



A first case report of neonatal persistent pneumothorax treated with an autologous blood patch

Otolog kan yaması ile tedavi edilen ilk yenidoğan persistan pnömotoraks olgusu

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The known about this topic

Persistent pneumothorax is a rare condition in newborns. Neonatal cases have been treated with povidone-iodine, fibrin glue injection, or a surgical approach. The long-term impact of the use of chemical agents in children is not known. The morbidity of surgery in newborns is self-evident.

Contribution of the study

Autologous blood patch pleurodesis has shown to be highly successful and safe in the adult population. Although blood patches are widely used in adult patients, there is limited experience in children. In this study, we report the first case of newborn persistent pneumothorax successfully treated with this technique without any complications.

Abstract

Pneumothorax is the most common type of air leak. Although the majority of pneumothoraces resolves spontaneously, some continue several days after the lung injury. Autologous blood patch pleurodesis is the most commonly used technique in the treatment of persistent pneumothorax. The use of an autologous blood patch in persistent pneumothorax in neonates has not been reported before. We report the first case of newborn persistent pneumothorax successfully treated with an autologous blood patch. The patient was a newborn aged 2 days. He was admitted to the neonatal intensive care unit due to subcostal-intercostal retractions after birth. Chest X-ray was performed and pneumothorax was detected on the right side. Persistence of the air leak led to treatment with an autologous blood patch on day 17 of pneumothorax development. Pleurodesis was repeated on days 3 and 6 of the first autologous blood patch, respectively. Air leak sealed within 2 days after the third autologous blood patch. In our opinion, this procedure is safe and effective when performed with the correct technique, and can also be used safely in newborns.

Keywords: Autologous blood patch, newborn, persistent pneumothorax

Öz

Pnömotoraks en sık görülen hava kaçağı tipidir. Her ne kadar pnömotoraksların çoğu kendiliğinden düzelse de, bazıları akciğer hasarından birkaç gün sonra da devam eder. Otolog kan yaması ile yapılan plörodezis persistan pnömotoraks tedavisinde en sık kullanılan tekniktir. Yenidoğanlarda persistan pnömotoraksta otolog kan yamasının kullanımı daha önce bildirilmemiştir. Bu çalışmada otolog kan yama tekniği ile başarılı bir şekilde tedavi edilen ilk yenidoğan persistan pnömotoraks olgusu sunulmuştur. İki günlük yenidoğan olgumuz doğum sonrası subkostal-interkostal çekilmeler nedeniyle Yenidoğan Yoğun Bakım Birimi'ne yatırıldı ve çekilen akciğer grafisinde sağ tarafta pnömotoraks saptandı. Hava kaçağının devam etmesi nedeni ile, hastaya, pnömotoraks gelişiminin 17. gününde otolog kan yaması ile plörodezis yapıldı. Plörodezis ilk uygulamadan sonraki 3. ve 6. günlerde iki kez daha tekrar edildi. Üçüncü otolog kan yamasından sonra iki gün içinde hava kaçağı tamamen geriledi. Fikrimizce bu teknik doğru bir şekilde uygulandığında güvenli ve etkili bir iyileşme sağlamaktadır ve yenidoğanlarda da güvenle kullanılabilir.

Anahtar sözcükler: Otolog kan yaması, persistan pnömotoraks, yenidoğan

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Introduction

Pneumothorax is the most common type of air leak and defined as an accumulation of air within the pleural space (1). Asymptomatic, without continued air leak, small pneumothoraces require only close observation (2). Although the majority of pneumothoraces resolve spontaneously or with thoracentesis/thoracostomy tube drainage, some continue for several days after the lung injury. A pneumothorax of more than five days' duration is called persistent air leak (PAL) (3).

The most accepted treatment of PAL is pleurodesis. Autologous blood patch (ABP) pleurodesis has shown to be simple, highly successful, and safe in the adult population, and it is the most commonly used technique in the treatment of PAL. Although ABPs are widely used in adult patients, there is limited experience in children. The use of ABP in persistent pneumothorax in neonates has not been reported before. In this study, we report the first case of newborn PAL successfully treated with the ABP technique.

