

Case Series:

Study of clinical profile in patients of spontaneous pneumothorax in a rural based tertiary care centre, Maharashtra

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Abstract:

Pneumothorax in the newborn is a medical and surgical emergency. Early diagnosis with a high index of suspicion and use of trans-illumination can be useful where in-house X-ray facilities are not available readily, and also for early diagnosis prior to x ray. Trans-illumination is nonionizing, noninvasive and portable, making it a useful tool for the neonatal intensive care unit (NICU). The use of nasal continuous positive airway pressure (NCPAP), conventional mechanical ventilation (CMV), exogenous surfactant supplement, high-frequency oscillatory ventilation (HFOV), and high-frequency jet ventilation (HFJV) have improved the general outcome for neonates with severe respiratory failure of different causes. However, it has also led to increased incidence of airleak syndrome, pneumothorax being one of them.

Introduction:

Pneumothorax in the newborn is a medical and surgical emergency. Early diagnosis with a high index of suspicion and use of trans-illumination can be useful where in-house X-ray facilities are not available readily, and also for early diagnosis prior to x ray. Trans-illumination is nonionizing, noninvasive and portable, making it a useful tool for the neonatal intensive care unit (NICU).

The use of nasal continuous positive airway pressure (NCPAP), conventional mechanical ventilation (CMV), exogenous surfactant supplement, high-frequency oscillatory ventilation (HFOV), and high-frequency jet ventilation (HFJV) have improved the general outcome for neonates with severe respiratory failure of different causes. However, it has also led to increased incidence of airleak syndrome, pneumothorax being one of them.

The initial clinical appearance of mild form pneumothorax may be asymptomatic. As the condition progresses, infants may suffer gradual deterioration of arterial blood gases with an increased oxygen or ventilator requirement. The infant may appear agitated, or have unstable vital signs including an initial increase in blood pressure. As the air leak progresses, progressive respiratory distress, including rapid breathing, grunting, nasal flaring, and chest wall retractions may become significant. When tension pneumothorax occurs, there will be acute and severe cyanosis, which combines with the onset of acute bradycardia, hypotension, decreased pulse pressure and peripheral perfusion, barrel shaped chest, and acute abdominal distension.

Use of a chest transillumination test with high intensity light may quickly help to establish a preliminary diagnosis in neonates, and excessive light can be transmitted at the affected side. Chest tube insertion for definitive drainage is usually necessary at the midclavicular line of the second to third intercostal spaces or at the anterior to midaxillary line of the fourth to sixth intercostal spaces. The chest tube can be connected with an underwater seal for promoting

adequate drainage. A chest radiograph to confirm the lung expansion condition and chest tube position is necessary after the procedures are completed.

Materials and method:

Study was carried in Rural Medical College (PIMS), Loni , Maharashtra, Pravara Institute of Medical Sciences – Deemed University (IEC PIMS-DU).

Aim of the study was, to study-

1. Early diagnosis of pneumothorax in a clinical setting using transillumination.
2. Confirmation of findings on transillumination by X-ray.
3. Early intervention and management using intercostal chest drain.

Inclusion criteria: IPD patients in age group of neonates to 1 month having pneumothorax.

Exclusion criteria: Patients more than 1 month of age.

Case studies:

CASE 1:

A neonate born at 31 weeks of gestation developed respiratory distress soon after birth. Child was administered surfactant where after showing initial improvement, ventilatory requirements increased, and possibility of patent ductus arteriosus (PDA) or pneumothorax were considered. Trans-illumination was performed using a portable light source machine. After switching off all the lights, cold light source probe was placed perpendicular to the skin and sufficient pressure applied to prevent light leak. Changes in the size and shape of the corona of light were noted as well as the appearance of light separated from the corona. The right side of hemi-thorax had diffuse corona of light as compared to left side, confirming the diagnosis of pneumothorax. We placed an intercostal drainage (ICD) tube after X-ray confirmation.

CASE 2:

A premature neonate, born at 32 weeks of gestation, was given late rescue surfactant therapy at 18 h of age with continued mechanical ventilation. His ventilatory requirements were increasing. There was also a haemodynamic compromise that was supported with volume bolus and multiple inotropes. Echocardiography revealed a structurally normal heart. The chest transillumination test was positive which was later confirmed by chest x-ray. Chest tube was inserted on the affected side.

CASE 3:

A 36 week old term female child born via vertex vaginal delivery with cry immediately after birth and referred to us as a case of trachea esophageal fistula. The child was operated upon on the second day of life and went on to develop tachypnea and respiratory distress on the fourth post-operative day. On trans-illumination test, pneumothorax was suspected on the right side which was confirmed on x- ray. ICD was placed in the second intercostal space anteriorly.

S. N O.	NAME	AGE	SEX	C/F	TRANSILLUMINATION TEST	X RAY	INTERVENTION	RESULTS
1.	B/O NUTAN PATHAN	NB	F	JERKY BREATHING, INCREASED VENTILLATORY REQUIREMENTS.	POSITIVE	S/O PNEUMOTHORAX ON RIGHT SIDE	ICD INSERTED	CLINICALLY AND RADIOLOGICALLY CHILD IMPROVED
2.	B/O MEENA SHAIKH	NB	M	HEAMODYNAMIC INSTABILITY, INCREASED VENTI REQUIREMENTS	POSITIVE	S/O PNEUMOTHORAX ON LEFT SIDE	ICD INSERTED	CLINICALLY AND RADIOLOGICALLY CHILD IMPROVED
3.	B/O SUJATA KULKARNI	NB	F	JERKY BREATHING, INCREASED DISTRESS	POSITIVE	S/O PNEUMOTHORAX ON RIGHT SIDE	ICD INSERTED	CLINICALLY AND RADIOLOGICALLY IMPROVED

Results and discussion:

CASE 1: Chest X-ray done post-ICD insertion had residual pneumothorax, which resolved subsequently. After proper antibiotic coverage for 10 days the baby improved significantly and was weaned off from ventilatory support.

CASE 2: A gradual improvement was seen in the clinical status and the baby was able to be weaned from the inotropes completely over the next 48 h, and also was extubated. There was evidence of early onset sepsis for which

antibiotic coverage was given. Feeds were started after hemodynamic stability was achieved and the neonate was discharged at 3 weeks of age.

CASE 3: ICD was kept with the underwater seal for a total duration of seven days following which tachypnea and distress settled down. The child had also developed anastomosis leak following surgery for which drainage catheter was placed. Feeds were initiated through nasogastric tube and taken on full feeds. The child was taken on breast feeds and discharged at 6 weeks of age.

Air leaks in preterm neonates with respiratory distress vary from 3% (receiving mechanical ventilation) to 9% (receiving CPAP support). Types of air leaks vary from simple pneumothorax to tension pneumothorax.

Transillumination has been used since long for the diagnosis of conditions like hydrocele and pneumothorax. It provides a rapid way of diagnosing an emergent condition which can be life saving for the baby.

False negative results on transillumination can occur in infants with increased subcutaneous fat or edema. The thickened tissue, particularly in the case of edema, interferes with trans-illumination. False positives trans-illumination can occur in infants with congenital lobar emphysema and pneumo-mediastinum.

Conclusion:

1. Transillumination test should be done at bedside for early diagnosis of pneumothorax.
2. The test is cheap, easily achievable and can be executed in the periphery by health care people, who doesn't have access to modern ultrasound machines.

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