Vol.2 Núm. 4 2020 ISSN-L: 2695-2785 DOI: -

MANEJO DE LA BRONQUIOLITIS

Marta Zamora Pasadas. Enfermera Especialista en enfermería pediátrica. Doctora en enfermería.

Luis Francisco Torres Pérez, Doctor en Ciencias de la Salud por la Universidad de Málaga. Presidente de la SAECC-ASADENCA. Miembro del grupo de investigación en Cuidados de Málaga IBIMA AA-20 INVESCUIDAMETODOLOGÍA.

Resumen: La bronquiolitis, forma parte del espectro de enfermedades del tracto respiratorio inferior, es una de las principales causas de enfermedad y hospitalización en bebés y niños menores de dos años. El objetivo es reunir la última evidencia disponible en relación con el manejo de la bronquiolitis aguda en niños.

Palabras clave: BRONQUIOLITIS, NIÑOS, TRATAMIENTO

MANAGING BRONCHIOLITIS

Abstract: Bronchiolitis is part of the spectrum of lower respiratory tract infections and one of the leading causes of illness and hospitalisation among infants and children under two years of age. This study aims to compile the latest available evidence regarding the management of acute bronchiolitis in children.

Keywords: BRONCHIIOLITIS, CHILDREN, TREATMENT

METHODOLOGY

A systematic review was conducted using the following databases: PubMed, SciELO, and the Andalusian Health Service Virtual Library. Only articles written in Spanish and published in the last 5 years were included.

RELEVANCE OF THE TOPIC

Acute bronchiolitis (AB) is the leading cause of hospital admissions for acute lower respiratory infections among children under 2 years of age. AB is a frequent cause of consultation in primary care and emergency departments (*bronquiolitis_p_gvr_4_2015.pdf*, no date).

Its mortality rate is less than 1%, but rises to around 3% when associated risk factors are involved. AB is a self-limiting infection lasting around 12 days. Its peak incidence occurs in children between 2 and 6 months of age from November to March (González de Dios & Ochoa Sangrador, 2010).

AB has a viral aetiology, with the Respiratory Syncytial Virus (RSV) causing 70% of cases. Other germs involved include: human rhinovirus (10-30%), human metapneumovirus (3.5-21%), adenoviruses (2-14%), *H. influenzae* (2-10%), enterovirus (1.3-9%), and human parainfluenza viruses (0.5-7%) (Ralston et al., 2014).

SUPPORT TREATMENT

General measures

A. Comprehensive approach

- Proper hydration and nutrition should be maintained by splitting food and fluid intake; (Class D) if possible, by oral/enteral route or, alternatively, by parenteral route (Nebot et al., 2010).
- It must be borne in mind that AB favours the aspiration of food: respiratory rate > 60-70 breaths per minute, abundant nasal secretions, and nasal flaring/rib recession.

B. Oxygenation and ventilation

- Supplemental oxygen is recommended for patients with oxygen saturation (SpO_2) lower than 92% (Cunningham et al., 2015).
- Supplemental oxygen should be withdrawn if SpO_2 > 90%, breathing difficulties are minimal, and oral intake is adequate (according to the American Academy of Pediatrics) or if SpO_2 > 94% (according to Cincinnati Children's Hospital Medical Center) (González de Dios & Ochoa Sangrador, 2010).
- As the clinical condition improves, continuous monitoring of SpO_2 becomes unnecessary.
- Nasal deobstruction: nasal irrigations with saline solution (with or without small suctioning of secretions). Suctioning of secretions before feeding and before nebulised treatments.
- Supine positioning with a 30° tilt, slight hyperextension and turning of the head (there are no experimental studies to support this).
- Avoiding factors aggravating patients' symptoms: inhalation of second-hand smoke and other bronchial irritants.

These measures, together with appropriate monitoring, constitute the most widely used and consistently accepted support treatment for AB; however, the evidence supporting them is weak, as they are extrapolations derived from routine clinical practice.

