

NEONATAL PNEUMOTHORAX IN THE “BEGA” NEONATOLOGY CLINIC BETWEEN 2014-2015

Daniela Iacob^{1,2}, Alina Elena Agoston-Vas², Marta-Nicoleta Grajdeanu², Mirabela Dima^{1,2}, Ileana Enatescu^{1,2}, Nicoleta Ionita², Iacob RE³, Ilie C^{1,2}

Abstract

Pneumothorax is a medical and surgical emergency. The most incriminated risk factors in the neonatal pneumothorax are: mechanical ventilation, pulmonary tissue anomalies, respiratory distress syndrome, sepsis; pneumonia; aspiration syndromes (meconium, blood), congenital malformations. In 0.07% of the cases pneumothorax can occur spontaneously in an apparently healthy new born infant.

This is a retrospective study of the pneumothorax cases in the “Bega” Neonatology Clinic from Timisoara through a period of 2 years (2014-2015). We found important aspects regarding maternal pathology, pregnancy related pathology and incidents during birth.

During 2014-2015 there were 4891 births in our Clinic, 378 of the new born infants were admitted in the Neonatal Intensive Care Unit (NICU). 12 of these infants had pneumothorax, which means an incidence of 2.38% and a prevalence of 0.24%. More than a half were unilateral pneumothorax cases. The gestational age of the new born infants included in the study is between 27-39 weeks, with a prevalence of the premature born infants, with an approximately equal ratio between sexes. 56% of the cases needed surgical intervention for pleural drainage. There is an increased proportion of the cases that needed invasive mechanical ventilation, cases with severe respiratory distress and also an increased proportion of the cases diagnosed with maternal-fetal infection. The evolution and the prognosis of the infants depended on the gestational age and associated pathology. The majority of the infants had a favorable evolution, with remission after 48 hours. By the pulmonary point of view the prognosis was good. The cases with intraventricular hemorrhage can be considered as a complication secondary to the fluctuations in the cerebral vascular circulation and blood pressure, the disturbance in the venous return, of hipercapnia, hypoxia and acidosis.

Key words: pneumothorax, new born, gestational age.

Introduction

Pneumothorax is a medical and surgical emergency. The most incriminated risk factors in the neonatal

pneumothorax are: mechanical ventilation, pulmonary tissue anomalies, respiratory distress syndrome, sepsis; pneumonia; aspiration syndromes (meconium, blood), congenital malformations. In 0.07% of the cases pneumothorax can occur spontaneously in an apparently healthy new born infant.

Objectives

We analyzed the frequency of pneumothorax in “Bega” Neonatology Clinic from Timisoara during 2014-2015, sex and gestational age related distribution and any correlation with mechanical ventilation and maternal pathology during pregnancy. We were also interested in the associated pathology and therapeutical management.

Material and method

We did a retrospective study analyzing patients observation sheets from “Bega” Neonatology Clinic over a period of 2 years (1st January 2014-31st December 2015). During this period there were born 4891 infants, 378 were admitted in the NICU and 12 of them had pneumothorax.

Results and discussions

In the scientific literature the incidence of pneumothorax in new born infants is 1 – 2 % and it can increase until 30% in the patients with pulmonary disease or who received mechanical ventilation [1-4]. Also pneumothorax is more frequent in boys and term or postmature new born infants than in premature infants [1, 5-8].

During the analyzed period, in our Clinic, there were 4891 births, 378 of the new borns were admitted in the NICU. 12 of these had pneumothorax, which means an incidence of 2.38%/year and a prevalence of 0,24%.

As a comparison in 2014 there were 2357 births and 2534 births in 2015. 173 of these new born infants were admitted in the NICU in 2014 and 205 in 2015. We noticed that the incidence of pneumothorax was relatively constant during the two studied years and it was very close to the published data. [1,2,9,10].

