and Landau's series (1935) were valvular in type and all died. Strongin's case appears to be the only previously recorded recovery in tension pneumothorax.

The treatment does not differ materially from that employed in adults—repeated thoracenteses with the requisite removal of air. The insertion of a needle attached to a water seal, as described by Chandler may be found necessary.

**Summary**

1. Three cases of spontaneous pneumothorax occurring in infants are described, all with recovery. They were (a) associated with staphylococcal pyaemia and tension pneumothorax. Effective treatment of the pyaemia (case 1) with penicillin is reported; and (b) associated with early respiratory effort.

2. The etiology, clinical features and difficulties of diagnosis are noted.

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**References**


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Ian Higgins

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