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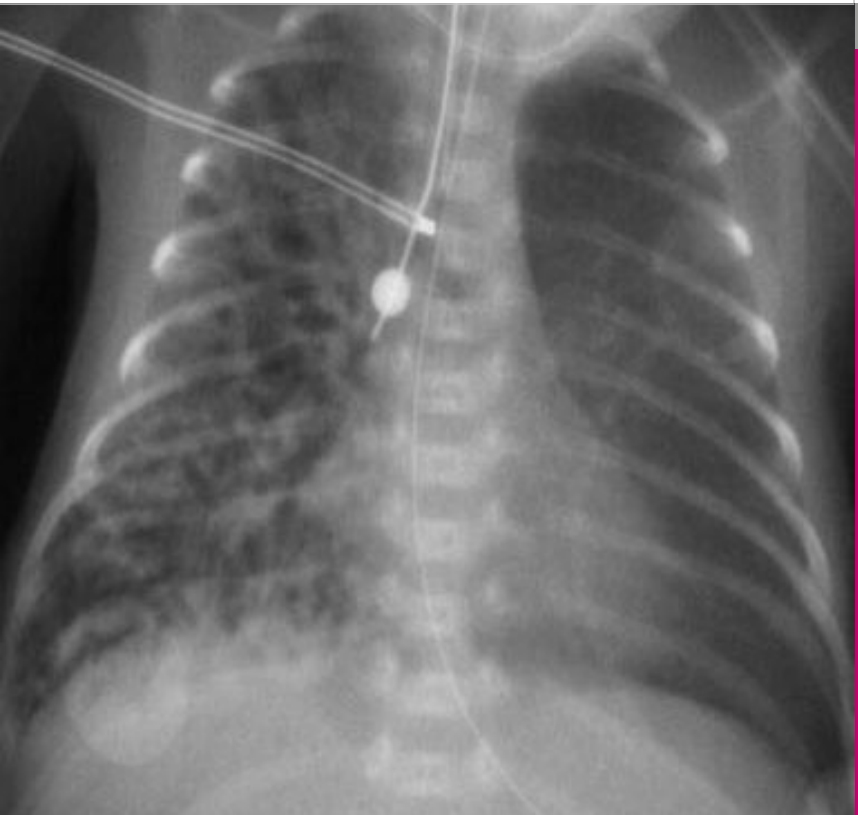
Selective bronchial occlusion in a preterm infant with unilateral pulmonary interstitial emphysema



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A preterm boy was transferred to our unit on day of life (DOL) 12 with unilateral pulmonary interstitial emphysema (PIE) of the right lung. He had been born by Cesarean section because of maternal pre-eclampsia and beginning HELLP syndrome at 29 2/7 weeks of gestation with birth weight of 1000 g. The mother had received two courses of antenatal corticosteroids.

Shortly after birth, signs of respiratory distress syndrome where noted. The patient was put on conventional mechanical ventilation and two doses of surfactant were given. On DOL 2, chest x-ray showed right-sided pulmonary interstitial emphysema (PIE). A subsequent pneumothorax was successfully treated with a chest tube. The boy could be extubated on DOL 8 and was put on CPAP. Despite careful positional treatment he needed to be re-intubated on DOL 9. A trial of selective intubation of the left mainstem bronchus was not successful.

The boy was therefore transferred to our unit and put on high frequency oscillatory ventilation (HFOV). However, further deterioration with worsening PIE and mediastinal shift were noted (Fig. 1). On DOL 14, we selectively obstructed the right mainstem bronchus with a 2F Fogarty catheter, which was inserted under fluoroscopic control (Fig. 2). There was a marked decrease of FiO_2 shortly after catheter placement.

Fourteen hours later, there was an acute deterioration in oxygenation after a fast head movement. Chest x-ray showed displacement of the catheter with overdistension of the right lung and a right-sided pneumothorax (Fig. 3). A chest tube was inserted and the catheter was replaced. Within 8 hours after replacement the right lower and middle lobe became atelectatic; the right upper lobe was still ventilated (Fig. 4).