¹“Victor Babeş” University of Medicine and Pharmacy Timișoara – Department of Neonatology

²Clinical Emergency County Hospital “Pius Brînzeu” Timișoara – “Bega” Neonatology Clinic

³“Victor Babeş” University of Medicine and Pharmacy Timișoara – Department of Pediatric Surgery

E-mail: danielariacob@yahoo.com, alinaelena.agoston@yahoo.com, ionescu_marta@yahoo.com, dima_mirabela@yahoo.com, lena_urda@yahoo.com, ionita_nicoll@yahoo.com, radueiacob@umft.ro, constantinilie@umft.ro

It is known that neonatal pneumothorax is more frequent in boys than girls [1, 11-14]. In the studies that we found in the scientific medical literature 65-70% of the pneumothorax cases were boys.

By the sex related distribution point of view, we also had a slightly predominance of pneumothorax in boys in our study (56%) compared to the female sex (44%). But if we make a comparison between the two years we notice that in 2014 the ratio is in girls favor (75%), opposite in 2015 when the ratio is 80% for boys.

The worldwide studies from the last years show an increased incidence of pneumothorax in infants born by cesarean section (approximately 60-70%) compared to those from vaginal delivery which means approximately 1/3 of the cases [1,14-17].

The study we did in our Clinic confirmed the literature data mentioning that the percentage of the infants with pneumothorax born by cesarean section exceeded the anterior published data reaching 90% of the cases, vaginal deliveries representing only 10%.

By the gestational age point of view, in the medical scientific literature, first place is occupied by the term and postmature infants, the percentage varies among the studies between 44% and 83% [1,9].

In contrast to these data the gestational age of the infants included in our study was between 27 -39 weeks, with a prevalence of premature infants (78%) while only 22% of the infants that developed pneumothorax were at term (fig. 1). We had no cases of pneumothorax in postmature infants.

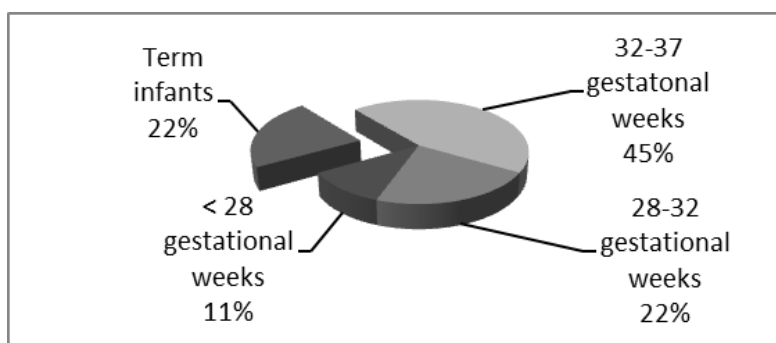


Fig.1- Gestational age related distribution of the infants with pneumothorax.

In the study lot 1/3 were normal birth weighted, the rest had a birth weight less than 2500 grams. Among the latter the highest percentage (33%) was represented by the infants with a birth weight 2000 and 2500 grams (fig.2). In contrast with our results, other studies cited in the literature

mentioned a higher percentage of the normal weighted infants. [1,9,14]

Analyzing maternal pathology during pregnancy we noticed the presence of: 22% infections, 11% previa placenta, metrorrhagia, 11% history of dead fetus (fig. 3).

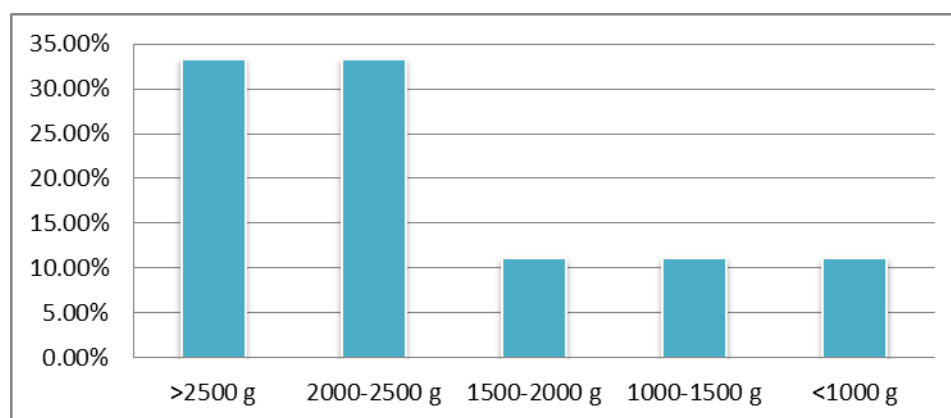


Fig. 2- Birth weight related distribution of the infants with pneumothorax.

