ranged from 4 to 12 days. We observed no complications related to the chest drain or wound closure.

At the time of this writing, the follow-up has continued through discharge (2 months), and we plan to complete the follow-up at age 1 year. To date, we have not observed any complications of this sutureless closure, acute (such as erythema, wound dehiscence, adhesions, delayed wound healing) or chronic (hyperpigmentation, hypertrophic scars or keloids).

In this series of 4 cases, the outcomes of this innovative closure technique were good, with good cosmetic results and no complications in the short and medium term, so we believe that cyanoacrylates can be considered a good alternative to traditional silk sutures for closure of chest drain incisions in newborns. Since the sample was small and there was no control group, additional studies with long-term patient follow-up are required to corroborate our findings.

Acknowledgments

We especially thank the parents of newborns that gave us consent to take photographs. We also thank all the professionals that routinely care for newborns at the NICU of the Hospital Universitario y Politécnico La Fe, Valencia.

References

1. González González JM. Cianoacrilato: definición y propiedades. Toxicidad y efectos secundarios. Aplicaciones en medicina y odontología. Av Odontoestomatol. 2012;28:95–102.
2. Cáceres Barreno A, Cava Vergiú C, Robello Malatto J, Alberca Ramos E, Rodríguez Chessa J. Biocompatibilidad del cianoacrilato de butilo en suturas en piel en comparación con las suturas convencionales. Rev Odont Mex. 2013;17:81–90.
3. Kwon JY, Yun HG, Park IY. n-Butyl-2-cyanoacrylate tissue adhesive (Histoacryl) vs. subcuticular sutures for skin closure of Pfannenstiel incisions following cesarean delivery. PLoS One. 2018:13.
4. Farion KJ, Russell KF, Osmond MH, Hartling L, Klassen TP, Durec T, Vandermeer B. Tissue adhesives for traumatic lacerations in children and adults. Cochrane Database Syst Rev. 2001:4.
5. Nose S, Sasaki T, Saka R, Minagawa K, Okuyama H. A sutureless technique using cyanoacrylate adhesives when creating a stoma for extremely low birth weight infants. SpringerPlus. 2016;5:189.
6. Saleemi MS, McLaren C, Sharma BK, Muthialu N, Roebuck D, Ng C. Bronchopleural fistula in a newborn undergoing ECMO-transbronchial closure. J Perinatol. 2013;33:659–60.

Inmaculada Lara-Cantón[a], Pilar Sáenz-González[b], Ana García-Robles[c], Maria Dolores Lorena Mocholí-Tomás[d], Álvaro Solaz-García[a,*]

[a] *Grupo Investigación Perinatología, Instituto de Investigación Sanitaria La Fe, Hospital Universitario y Politécnico La Fe, Valencia, Spain*
[b] *Servicio de Neonatología, Hospital Universitario y Politécnico La Fe, Valencia, Spain*
[c] *PharmD, Grupo de Investigación Perinatología, Instituto de Investigación Sanitaria La Fe, Hospital Universitario y Politécnico La Fe, Valencia, Spain*
[d] *Unidad de Cuidados Intensivos Neonatales, Servicio deNeonatología, Hospital Universitario y Politécnico La Fe, Valencia, Spain*

* Corresponding author.
E-mail address: alvarosogar@gmail.com (Á. Solaz-García).

12 June 2019 17 July 2019

https://doi.org/10.1016/j.anpede.2019.07.008

Cerebral air embolism in neonates☆

Embolismo aéreo cerebral en neonatos

Dear Editor:

We present 3 cases of cerebral air embolism in newborn infants.