Twenty-four hours later chest tube and Fogarty catheter were removed after one dose of dexamethasone (Fig. 5). The next day, there was a displacement of the nasotracheal tube, which led to atelectasis of the right upper lobe and overdistension of the right middle and lower lobe (Fig. 6). After correction of the tracheal tube FiO_2 remained below 0.25 in spite of the radiological deterioration. After another dose of dexamethasone the boy was successfully extubated on DOL 18 and put on nasal CPAP with FiO_2 still below 0.25. On chest X-ray three days after extubation, PIE had almost disappeared and lung volume was normal (Fig. 7). After cessation of CPAP-therapy FiO_2 remained below 0.25.

Unfortunately, the boy developed cystic periventricular leukomalacia and a grade IV PIVH diagnosed on ultrasound on DOL 22. The preceding ultrasound on DOL 14 had been normal. These findings were considered to be a complication of PIE with mediastinal shift and elevated central venous pressure.

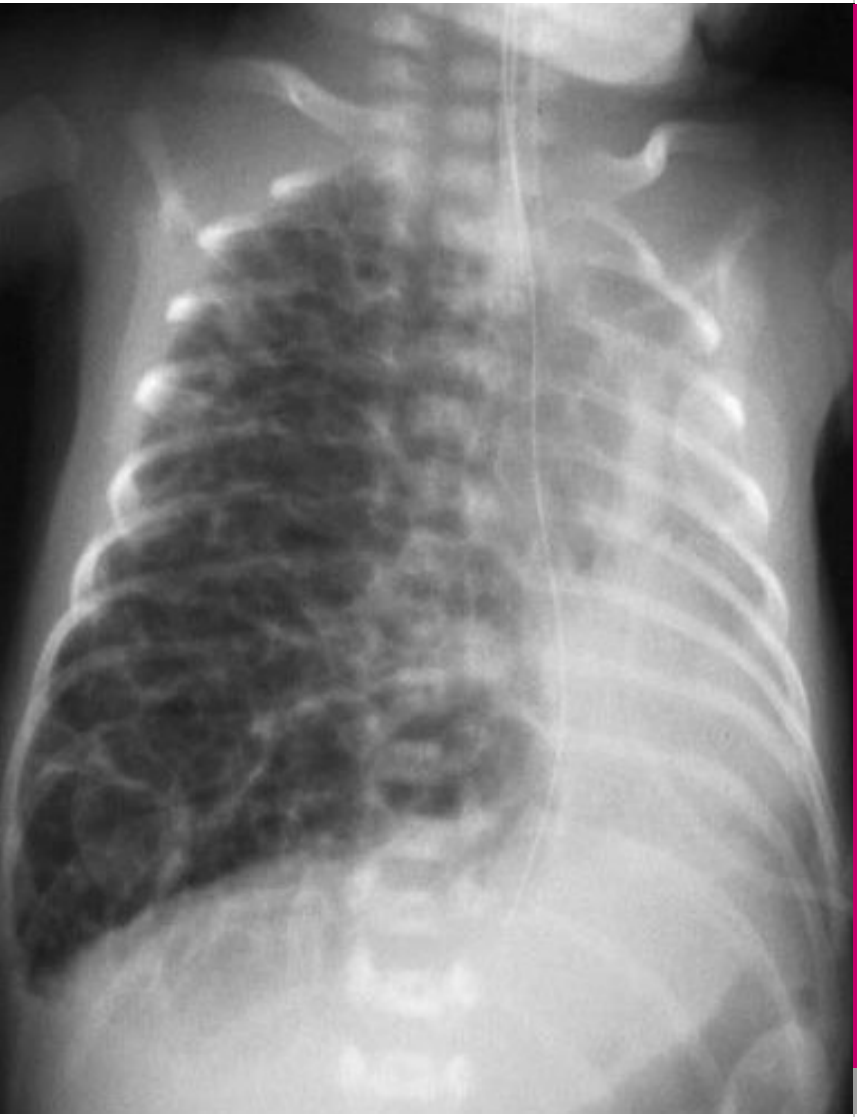

Fig. 1

Worsening right-sided PIE.