Case

The patient was a newborn aged 2 days. He was born at 36+5 weeks of gestation in November 2018 with a birth weight of 2550 g. Apgars were 8 and 9 at 1st and 5th minutes, respectively, and he was admitted to the neonatal intensive care unit (NICU) due to subcostal-intercostal retractions after birth. At admission, the findings of chest radiography and other diagnostic tests were normal. In the follow-up, after 24 hours, respiratory distress was observed. Chest X-ray was performed and pneumothorax was detected on the right side (Fig. 1a). A chest tube was inserted in the right pleura and placed to water-seal. After 15 days of chest tube drainage and continuous suctioning, there was still residual air on the chest radiograph. During this period, when we tried to separate the chest tube from the negative drainage, severe respiratory distress and the mediastinal shift emerged in a short time. Persistence of the air leak led to performing an ABP on day 17 of pneumothorax development. Although we used this technique in a 12-year-old patient before, it was our first experience in a newborn. Pleurodesis was performed at the bedside with a sterile technique. Fresh whole blood (3 mL/kg volume) was collected from a large peripheral vein. Then, the collected blood was immediately injected into the pleural cavity via a chest tube. This was followed by an immediate injection of 5 mL air to prevent the blood from clotting in the chest tube. Then, we suspended the chest tube 60 cm overhead and kept the tube to water-seal. After 4 hours, the chest tube was taken to its normal position. Although the air leak still continued after the first ABP, the need for negative suction was discontinued and no further neg-

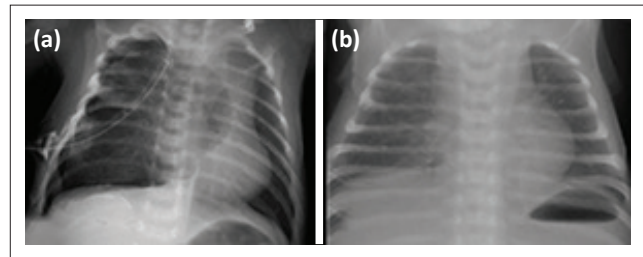


Figure 1. Chest radiograph (a) before and (b) after autologous blood patch pleurodesis

ative drainage was performed. Pleurodesis was repeated on days 3 and 6 of the first ABP, respectively. The air leak sealed within 2 days after the third ABP (Fig. 1b). No sedation was used, and oxygen saturation and vital signs were normal during the procedures. The patient was not intubated during the treatment. For the two months of follow-up, we detected no issues related to the three-times use of autologous fresh whole blood. The parents provided written consent for use of the APB technique and publication of this case report.

Discussion

Persistent air leak usually develops after spontaneous pneumothorax or after lung surgery. Symptomatic spontaneous pneumothorax and PAL are rare conditions in newborns. There are some case reports in the literature (4). The neonatal PAL cases reported in the literature had been treated either with povidone-iodine (5), fibrin glue injection (4), selective bronchial occlusion/intubation, and high-frequency ventilation (6), or with a surgical approach.

The long-term impact of the use of chemical agents (such as povidone-iodine) in children is not known (7). The use of fibrin glue has been plagued by complications. In addition, selective bronchial occlusion or intubation is a technically difficult approach. Therefore, surgery is usually the approach chosen in the pediatric population (7), but the morbidity of surgery in newborns is self-evident.

Autologous blood patch pleurodesis has shown to be a simple, successful, and safe procedure in the adult population; Robinson was the first to describe this technique in 1987 (8). This technique has recently been used safely in the pediatric population (7, 9). The exact mechanism of ABP is yet understood. It has been postulated that there are two mechanisms of action:

1. There is probably a blood patch effect or direct sealing of the air leak with coagulated blood (10).
2. The actual pleurodesis occurs afterwards through inflammation and scarring (11).

Autologous blood patch avoids the use of exogenous and potentially toxic, chemical substances. Additionally, it is inexpensive, easy to perform, and well-tolerated. Therefore, ABP presents an attractive option for newborn PAL. The youngest infant with PAL treated with ABP reported in the literature was a 2-month-old male patient (7). To our knowledge, our study presents the first newborn PAL treated with ABP in the literature.

The most frequently reported complications of ABP in adult patients are fever, pneumothorax, and empyema. Clamping of the chest tube is not recommended after the procedure because the possibility of pneumothorax is increased. Instead, some authors advocate suspending the chest tube 60 cm overhead and keeping the tube to water-seal. This technique prevents the drainage of blood via the tube while allowing air to escape from the chest. However, the excessive agitation of the baby during the blood collection process and the consequent severe straining make the height of 60 cm inadequate. For this reason, we advocate suspending the chest tube 80 cm overhead. There are no complications of ABP in pediatric case series. Also, we observed no complications in our patient. We observed no adverse effects even from repeated ABP.

In conclusion, APB pleurodesis is a simple and inexpensive treatment for PAL. In our opinion, this procedure is safe and effective when performed with the correct technique, and can also be used safely in newborns. Larger studies are needed to evaluate the long-term effects of ABP in newborns before recommending its routine use.

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