Case 1

Girl born preterm (PT) at 24 weeks' gestation with a birth weight of 764 g. After birth, the patient required level IV advanced neonatal resuscitation with endotracheal intubation, invasive mechanical ventilation and umbilical vein catheterization. At 5 days post birth, she exhibited sudden deterioration with desaturation, bradycardia, marked irritability and uncoordinated movements requiring high-frequency ventilation and sedation with morphine. The amplitude-integrated electroencephalogram (aEEG) evinced convulsive seizures that coincided with sucking movements, which resolved after administration of 2 boluses of phenobarbital. A transfontanellar ultrasound examination revealed several hyperechoic birefringent features in the periventricular region compatible with air embolism (Fig. 1). The follow-up scan at 24 h revealed a decrease in the number of hyperechoic features, with full resolution of these sonographic abnormalities in subsequent days. The patient died at 40 weeks of postmenstrual age of necrotising enterocolitis and persistent sepsis.

☆ Please cite this article as: Pérez A, Gregorio R, Gómez P, Ruiz Y, Sánchez-Luna M. Embolismo aéreo cerebral en neonatos. An Pediatr (Barc). 2020;93:54–57.

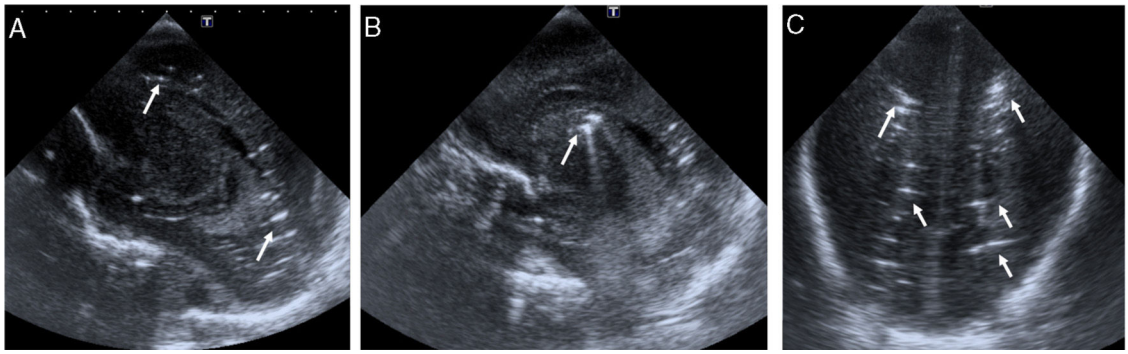

Figure 1 Ultrasound sagittal (A and B) and coronal (C) views showing multiple hyperechoic, birefringent spots and lines in the deep periventricular white matter on both sides of the brain (arrows in A and C) and right caudothalamic groove (arrow in B) that could be attributed to cerebral air embolism.

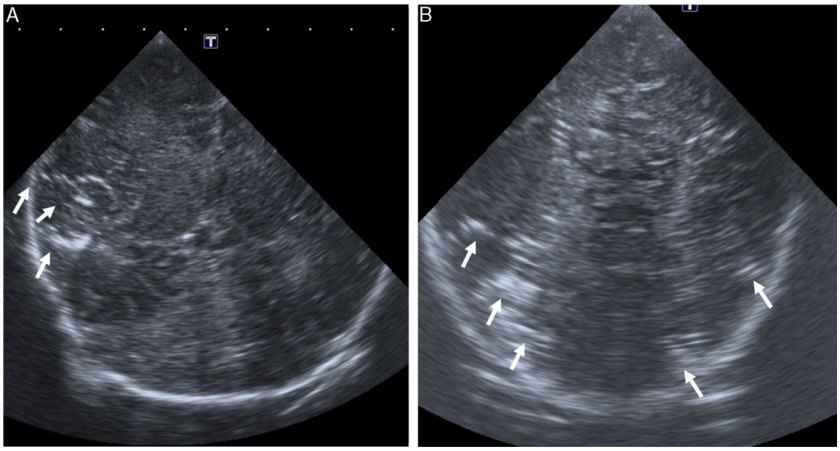

Figure 2 Ultrasound coronal views showing hyperechoic birefringent parallel bands in the right insula (arrow in A) and right and left parieto-occipital regions (arrows in B), possibly caused by cerebral air embolism.