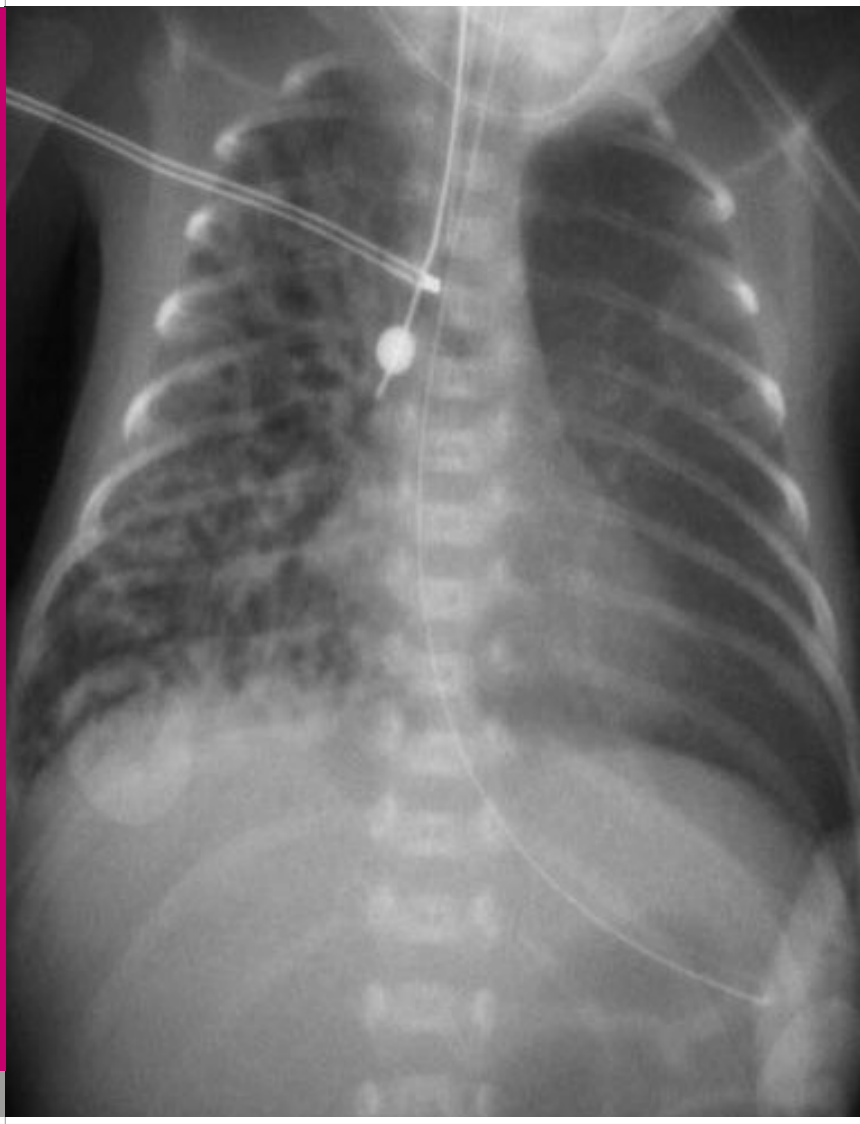

Fig. 2

2F Fogarty catheter advanced into the right mainstem bronchus.