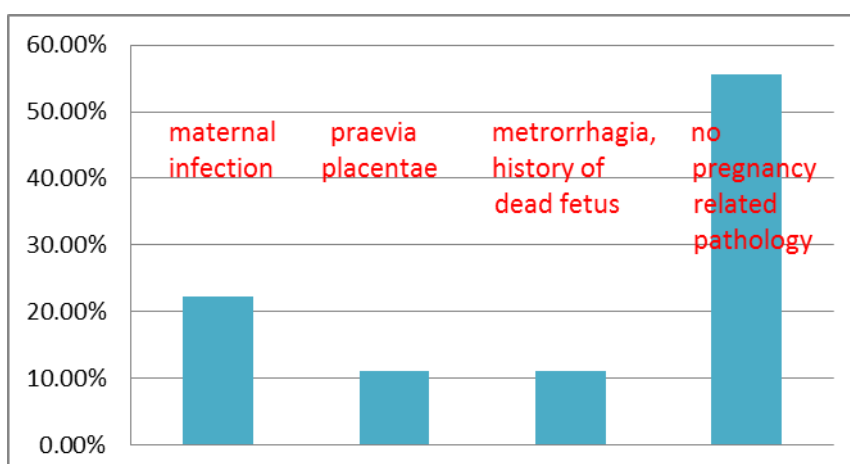


Fig. 3- Pathological history of the mother before and during the pregnancy.

The use of mechanical ventilation and the presence of respiratory distress syndrome were incriminated as risk factors for pneumothorax [1,9,14,18]. 89% of the pneumothorax cases occurred in the infants with severe respiratory distress syndrome and mechanical ventilation.

In the scientific medical literature it is mentioned that 2/3 of the unilateral pneumothorax cases involve the right

lung, [12,19] and bilateral pneumothorax represents 15 to 25% of the cases [1,9,14,18]. Our study confirms these data as almost 80% of the cases are unilateral pneumothorax, the most of them being localized on the right lung, while bilateral pneumothorax is seldom diagnosed (fig. 4).

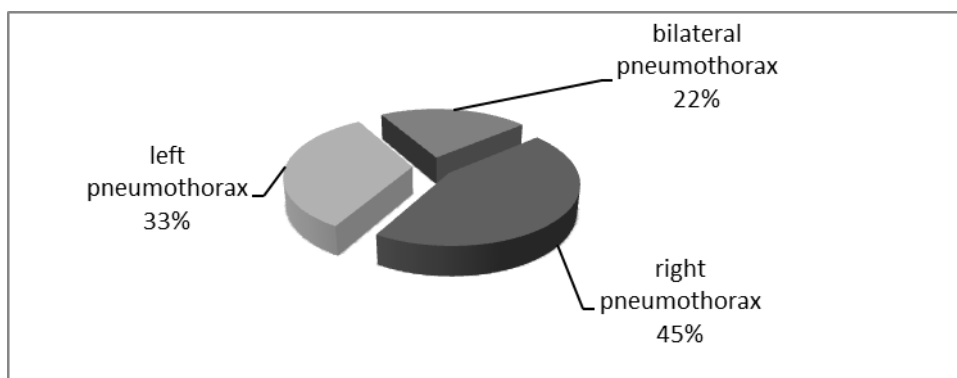


Fig. 4- Localization related distribution of the neonatal pneumothorax.

Small dimension pneumothorax usually resolve spontaneously. In contrast pneumothorax that affects > 20% of the lung surface and in tension pneumothorax need pleural drainage for evacuation [18,19]. In literature the percentage of the latter is between 79-93% [1,14]. In our case 56% needed pleural drainage, in the rest of the cases pneumothorax resorbed spontaneously.

Studying the associated pathology, we observe that the most frequent association was that with respiratory distress syndrome (RDS) (66%), followed by the intraventricular hemorrhage (IVH) (50%), perinatal hipoxic-ischemic encephalopathy (HIE) (44%), maternal fetal infection (40%) and in a lower percentage by pneumonia, congenital

hypothyroidism, cardiac and respiratory failure and seizures (fig. 5).