Case 2

Male neonate born at term that had bradycardia during the second stage of labour. He required level IV advanced resuscitation with intubation and mechanical ventilation due to sustained hypoxaemia. Postnatal diagnosis of hypoplastic left heart. The patient underwent catheterization of umbilical vessels for monitoring and delivery of inotropic agents. Due to severe hypoxaemia, the patient was placed under extracorporeal membrane oxygenation (ECMO) and underwent emergency surgery. The transfontanellar ultrasound scan performed before initiation of ECMO revealed diffuse cerebral oedema with hyperechoic spots in the cortical region and bilateral birefringent hyperechoic foci in the parieto-occipital region that could have been produced by small air bubbles (Fig. 2). In the follow-up ultrasound scan at 24 h, the only feature that remained was the cortical hyperechogenicity. The patient died 11 days post birth due to severe hypoxic-ischaemic encephalopathy.

Case 3

Boy born preterm at 34 weeks with a birth weight of 1740 g, delivered by emergency Caesarean section due to foetal bradycardia. He required level IV advanced resuscitation with intubation, conventional mechanical ventilation, and umbilical catheter placement for monitoring and delivery of blood products. The transfontanellar ultrasound scan at 3 h post birth showed hyperechoic bands arranged in the shape of a semi-oval outline in the periatrial white matter of the right hemisphere, suggestive of air embolism (Fig. 3). The patient exhibited gradual clinical improvement in the continuous aEEG monitoring, with a normal neurologic assessment. The follow-up ultrasound scan at 24 h was normal. The patient was discharged at 9 days post birth with age-appropriate psychomotor development.

Air embolisms are produced by the traumatic or iatrogenic entry of air in the venous or arterial circulation as a result of surgery, traumatic injury, intravascular procedures, invasive mechanical ventilation,[1] non-invasive mechanical ventilation, cardiopulmonary resuscitation[2] or even necrotising enterocolitis, and remains an underdiagnosed condition. It may affect different areas, including pulmonary circulation, the heart or the brain, and can even trigger a systemic inflammatory response.[1]

Cerebral air embolisms may originate in the venous pulmonary circulation due to the presence of a bronchovenous fistula or a vascular lesion secondary to barotrauma.[3] There is a higher risk in the paediatric population due to the imma-

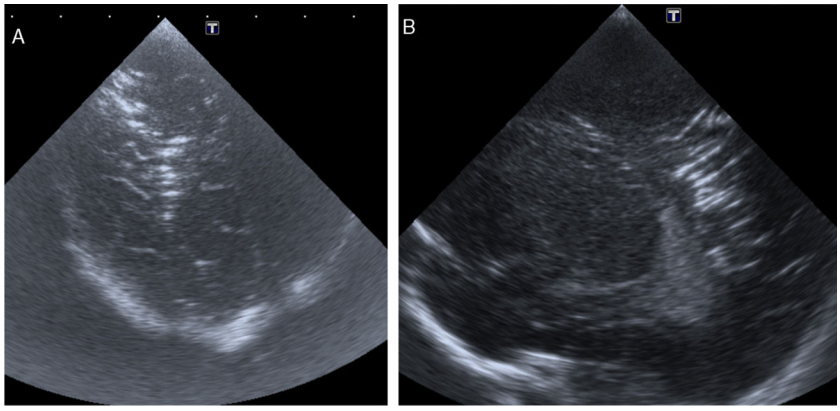

Figure 3 Cranial ultrasound angled coronal (A) and right sagittal (B) views showing parallel hyperechoic bands forming a semi-oval outline in the deep white matter of the right hemisphere. Features compatible with cerebral air embolism.

turity of the lungs, with the greatest mortality found in preterm infants.[4] Entry of air into the brain may also result from paradoxical flow induced by a patent foramen ovale[1] or retrograde ascent of air bubbles in the opposite direction of the venous flow.[5]

In the case series presented here, all infants had a history of umbilical catheter placement and handling, which may have been the cause of the embolism.