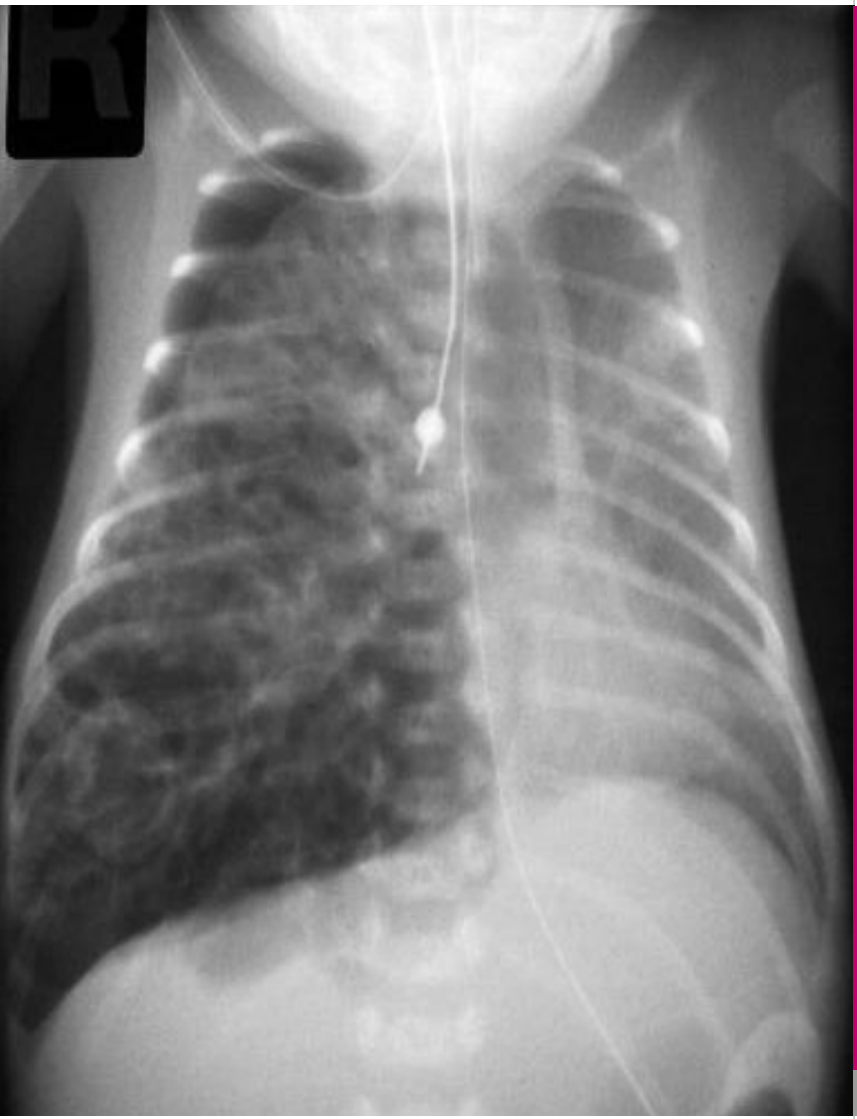

Fig. 3

PIE with pneumothorax.