Use of bronchodilators

A. Nebulised salbutamol (β_2 agonist).

- Cases that will benefit from this treatment cannot be predicted, so any therapeutic attempt will have to be both personalised and monitored. Small changes in clinical scale scores and SpO_2 may be identified, but are not correlated with other measures with a higher clinical impact (hospital admission and length of stay).
- Adverse effects: increased tachycardia and decreased SpO_2 (González de Dios & Ochoa Sangrador, 2010).
- Risks (adverse effects, cost of medication, and administration) outweigh benefits (short-term clinical improvement), although not sufficiently to reject a therapeutic attempt with salbutamol. Treatment with adrenergic β_2 receptor agonists is not recommended on a routine basis (Class A) (Gadomski & Scribani, 2014). If used, they should be discontinued if no clinical improvement is observed after administration (González de Dios & Ochoa Sangrador, 2010).

B. *Oral salbutamol*

- The effects observed suggest that oral salbutamol is not effective for managing AB.
- Adverse effects: significant increase in heart rate, outweighing benefits (González de Dios & Ochoa Sangrador, 2010).

C. *Adrenaline*

Adrenaline has a potential theoretical benefit in the treatment of AB due to its alpha-adrenergic properties (with vasoconstrictive effects and reduction of oedema) and its beta-adrenergic properties (as a bronchodilator): alleviation of airflow obstruction.

- Reduced length of hospital stay. Randomised controlled trials suggest that adrenaline treatment is better than placebo (with improved short-term clinical scores) and salbutamol (with improved clinical and oxygenation scores, benefits for respiratory function, and decreased proportion of hospital admissions).
- Significantly more favourable differences among outpatients than among inpatients (different stages of disease: more seriously ill children are more resistant to treatment).
- When compared to salbutamol, adrenaline provides greater short-term benefits, but has no influence on admission rates or on patients with moderate and/or severe AB.
- Adverse effects: few. Greater pallor with adrenaline after 30 minutes.

Based on the clinical information available, it is not possible to predict which cases will benefit from this treatment (Hartling et al., 2011).

D. *Ipratropium bromide*

Low and inconsistent clinical impact (Ml et al., 2002).

- Few, not clinically relevant adverse effects.
- Risks outweigh benefits when used on a routine basis.
- Not recommended for use (Class C).

E. *Methylxanthines*

In the studies published to date, no beneficial effects have been found for these patients after the administration of theophylline.

Retrospective studies report favourable responses to methylxanthines in the reduction of apnoeic pauses and in the prevention of mechanical ventilation caused by apnoea (especially in ex-premature patients) (Class D) (*gpc_463_bronquiolitis_compl.pdf*, no date).

Use of corticosteroids

Corticosteroids provide no clinical benefits for previously healthy infants with a first bout of AB, either during the acute phase or in the subsequent course of the disease.

- Corticosteroids are not recommended as treatment in any of their forms (Class A) (González de Dios & Ochoa Sangrador, 2010).

- More severely affected infants who develop acute respiratory distress syndrome (ARDS) may benefit from the administration of corticosteroids, shortening the duration of symptoms and hospital stays (Class D).
- Nebulised corticosteroids: potential improvement observed in the follow-up of some patients, although evidence is contradictory and inconsistent.

Use of antivirals and antibiotics

- Ribavirin: High cost. Doubtful effectiveness. Potential teratogenic effects on pregnant women. Not recommended for use on a routine basis (Class B) (Ventre & Randolph, 2007).
- Antibiotics (Farley et al., 2014):
  - The use of antibiotics is not recommended unless there is concern over a complication such as secondary bacterial pneumonia or other superinfections (Class A).
  - Low risk of bacteraemia in children with AB and fever. If a bacterial infection is present, the most common cause is urinary tract infection.
  - AB is frequently associated with otitis media.
  - A significant percentage of patients requiring mechanical ventilation present with pulmonary bacterial co-infection. The use of antibiotics is recommended (Class D).
  - If patients have atelectasis or alveolar involvement, routine use of antibiotics is not recommended (Class B).
  - There is not enough evidence to support the use of macrolides: they are not recommended (Class B).