The clinical manifestations of cerebral air embolism vary and depend on the site of occlusion, the size of the bubbles, the speed of entry, the position of the patient and the health status of the patient,[5] ranging from trivial to catastrophic.[1] They may range from transient neurologic symptoms, such as convulsive seizures (case 1) to sudden loss of consciousness or death. It is of utmost importance that this entity is suspected in patients exhibiting an abrupt worsening following a compatible medical procedure.

As described in our case series and other articles, a transfontanellar ultrasound scan can contribute to an early diagnosis, in some cases resulting from a chance finding,[6] as was the case in 2 of our patients. We used a Philips Affiniti® 70G ultrasound machine with a cephalic imaging C8-5 transducer (frequency range, 5–8 Hz). In other age groups, the gold standard for diagnosis would be computed tomography,[6] which should be performed in the acute phase,[6,7] as imaging tests in subsequent stages may find features corresponding to resolution of the embolism.

Treatment in symptomatic patients consists of hyperbaric oxygen therapy or high-flow oxygen therapy[1,8,9] and placing the patient in the Trendelenburg position,[1,9] although at present there is no protocol for management of cerebral air embolism in newborns. Oxygen delivery is not only important for management of hypoxaemia, but also in reducing the size of the air bubbles by establishing a diffusion gradient that favours elimination of the gas.[10]

Since the consequences of cerebral air embolism can be dire and there is no standardised treatment protocol for the neonatal population, the main strategy is currently prevention[1] and the optimization of procedures that may cause iatrogenic problems, in addition to including cerebral air embolism in the differential diagnosis of patients that exhibit sudden worsening with or without neurological manifestations.

References

1. Brull SJ, Prielipp RC. Vascular air embolism: a silent hazard to patient safety. J Crit Care. 2017;42:255–63.
2. Andriessen P, Halbertsma F, van Lijnschoten G, Weerdenburg H, Bambang Oetomo S. Systemic air embolism after cardiopulmonary resuscitation in a preterm infant. Acta Paediatr. 2008;97:822–4.
3. Wynsma LA. Negative outcomes of intravascular therapy in infants and children. AACN Clin Issues. 1998;9:49–63.
4. Wald M, Kirchner L, Lawrenz K, Amann G. Fatal air embolism in an extremely low birth weight infant: can it be caused by intravenous injections during resuscitation? Intensive Care Med. 2003;29:630–3.
5. Schlimp CJ, Loimer T, Rieger M, Lederer W, Schmidts MB. The potential of venous air embolism ascending retrograde to the brain. J Forensic Sci. 2005;50:906–9.
6. Rivers-Bowerman MD, Litz S, Schmit P. Ultrasonographic detection of air in the superior sagittal sinus in a neonate with transposition of the great arteries. Radiol Case Rep. 2017;12:204–6.
7. Pinho J, Amorian JM, Araújo JM, Vilaça H, Ribeiro M, Pereira J, et al. Cerebral gas embolism associated with central venous catheter: systematic review. J Neurol Sci. 2016;362:160–4.
8. Blanc P, Boussuges A, Henriette K, Sainty JM, Deleflie M. Iatrogenic cerebral air embolism: importance of an early hyperbaric oxygenation. Intensive Care Med. 2002;28:559–63.
9. Schlimp CJ, Bothma PA, Brodbeck AE. Cerebral venous air embolism: what is it and do we know how to deal with it properly? JAMA Neurol. 2014;71:243.
10. Muth CM, Shank ES. Gas embolism. New Engl J Med. 2000;342:476–82.