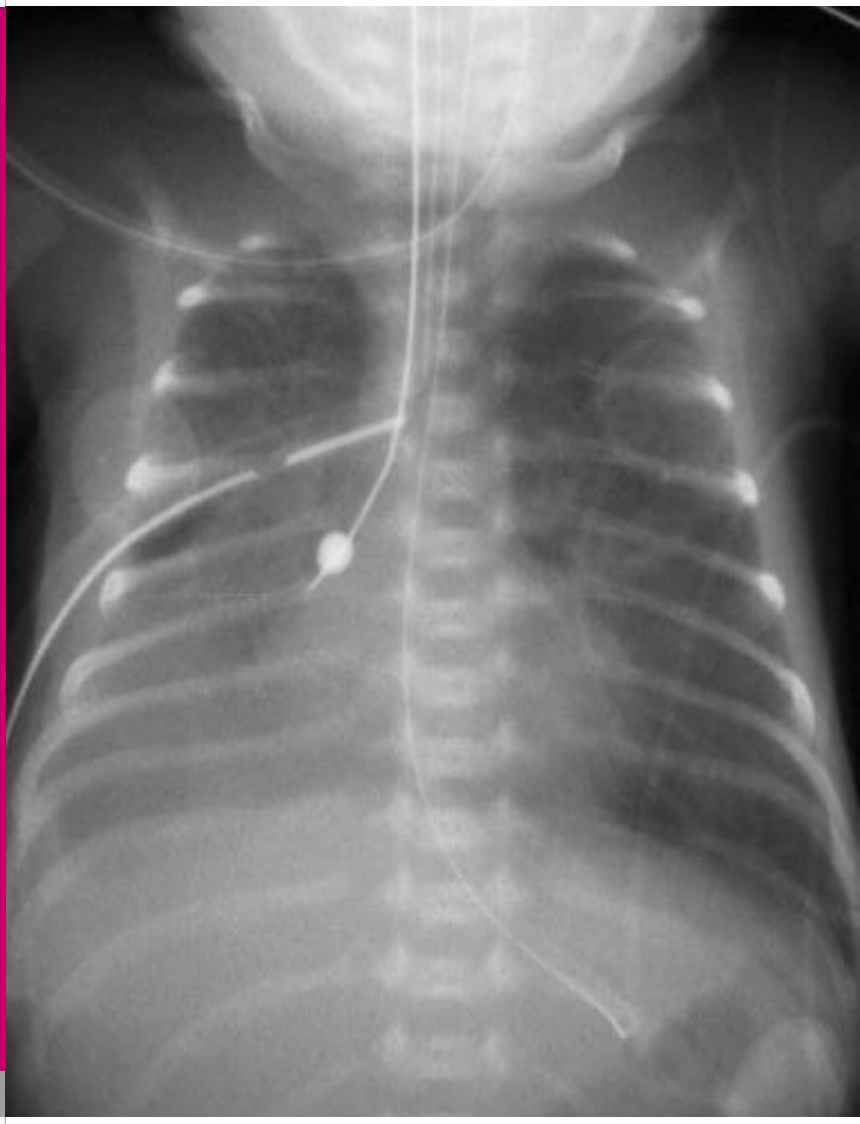

Fig. 4

Atelectasis of right lower and middle lobes.