Other drugs

- Nebulised hypertonic saline solution (3% sodium chloride), alone or with bronchodilators and in repeated doses, helps to reduce inpatient hospital stays (Class A) (González de Dios & Ochoa Sangrador, 2010) (Johnson et al., 2013).
- Immunoglobulins: the studies consulted advise against using them on these patients (Class E) (González de Dios & Ochoa Sangrador, 2010) (Fuller H, no date).
- Recombinant human DNase: a mucolytic agent effective in the elimination of airway secretions when nebulised:
  - This sputum-thinning drug improves lung function and reduces the number of pulmonary exacerbations in patients with moderate lung disease.
  - After weighing up the risks, costs, and benefits, it is not recommended for use (Class A).
- Interferon: interferon production diminishes during RSV infection, hence its potential therapeutic interest.
  - Slight improvement in scores from day two, but clinically irrelevant.
  - Unfavourable balance of risks, costs, and benefits (Class E).

BREATHING SUPPPORT

Breathing support is the intervention of choice and the one with the greatest influence on the progression of this condition.

Continuous Positive Airway Pressure (CPAP)

This form of mechanical ventilation facilitates the work of breathing, prevents atelectasis, and improves gas distribution in obstructed airways. Non-Invasive Ventilation (NIV) in the form of CPAP has few adverse effects and is well tolerated. CPAP prevents intubations and invasive mechanical ventilation in these patients (Class B) and is effective in patients with severe respiratory distress, recurrent apnoea, or hypercapnia (Class B) (*respiratoria_g_bronquio.pdf*, no date).

Invasive mechanical ventilation should be considered in patients with respiratory failure, patients with recurrent apnoeic pauses, and when other forms of NIV have failed (Class A) (Franklin et al., 2019).

Heliox

Heliox is a gas mixture of oxygen and helium that promotes laminar flow, reduces airway resistance, and facilitates the work of breathing.

It could be useful in certain patients with moderate-to-severe AB (Class C) (Iglesias Fernández et al., 2009). As a source of nebulisation, heliox could improve the quantity and distribution of the drugs inhaled (there are no studies on bronchiolitis available; the study quoted here deals with asthma) (El-Khatib et al., 2014).

Nitric oxide (NO)

There is no evidence that nitric oxide may be beneficial either as a pulmonary vasodilator or as a bronchodilator. Nitric oxide is restricted to severe cases of AB that are refractory to conventional mechanical ventilation (Class E) (Tal et al., 2018).

Physical therapy

Physical therapy helps infants with AB to expel secretions and alleviates laboured breathing.

Although respiratory physical therapy is commonly used in some countries, such as France, there is no hard evidence to suggest that it is beneficial for these patients (Class A) (González de Dios & Ochoa Sangrador, 2010).

REFERENCES

Bronquiolitis_p_gvr_4_2015.pdf. (no date). Retrieved on 11 October 2020 from https://lovexair.com/wp-content/uploads/2015/09/bronquiolitis_p_gvr_4_2015.pdf

Cunningham, S., Rodriguez, A., Adams, T., Boyd, K. A., Butcher, I., Enderby, B., MacLean, M., McCormick, J., Paton, J. Y., Wee, F., Thomas, H., Riding, K., Turner, S. W., Williams, C.,

McIntosh, E., Lewis, S. C., & Bronchiolitis of Infancy Discharge Study (BIDS) group. (2015). Oxygen saturation targets in infants with bronchiolitis (BIDS): A double-blind, randomised, equivalence trial. *Lancet (London, England)*, *386*(9998), 1041-1048. https://doi.org/10.1016/S0140-6736(15)00163-4

El-Khatib, M. F., Jamaleddine, G., Kanj, N., Zeineddine, S., Chami, H., Bou-Akl, I., Husari, A., Alawieh, M., & Bou-Khalil, P. (2014). Effect of heliox- and air-driven nebulized bronchodilator therapy on lung function in patients with asthma. *Lung*, *192*(3), 377-383. https://doi.org/10.1007/s00408-014-9570-0

Farley, R., Spurling, G. K. P., Eriksson, L., & Del Mar, C. B. (2014). Antibiotics for bronchiolitis in children under two years of age. *The Cochrane Database of Systematic Reviews*, *10*, CD005189. https://doi.org/10.1002/14651858.CD005189.pub4

Franklin, D., Fraser, J. F., & Schibler, A. (2019). Respiratory support for infants with bronchiolitis, a narrative review of the literature. *Paediatric Respiratory Reviews*, *30*, 16-24. https://doi.org/10.1016/j.prrv.2018.10.001