Alba Pérez[a,*], Rebeca Gregorio[b], Pablo Gómez[c], Yolanda Ruiz[d], Manuel Sánchez-Luna[a]

[a] *Servicio de Neonatología, Hospital Universitario Gregorio Marañón, Madrid, Spain*
[b] *Servicio de Neonatología, Hospital Virgen de la Salud, Toledo, Spain*
[c] *Servicio de Pediatría, Hospital Universitario Niño Jesús, Madrid, Spain*
[d] *Servicio de Radiología, Hospital Universitario Gregorio Marañón, Madrid, Spain*

* Corresponding author.
E-mail addresses: albaperezp86@gmail.com, alba.perez@salud.madrid.org (A. Pérez).

https://doi.org/10.1016/j.anpede.2019.06.014

Psychological impact of lockdown (confinement) on young children and how to mitigate its effects: Rapid review of the evidence☆

Impacto psicológico del confinamiento en la población infantil y como mitigar sus efectos: revisión rápida de la evidencia

Dear Editor:

In response to the pandemic of coronavirus disease 2019 (COVID-19) caused by the SARS-CoV-2 virus, the Spanish Government declared a state of emergency as an urgent measure to protect the health and safety of the citizens, contain the spread of disease and support the public health care system. Although these restrictive measures can contain the outbreak, there is concern regarding the potential deleterious impact in the physical and mental health of children of the prolonged closure of schools and the lockdown at home.[1]

Confinement is a necessary preventive measure during outbreaks of significant diseases, but it can have a far-reaching and substantial deleterious psychological impact in the population subjected to isolation.[2] This highlights the need to integrate effective measures to mitigate these negative consequences when planning this type of intervention.

The complexities of confinement pose a challenge to policymakers and the authorities and an opportunity to expedite reviews to summarise the existing evidence in order to plan, develop and implement appropriate and effective public health policies fitting the current circumstances.[2] In fact, the World Health Organization (WHO) recommends these rapid reviews.[3]

The aim of this article is to review the available evidence on the psychological impact of confinement in children, seeking to identify the main stressors and protective factors at play.

We performed a rapid review of the psychological impact of lockdowns in children and adolescents following the recommendations of the WHO.[3] We performed searches in 3 electronic databases (PubMed, EMBASE and Google Academics) and reviewed expert recommendations.

Of the 57 documents initially identified in the search, only 3 met the selection criteria for inclusion in the review. In 2013, Sprang and Silman analysed the prevalence of symptoms of post-traumatic stress in the context of health-related disasters.[4] They found that the mean scores in instruments for measurement of post-traumatic stress features were 4 times greater in children that had been quarantined compared to children that had not. A similar study in university students did not find significant differences in the probability of post-traumatic stress-related symptoms or general mental health problems in the quarantined group versus the non-quarantined group.[5] DiGiovanni et al.[6] found that adolescents had difficulty adhering to quarantine rules and were more likely to break quarantine.

We did not find any study examining which factors are associated with decreased stress or distress in children subjected to a lockdown.

Although there are many recommendations, most of them are based on expert opinion and have not been tested in studies. Tables 1 and 2 present a summary of the expert recommendations most widely agreed on for mitigating the negative impact of confinement in children.[7–9]

Although there is evidence on the association of the duration of lockdowns and their negative impact on mental health in adults (increased risk of mood disorders, symptoms of depression, irritability, stress . . .),[2] the available evidence in the paediatric population is anecdotal and the conclusions limited.

The complexities of confinement pose a major challenge to policymakers and the authorities but also provide an opportunity to produce rapid reviews to summarise the existing evidence on the issue and help to plan, develop and implement appropriate and effective public health policies fitting the current circumstances.[1,2]

Although the current volume and the quality of the research available on this subject are limited and most studies to date have focused on adults, we must make the effort to extrapolate the conclusions to propose useful interventions during a crisis that is still ongoing. We think that studies should be performed on an urgent basis in the current context to establish the psychological impact of lockdowns and health-related crises in children and to assess the effectiveness of any related short- or long-term interventions.

☆ Please cite this article as: García Ron A, Cuéllar-Flores I. Impacto psicológico del confinamiento en la población infantil y como mitigar sus efectos: revisión rápida de la evidencia. An Pediatr (Barc).2020;93:57–58.