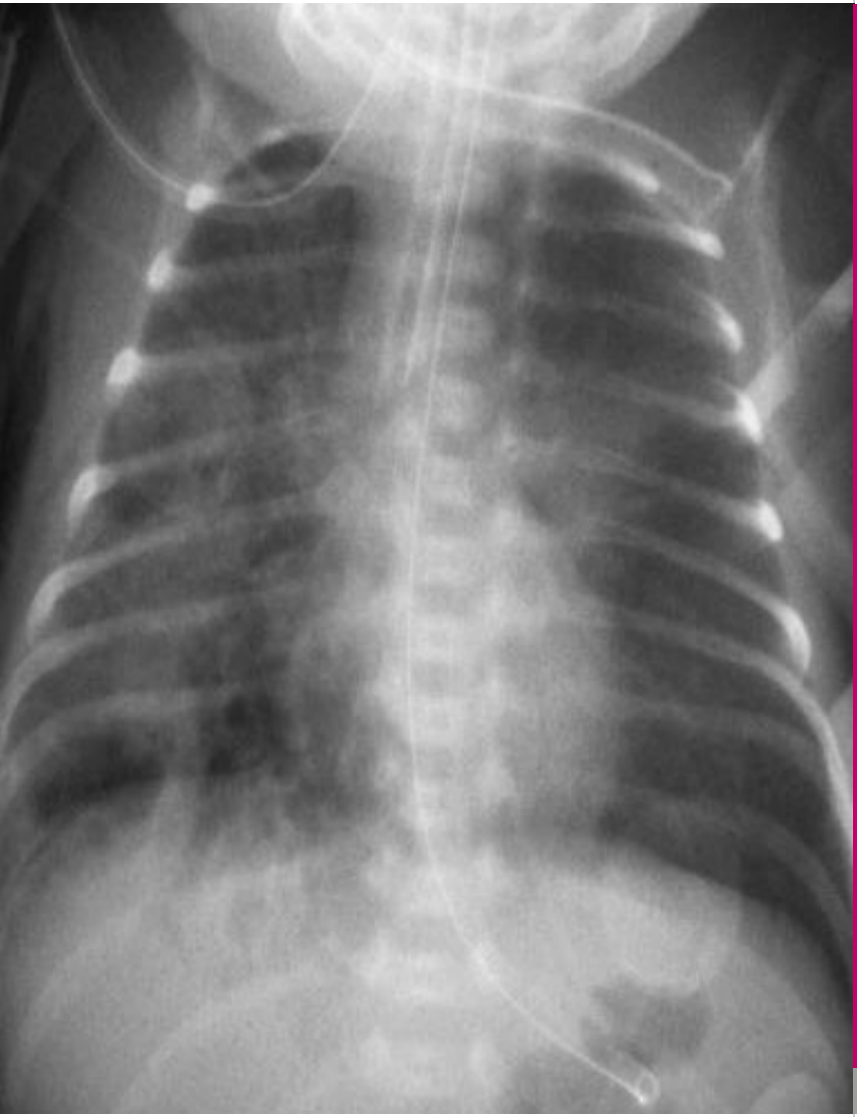

Fig. 5

Chest X-ray following removal of chest tube and Fogarty catheter.

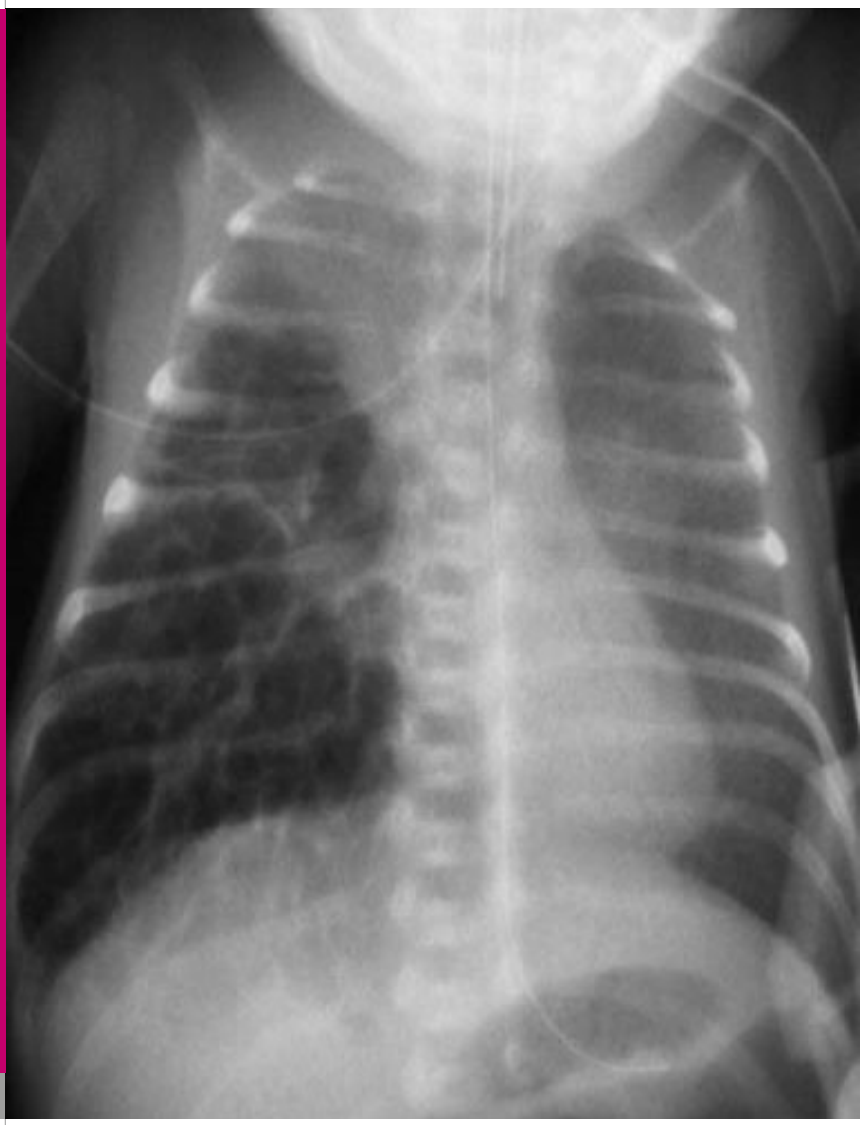

Fig. 6

Atelectasis of right upper lobes and overdistension of right middle and lower lobes.