Also in the scientific literature in the first place as comorbidities is RDS followed by meconium aspiration syndrome [1,14,18,19]. There have been also mentioned: pneumonia, cardiac failure, hyaline membranes disease, neonatal asphyxia, multiple organs dysfunction, congenital malformations etc.[1,9,14]. Pneumothorax associated with RDS increases the risk for IVH, chronic pulmonary disease and death [3,21].

The evolution was favorable under therapy with recovery in 89% of the cases. We had only one decease in 2014, a new born infant from a pregnancy at risk, the mother

being diagnosed with uterine fibroids, metrorrhages during the pregnancy, with a history of a dead anencephalic fetus.

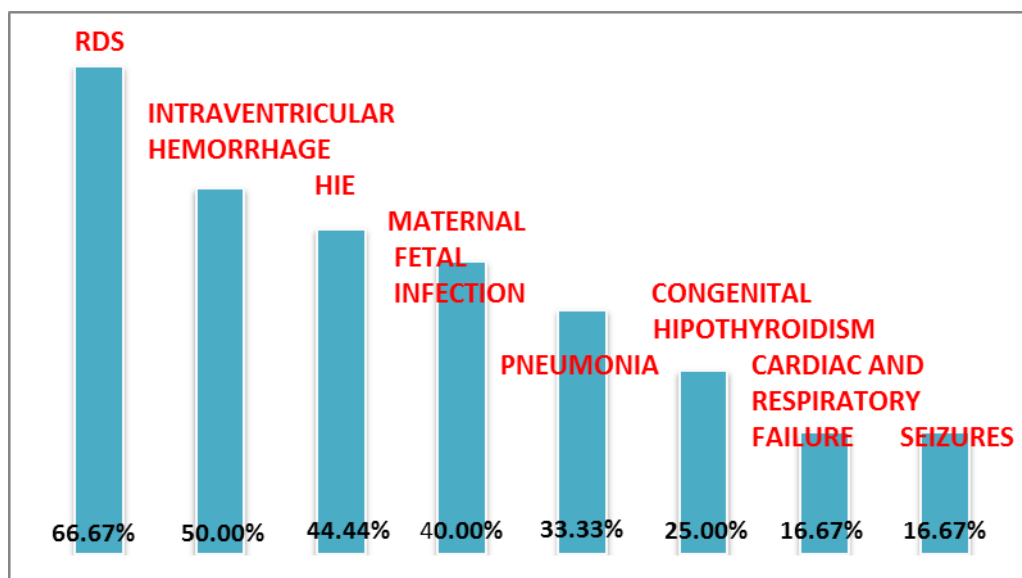


Fig. 5- Associated pathology.

Conclusions

1. The majority of the pneumothorax cases were unilateral.
2. Cesarean section is a supplementary risk for pneumothorax appearance.
3. Respiratory distress syndrome is one of the most frequent causes of pneumothorax.
4. The evolution and the prognosis of the infants with pneumothorax depends on the gestational age and associated pathology.

5. The majority of the infants had a favorable evolution with the remission of the pneumothorax in 48 hours.
6. Long term prognosis regarding the respiratory function was good.
7. The IVH can be considered as a complication secondary to the fluctuations in the cerebral vascular circulation and blood pressure, the disturbance in the venous return, of hipercapnia, hypoxia and acidosis.