Fuller H. (no date). *Inmunoglobulinas para el tratamiento de la infección por virus sincicial respiratorio (Revisión Cochrane traducida)*. Retrieved on 12 October 2020 from http://www.fisterra.com/guias2/cochrane/AB004883-ES.htm

Gadomski, A. M., & Scribani, M. B. (2014). Bronchodilators for bronchiolitis. *The Cochrane Database of Systematic Reviews*, *6*, CD001266. https://doi.org/10.1002/14651858.CD001266.pub4

González de Dios, J., & Ochoa Sangrador, C. (2010). Recomendaciones de la Conferencia de Consenso de Bronquiolitis Aguda en España: De la evidencia a la práctica. *Pediatría Atención Primaria*, *12*, s107-s128.

Gpc_463_bronquiolitis_compl.pdf. (no date). Retrieved on 11 October 2020 from https://www.aepap.org/sites/default/files/documento/archivos-adjuntos/gpc_463_bronquiolitis_compl.pdf

Hartling, L., Bialy, L. M., Vandermeer, B., Tjosvold, L., Johnson, D. W., Plint, A. C., Klassen, T. P., Patel, H., & Fernandes, R. M. (2011). Epinephrine for bronchiolitis. *The Cochrane Database of Systematic Reviews*, *6*, CD003123. https://doi.org/10.1002/14651858.CD003123.pub3

Iglesias Fernández, C., Huidobro Fernández, B., Míguez Navarro, C., Guerrero Soler, M., Vázquez López, P., & Marañón Pardillo, R. (2009). Heliox como fuente de nebulización del tratamiento broncodilatador en lactantes con bronquiolitis. *Anales de Pediatría*, *70*(1), 40-44. https://doi.org/10.1016/j.anpedi.2008.08.001

Johnson, L. W., Robles, J., Hudgins, A., Osburn, S., Martin, D., & Thompson, A. (2013). Management of bronchiolitis in the emergency department: Impact of evidence-based guidelines? *Pediatrics*, *131 Suppl 1*, S103-109. https://doi.org/10.1542/peds.2012-1427m

Ml, E., A, B., M, K., Tm, E., & F, D. (2002). Anticholinergic drugs for wheeze in children under the age of two years. *The Cochrane Database of Systematic Reviews*, *1*, CD001279-CD001279. https://doi.org/10.1002/14651858.cd001279

Nebot, M. S., Teruel, G. C., Cubells, C. L., Sabadell, M. D. E., & Fernández, J. P. (2010). [Acute bronchiolitis clinical practice guideline: Recommendations for clinical practice]. *Anales*

De Pediatria (Barcelona, Spain: 2003), *73*(4), 208.e1-10. https://doi.org/10.1016/j.anpedi.2010.04.015

Ralston, S. L., Lieberthal, A. S., Meissner, H. C., Alverson, B. K., Baley, J. E., Gadomski, A. M., Johnson, D. W., Light, M. J., Maraqa, N. F., Mendonca, E. A., Phelan, K. J., Zorc, J. J., Stanko-Lopp, D., Brown, M. A., Nathanson, I., Rosenblum, E., Sayles, S., Hernandez-Cancio, S., & American Academy of Pediatrics. (2014). Clinical practice guideline: The diagnosis, management, and prevention of bronchiolitis. *Pediatrics*, *134*(5), e1474-1502. https://doi.org/10.1542/peds.2014-2742

Respiratoria_g_bronquio.pdf. (no date). Retrieved on 11 October 2020 from https://seup.org/pdf_public/gt/respiratoria_g_bronquio.pdf

Tal, A., Greenberg, D., Av-Gay, Y., Golan-Tripto, I., Feinstein, Y., Ben-Shimol, S., Dagan, R., & Goldbart, A. D. (2018). Nitric oxide inhalations in bronchiolitis: A pilot, randomized, double-blinded, controlled trial. *Pediatric Pulmonology*, *53*(1), 95-102. https://doi.org/10.1002/ppul.23905

Ventre, K., & Randolph, A. (2007). Ribavirin for respiratory syncytial virus infection of the lower respiratory tract in infants and young children. *Cochrane Database of Systematic Reviews*, *1*. https://doi.org/10.1002/14651858.CD000181.pub3