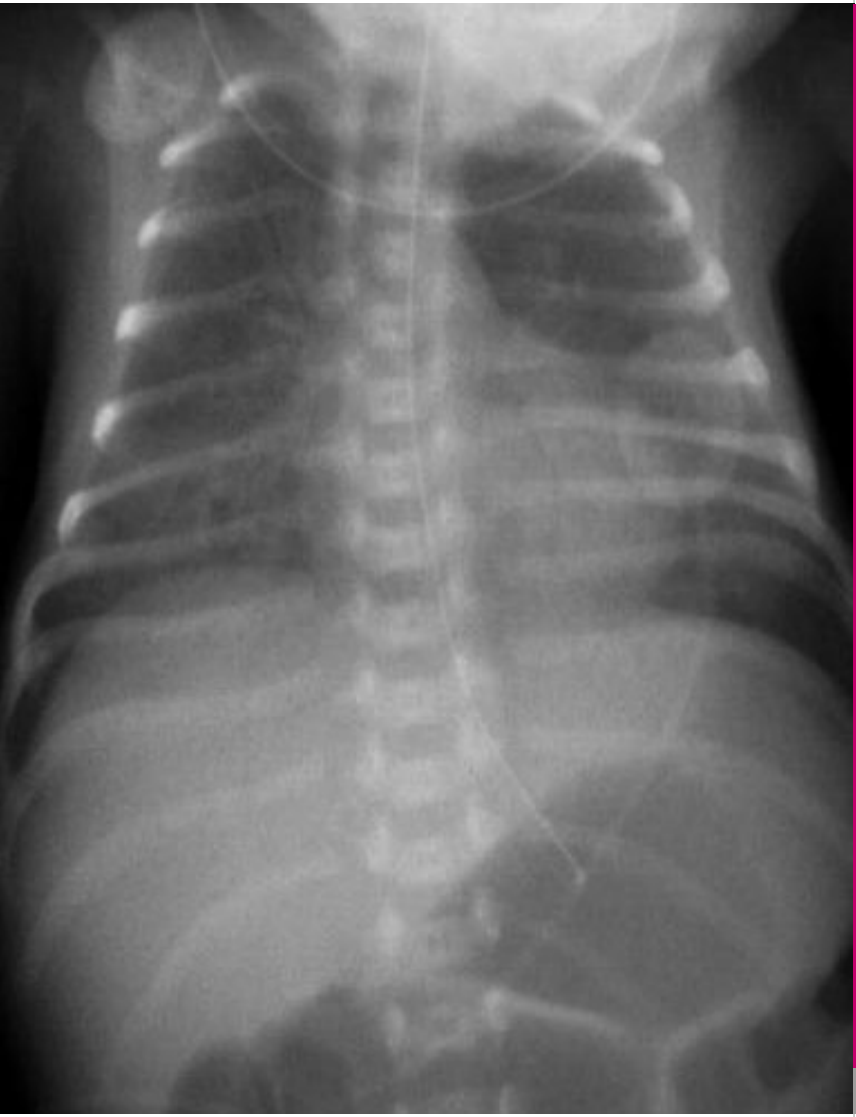

Fig. 7

Chest X-ray three days after extubation.

DISCUSSION

Unilateral PIE and the options for treatment have been reported in another Case of the Month (Berger TM, October 2000). Therefore, we would like to focus our discussion on possible problems and complications of selective bronchial obstruction.

1. Correct placement of the catheter may be difficult because of small-sized airways. We recommend fluoroscopic control during placement.

2. Insufficient filling of the balloon or displacement of the catheter may cause distal pulmonary overdistension secondary to exspiratory flow obstruction. Radiological control of position and size of the catheter should be performed frequently.

3. The properties of the balloon (low volume – high pressure) may lead to local mucosal necrosis. Removing the catheter after 24-36 hours with a preceding dose of corticosteroids may be a safe approach.

Because of the potential complications, selective bronchial occlusion should be performed only after failure of conservative treatment with positional measures and HFOV. It represents a valuable alternative to selective bronchial intubation.

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