References

1. B Apiliogullari, Gs Sunam, S Ceran and H Koc: Evaluation of Neonatal Pneumothorax, The Journal of International Medical Research 2011; 39: 2436 – 2440
2. Litmanovitz I, Carlo WA: Expectant management of pneumothorax in ventilated neonates. Pediatrics 2008; 122: e975 – e979
3. Marjaneh Zarkesh, Mohammad Momtazbakhsh, Hosein Mojtabai Incidence and risk factors of pneumothorax in premature low birth weight infants under mechanical ventilation. Iranian Journal of Neonatology 2013; 4(3):1-6
4. Seguier L, Elizur E, Klin A, et al. Management of primary spontaneous pneumothorax in children. Clin. Pediatr. 2011; 50: 797-802.
5. Ogino MT: Pulmonary air leak. In: Manual of Neonatal Care, 5th edn (Cloherty JP, Eichenwald EC, Stark AR, eds). Lippincott, Williams & Wilkins, 2004; pp 371 – 377.
6. Esme H, Dog̃ru O, Eren S, et al: The factors affecting persistent pneumothorax and mortality in neonatal pneumothorax. Turk J Pediatr 2008; 50: 242 – 246
7. Navaei F, Aliabadi B, Moghtaderi M, Kelishadi R., Predisposing factors, incidence and mortality of pneumothorax in a neonatal intensive care unit in Isfahan, Iran. Zhongguo Dang Dai Er Ke Za Zhi. 2010 Jun;12(6):417-20.
8. Ho Seop Lim, M.D., Ho Kim, M.D., Jang Yong Jin, M.D., Young Lim Shin, M.D., Jae Ock Park, M.D., Chang Hwi Kim, M.D. and Sung Shin Kim, M.D. Characteristics of Pneumothorax in a Neonatal Intensive Care UnitJ Korean Soc Neonatol • 2011;18:257-264
9. Ramesh Bhat Y, Ramdas V. Predisposing factors, incidence and mortality of pneumothorax in neonates. Minerva Pediatr. 2013 Aug;65(4):383-8.
10. Arthur E. Kopelman, MD, Pneumothorax in Newborns Merck Manuals: <https://www.merckmanuals.com/home/children-s-health-issues/problems-in-newborns/pneumothorax-in-newborns#v814675>
11. Ngermcham S, Kittiratsatcha P, Pacharn P: Risk factors of pneumothorax during the first 24 hours of life. J Med Assoc Thai 2005; 88(suppl 8): S135 – S141.
12. Stoll BJ, Kliegman RM: Extrapulmonary extravasation of air. In: Nelson Textbook of Pediatrics, 17th edn

- (Behrman RE, Kliegman RM, Jenson HB, eds). Philadelphia: WB Saunders, 2004; pp 586 – 587.
13. Katar S, Devecioglu C, Kervancioglu M, et al: Symptomatic spontaneous pneumothorax in term newborns. *Pediatr Surg Int* 2006; 22: 755 – 758.
 14. Dr. PremKumar Pitchaikani. Dr. Ramona Dumitru. Pneumothorax in Wales 2014. www.walesneonatalnetwork.wales.nhs.uk/.../27...
 15. Benterud T, Sandvik L, Lindemann R: Cesarean section is associated with more frequent pneumothorax and respiratory problems in the neonate. *Acta Obstet Gynecol Scand* 2009; 88: 359 – 361.
 16. Horowitz K, Feldman D, Stuart B, et al: Full-term neonatal intensive care unit admission in an urban community hospital: the role of respiratory morbidity. *J Matern Fetal Neonatal Med* 2011; 24: 1407–1410.
 17. Hansen AK, Wisborg K, Uldbjerg N, Henriksen TB: Risk of respiratory morbidity in term infants delivered by elective caesarean section: cohort study. *BMJ*. 2008 Jan 12;336(7635):85-87. Epub 2007 Dec 11.
 18. Zenciroglu A, Aydemir C, Bas, AY, et al: Evaluation of predisposing and prognostic factors in neonatal pneumothorax cases. *Tuberk Toraks* 2006; 54: 152 – 156.
 19. William Gluckman, DO, MBA, FACEP; Chief Editor: Michael R Bye, MD Pediatric Pneumothorax, *Medscape*, Oct 26, 2015.
 20. Watkinson M, Tiron I: Events before the diagnosis of a pneumothorax in ventilated neonates. *Arch Dis Fetal Neonatal Ed* 2001; 85: F201 – F203.
 21. Malek A, Afzali N, Meshkat M, et al. pneumothorax after mechanical ventilation in newborns. *Iran J Pediatr*, 2011; 21(1):45-50.

Correspondence to:

Radu Emil Iacob
Department of Pediatric Surgery,
University of Medicine and Pharmacy
“Victor Babes” Timisoara,
Eftimie Murgu, 2,
Timisoara
Romania
E-mail: radueiacob@umft.ro